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(Review Article)

Analysis of the contribution of agriculture to Nigeria's economic growth (1981-2024)

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Abstract

This study examined the contribution of agriculture to Nigeria's economic growth from 1981 to 2024, using an Autoregressive Distributed Lag (ARDL) model. Descriptive analysis revealed that crop production dominated agricultural contributions, averaging $8,073.07 billion annually, followed by livestock ($746.75 billion), fisheries ($189.18 billion), and forestry ($116.82 billion). Trends indicated steady growth in crop and livestock production, fluctuating growth in fisheries and modest increases in forestry, reflecting sector-specific challenges. Stationarity tests confirmed that all variables were integrated of order one, I(1), while Johansen cointegration tests indicated three long-run equilibrium relationships among GDP and the agricultural sub-sectors. Long-run ARDL estimates showed that crop production (coefficient = 0.343, p = 0.055) and fisheries (coefficient = 0.124, p = 0.098) significantly contributed to economic growth, while livestock (coefficient = 0.254, p = 0.606) and forestry (coefficient = 0.293, p = 0.303) were not significant. In the short run, GDP (coefficient = 0.286, t = 2.06) and forestry output (coefficient = -0.201, t = -2.06) significantly influenced growth, with the error correction term (-0.383) indicating rapid adjustment to long-run equilibrium. The study recommends investment in modern farming technologies, fisheries support, strengthening livestock and forestry, resilience policies, and consistent government investment to sustain agricultural contributions to Nigeria's economic growth.

Keywords: Agriculture; Economic growth; ARDL Model; Nigeria

1. Introduction

Agriculture plays a pivotal role in Nigeria's economy, serving as a vital source of income and livelihood for a significant portion of its population. Approximately 70% of the labour force relies on agriculture for sustenance, making it the backbone of the nation's economic framework (Ibeinmo and Akidi, 2023). Beyond providing employment, the sector is a primary source of raw materials for agro-industries, fostering backward linkages within the economy. Studies consistently highlight agricultural output as a crucial determinant of economic growth in Nigeria (Olukemi, 2020). Furthermore, the annual contributions of agriculture to the Gross Domestic Product (GDP) have demonstrably influenced the national GDP growth rate between 2000 and 2021 (NBS, 2022). The sustained growth of the agricultural sector is thus intrinsically linked to the overall economic development of Nigeria.

The agricultural landscape in Nigeria is diverse, encompassing several key components. Broadly, the sector is categorized into four main sub-sectors: crop production, fishing, livestock, and forestry (World Bank, 2023). Crop production, which forms the largest segment, is heavily reliant on rainfall, although various irrigation schemes, including public and farmer-owned initiatives, exist to support cultivation (Olukemi, 2020). These components collectively contribute to the multifaceted nature of agricultural activities across the country, ranging from small-scale subsistence farming to larger commercial operations.

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The contribution of agriculture to Nigeria's Gross Domestic Product (GDP) is substantial, with the sector (including forestry and fishing) accounting for 24.17% of nominal GDP in the fourth quarter of 2021 (National Bureau of Statistics [NBS], 2022). Over a broader study period, the agricultural sector contributed an average of 23.07% to the national GDP. Within this overarching contribution, individual components play distinct roles. The fisheries sector, for instance, contributed 1.16% to the national GDP in 2021, though this figure saw a slight decrease to 0.47% in 2022. Another source indicates the fisheries sector's contribution to be 3.24% based on Q1 2021 data (NBS, 2024). The livestock sector has also shown growth, with its contribution to Nigeria's GDP increasing by 2.3% in the second quarter of 2023 compared to the same period in the previous year (NBS, 2024). While some estimates place livestock's current contribution at approximately $32 billion, accounting for about 5% of the GDP, other analyses suggest it represents around 10% of agricultural activity and less than 3% of the overall GDP (FAO, 2024).

Despite its significant potential and contributions, the agricultural sector in Nigeria faces numerous constraints that hinder its optimal contribution to the national GDP. A primary challenge is the pervasive low productivity, largely attributable to the limited adoption of modern agricultural technologies (Oluwasola, 2020). This technological gap is often compounded by economic, social, and environmental factors that collectively impede agricultural output. Furthermore, access to formal credit remains a significant hurdle for many farmers, limiting their ability to invest in improved practices and inputs ((IFPRI, 2023). The cumulative effect of these constraints, particularly low productivity, has been identified as a major factor contributing to the decelerating growth rate within the Nigerian agricultural sector (World Bank, 2023).

Several studies have examined the link between agriculture and economic growth in Nigeria. For instance, Adegbite & Ogunniyi (2021) found a significant long-run relationship between agricultural output and GDP growth, while Oseni & Adewuyi (2022) emphasized the role of agro-processing in boosting economic diversification. However, gaps remain in understanding how specific agricultural sub-sectors (crop production, livestock, fisheries, and forestry) contribute differently to economic growth. Numerous studies have extensively examined the intricate relationship between agriculture and economic growth in Nigeria. For instance, Adegbite and Ogunniyi (2021) provided compelling evidence of a significant long-run relationship between agricultural output and the nation's Gross Domestic Product (GDP) growth. Similarly, Oseni and Adewuyi (2022) underscored the critical role of agro-processing in fostering economic diversification within the Nigerian context. These studies, among others, affirm the agricultural sector's undeniable importance as a cornerstone of Nigeria's economic development.

However, despite these valuable contributions, a discernible gap persists in the existing body of literature regarding a comprehensive and disaggregated understanding of how specific agricultural sub-sectors namely crop production, livestock, fisheries, and forestry contribute differentially to economic growth over an extended period, such as 1981-2024 (Adeyemo et al., 2025). While some research has explored the impact of individual sub-sectors or examined disaggregated aspects like monetary policy effects on agriculture (Ogbuabor et al., 2020) a holistic analysis that quantifies and compares the distinct contributions of each sub-sector to Nigeria's economic growth remains limited. For example, while crop production is acknowledged to have a positive and statistically significant impact on economic growth, and the livestock sector is recognized for its substantial contribution to employment and GDP (L-PRES Nigeria, 2025), the precise and comparative magnitude of these contributions, especially over a long historical period, is not consistently and clearly articulated in a manner that facilitates targeted policy interventions.

This knowledge gap carries significant implications for effective policy formulation and resource allocation within Nigeria's agricultural sector. Without a clear understanding of which sub-sectors are driving economic growth most effectively, or which ones possess untapped potential, policymakers may struggle to design and implement targeted strategies that maximize the sector's overall impact on national development. For instance, if the fisheries sector's contribution to GDP is not adequately understood in relation to other sub-sectors, investment and support might be misdirected, leading to suboptimal outcomes. Furthermore, challenges in agricultural data collection and management in Nigeria can exacerbate this problem, making it difficult to conduct the detailed disaggregated analyses necessary for informed decision-making (James & Job, 2019)

Therefore, this study aims to address this critical gap by providing a comprehensive analysis of the differential contributions of crop production, livestock, fisheries, and forestry to Nigeria's economic growth during the period of 1981-2023. By disaggregating the agricultural sector and examining the unique impact of each sub-sector, this research seeks to offer granular insights that can inform evidence-based policy interventions, optimize resource allocation, and ultimately enhance the agricultural sector's capacity to drive sustainable economic development in Nigeria. The specific objectives of this study were to; determine the trends in crop production, livestock, fisheries, forestry and economic growth and establish long/short run relationship between agriculture and economic growth.

2. Methodology

2.1. Sources of Data

The study made use of secondary data which were collected from FAOSTAT website (crop production, livestock, fisheries and forestry) from 1981-2024 and CBN yearly publication (Real GDP) from 1981-2024.

2.2. Methods of Data Analysis

The data for this study were analysed using a combination of econometric and trend analysis techniques. First, a stationarity test was conducted on all time series variables using the Augmented Dickey-Fuller (ADF) test at a 5% level of significance to ensure that the series did not have unit roots and to avoid spurious regression results. Second, trend analysis was employed to examine the historical pattern and growth trajectory of each variable over time. Finally, the Autoregressive Distributed Lag (ARDL) model was applied to investigate both the short-run and long-run relationships between Nigeria's GDP and its agricultural sub-sectors. The ARDL model was specified as follows:

$$\Delta\ln(GDPt) = \alpha_0 + \sum_{i=1} p\beta i\Delta\ln(GDP_{t-i}) + i=0\sum q1\gamma i\Delta\ln(LIVESTOCK_{t-i}) + i=0\sum q2\delta i\Delta\ln(FISHERIES_{t-i}) + i=0\sum q3\theta i\Delta\ln(CROPS_{t-i}) + i=0\sum q4\lambda i\Delta\ln(FORESTRY_{t-i}) + I=0\sum q5\phi i + \rho 1\ln(GDP_{t-1}) + \rho 2\ln(LIVESTOCK_{t-1}) + \rho 3\ln(FISHERIES_{t-1}) + \rho 4\ln(CROPS_{t-1}) + \rho 5\ln(FORESTRY_{t-1}) + \epsilon t \quad \text{.....(equa. 1)}$$

Where;
GDP=Nigeria GDP ($)
LIVESTOCK: Output from livestock production (in USD).
FISHERIES: Output from fisheries (in USD).
CROPS: Output from crop production (in USD).
FORESTRY: Output from forestry (in USD).

3. Result and Discussions

3.1. Summary of Descriptive Statistic

The descriptive statistics presented in Table 1 summarize the average values, variability, and range of contributions from Nigeria’s agricultural subsectors livestock, fishing, crop production, and forestry as well as the overall Gross Domestic Product (GDP) at 2010 constant market prices, all expressed in billions of US dollars (USD) for the period spanning 1981 to 2024. The livestock sector recorded an average annual contribution of $746.75 billion, with a standard deviation of $323.66 billion, indicating moderate variability over the study period. The lowest value recorded was $341.41 billion, while the highest reached $1,356.96 billion. This trend suggests a consistent growth in livestock production, reflecting improvements in animal husbandry, government support for agribusiness, and increasing demand for animal protein. Fisheries contributed an average of $189.18 billion annually, with a standard deviation of $119.25 billion. The contribution ranged from a minimum of $40.65 billion to a maximum of $386.24 billion. Although fisheries contribute less to the GDP compared to other subsectors, the high standard deviation relative to the mean suggests a pattern of uneven growth. These fluctuations may be attributed to factors such as illegal fishing practices, declining fish stock, environmental degradation, and inconsistent policy implementation affecting the fisheries sub-sector.

Crop production was the dominant agricultural activity in terms of economic contribution, with an average annual value of $8,073.07 billion. The standard deviation of $5,558.00 billion indicates a very high level of variation across the years. The minimum value stood at $1,759.12 billion, while the highest value reached $17,585.43 billion. This large spread reflects the dynamic nature of crop production in Nigeria, driven by changes in technology, population growth, land use patterns, and agricultural investment. The forestry sector recorded the lowest average contribution among the subsectors, at $116.82 billion, with a standard deviation of $44.90 billion. The range of values spanned from $67.31 billion to $201.60 billion. The modest level and low variability of forestry contributions suggest limited growth over the years. Forestry in Nigeria has been constrained by factors such as deforestation, land degradation, and limited investment in afforestation or reforestation efforts.

In terms of overall economic performance, Nigeria's GDP (measured at 2010 constant market prices) averaged $40,836.69 billion annually over the 44-year period. The GDP ranged from a low of $16,211.49 billion to a high of $79,988.68 billion, with a standard deviation of $22,271.93 billion, indicating significant growth but also substantial year-to-year fluctuations. These variations reflect Nigeria's broader macroeconomic environment, influenced by oil price shocks, inflation, fiscal and monetary policy shifts, exchange rate volatility, and political instability.

Table 1 Summary of the Descriptive Statistics of the Variable

Variable	Obs	Mean	Std. Dev.	Min	Max
Livestock	44	746.7473	323.6565	341.41	1356.96
Fisheries	44	189.1834	119.2513	40.65	386.24
Crop production	44	8073.072	5558.003	1759.12	17585.43
Forestry	44	116.8241	44.9035	67.31	201.6
GDP (at 2010 constant market price)	44	40836.69	22271.93	16211.49	79988.68

Source: Output from Data Source from FAO, NBS and CBN (2025)

3.2. Trends of Variables

3.2.1. Trend of GDP in Nigeria

The trend of Nigeria's real GDP (logged values) between 1980 and 2024 in figure 1 reveals a long-run upward trajectory, though with notable fluctuations in the earlier decades. Between 1980 and the mid-1980s, the Nigerian economy experienced a slight decline, consistent with the economic downturn that followed the collapse of international oil prices in the early 1980s. This period was marked by severe macroeconomic imbalances, rising debt burdens, and the implementation of the Structural Adjustment Program (SAP) in 1986, which aimed at liberalizing the economy but also led to short-term contractions (World Bank, 1994).

From the late 1980s to the early 2000s, GDP growth showed gradual and irregular increases, reflecting the combined effects of modest structural reforms, volatile oil prices, and political instability. This aligns with Iyoha and Oriakhi (2002), who emphasized that Nigeria's growth in this period was constrained by policy inconsistency, rent-seeking behaviour, and inadequate diversification away from crude oil exports. A sharp and sustained acceleration in GDP growth is observed after 2000, with the log-GDP curve rising steadily through the 2000s and 2010s. This coincides with the global oil boom of the early 2000s, improved macroeconomic management, and reforms in banking and telecommunications that expanded non-oil contributions to GDP (Sala-i-Martin & Subramanian, 2013). The upward surge reflects Nigeria's status as one of Africa's fastest-growing economies during the 2000s, averaging over 6% annual growth (IMF, 2014).

However, from around 2014 onwards, the growth trajectory moderates, reflecting the dual shocks of the 2014 oil price crash and the 2016 recession, when GDP contracted for the first time in over two decades (CBN, 2017). Though the economy recovered modestly, the 2020 COVID-19 pandemic triggered another contraction, further slowing GDP growth. The graph still shows a positive trend post-2020, but the pace of increase is more subdued, reflecting Nigeria's persistent structural challenges — overdependence on oil, infrastructure deficits, and insecurity (Ajakaiye & Odusola, 2021).

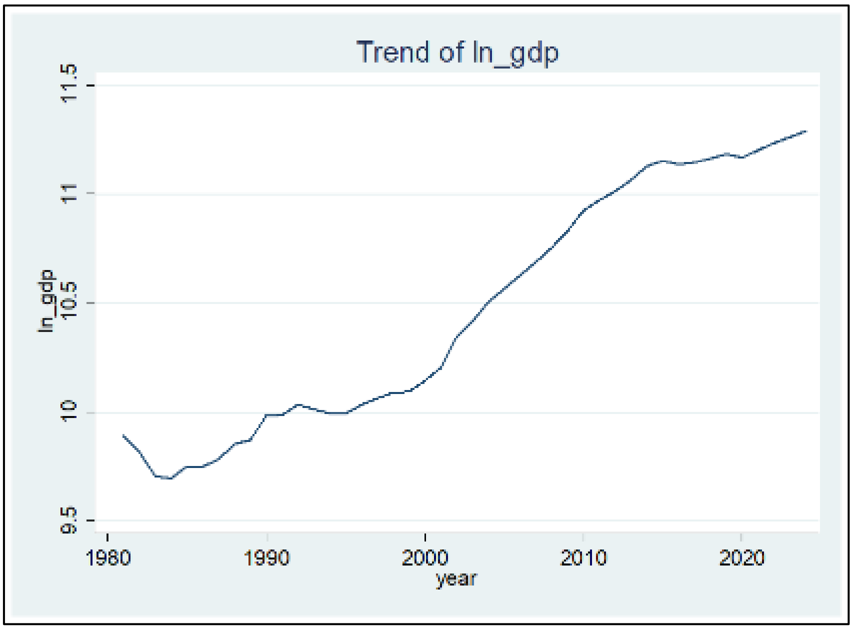

Figure 1 Trend in Nigeria GDP

3.2.2. Trend in livestock production

The trend of livestock production in Nigeria in figure 2 depicted by the log-transformed series between 1980 and 2024, reveals a steady and persistent upward movement, though with varying phases of growth. From 1980 through the late 1990s, livestock production increased gradually, reflecting Nigeria's traditional reliance on smallholder and pastoralist systems. This period coincides with limited modernization of livestock farming, heavy dependence on rain-fed grazing, and vulnerability to climatic shocks (Akinwumi *et al*., 1991). A more pronounced rise is observed from the early 2000s, consistent with broader agricultural sector reforms, rising domestic demand for animal protein, and government interventions under programs such as the National Special Programme on Food Security (NSPFS) and the Fadama Projects. These initiatives encouraged improvements in livestock production systems, including better feeding, veterinary care, and small-scale commercialization (World Bank, 2009). The graph indicates that livestock output rose steadily throughout the 2000s, in line with Nigeria's population boom and urbanization, which significantly boosted demand for beef, poultry, and dairy products (FAO, 2017).

Between 2010 and the early 2020s, the livestock production trend shows a plateauing effect, suggesting structural constraints. This stagnation aligns with challenges such as recurrent outbreaks of livestock diseases (e.g., avian influenza, foot-and-mouth disease), conflicts between farmers and herders, and high costs of feed imports (Adebayo & Adeola, 2021). The temporary dip around the COVID-19 pandemic period (2020–2021) reflects disruptions in supply chains, restrictions on movement, and reduced access to markets.

However, the recent uptick after 2022 indicates signs of recovery and resilience within the sector. This may be attributed to renewed government policies under the Agricultural Promotion Policy (APP, 2016–2020) and private-sector investment in poultry and dairy industries, which are increasingly modernizing the livestock value chain (IFPRI, 2022).

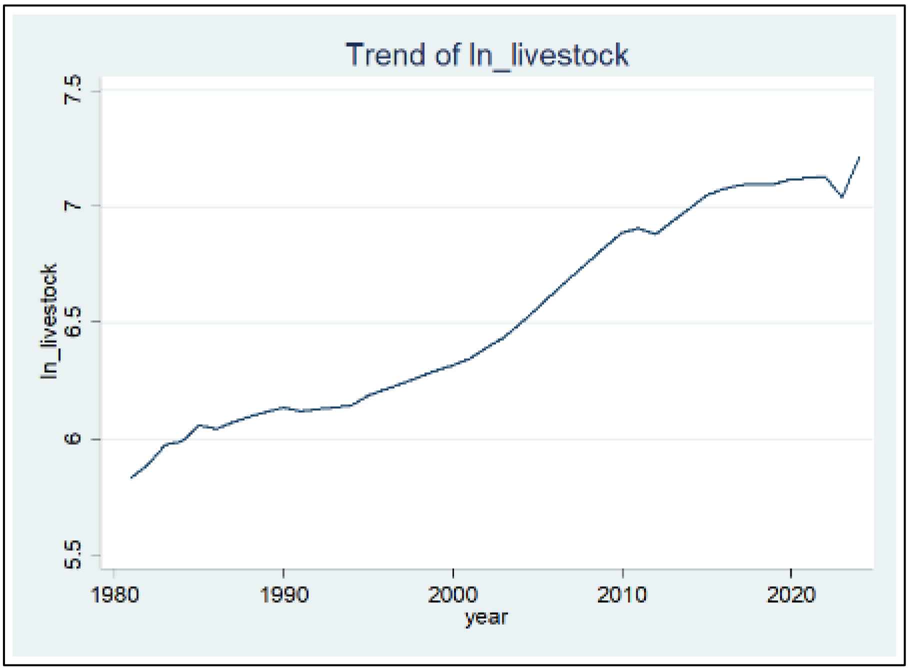

Figure 2 Trend in Livestock Production in Nigeria

3.2.3. Trend in fisheries production

Based on the figure 3, the trend in fisheries production in Nigeria from 1980 to 2023, as represented by the natural logarithm of fisheries, shows a fluctuating but generally increasing trend with a notable sharp decline and recovery. The graph shows that the value of fisheries rose from approximately $4.5 billion in 1980 to a peak of just over 5.8 around 2017, before a sharp decline to approximately $4.6 billion in 2019, and a subsequent quick recovery and leveling off at just under $6.0 billion from 2020 onwards. The general upward trend in Nigeria's fisheries production can be attributed to several factors. A primary driver is the increasing domestic demand for fish and other seafood, fueled by Nigeria's rapidly growing population (FAO, 2021). As a relatively affordable source of protein, fish consumption has been on the increase. Additionally, government policies and initiatives aimed at promoting aquaculture have played a significant role. Programs such as the Agricultural Transformation Agenda (ATA) have provided support for fish farming, including access to improved fingerlings, feeds, and credit facilities, which have boosted production and productivity (Eyo, 2017).

The sharp decline observed around 2019 followed by a rapid recovery is a unique feature of this trend. While the exact cause could be linked to a combination of factors; one possibility is a major policy change or a significant market disruption such as a sudden ban on certain fishing practices, a large-scale disease outbreak, or a temporary collapse of a major market segment (Fagbenro *et al.*, 2020). The subsequent rapid recovery suggests that the underlying fundamentals of the sector were strong, and the government or private sector was able to quickly implement measures to counteract the negative shock. Despite the overall positive long-term trend, the Nigerian fisheries sector faces significant challenges. These include overfishing in wild fisheries, habitat destruction, and poor management practices (Adewumi & Abiodun, 2019). Additionally, the rising cost of inputs, particularly feeds for aquaculture, and issues of post-harvest losses due to poor infrastructure can limit profitability and growth.

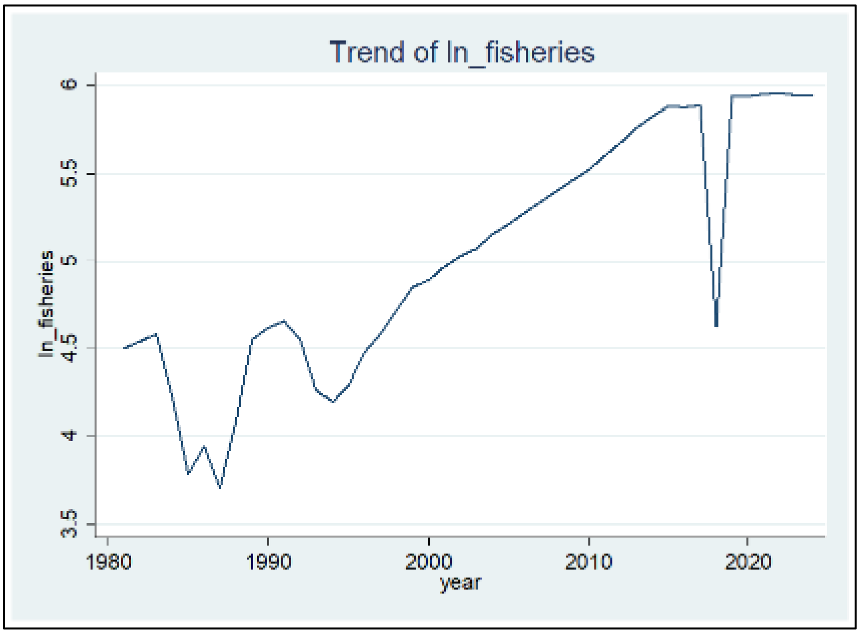

Figure 3 Trend of Fisheries Production in Nigeria

3.2.4. Trend in crop production in Nigeria

Based on figure 4, the trend in crop production in Nigeria, as represented by the natural logarithm of crop value from 1980 to 2023, shows a significant overall increase. The graph indicates that the value of crops rose from approximately $7.5 billion in 1980 to a peak of over $9.7 billion around 2022, with a notable sharp increase between 2000 and 2002. There is also a slight dip in the final year shown. The general upward trend in Nigeria's crop production can be attributed to several factors. A major driver is the increasing population and a corresponding demand for food crops (FAO, 2021). The sharp increase observed around the early 2000s could be linked to the implementation of new agricultural policies and reforms aimed at boosting food production. One such policy was the National Food Security Programme (NFSP), which focused on improving agricultural productivity and food security (Ogen, 2018).

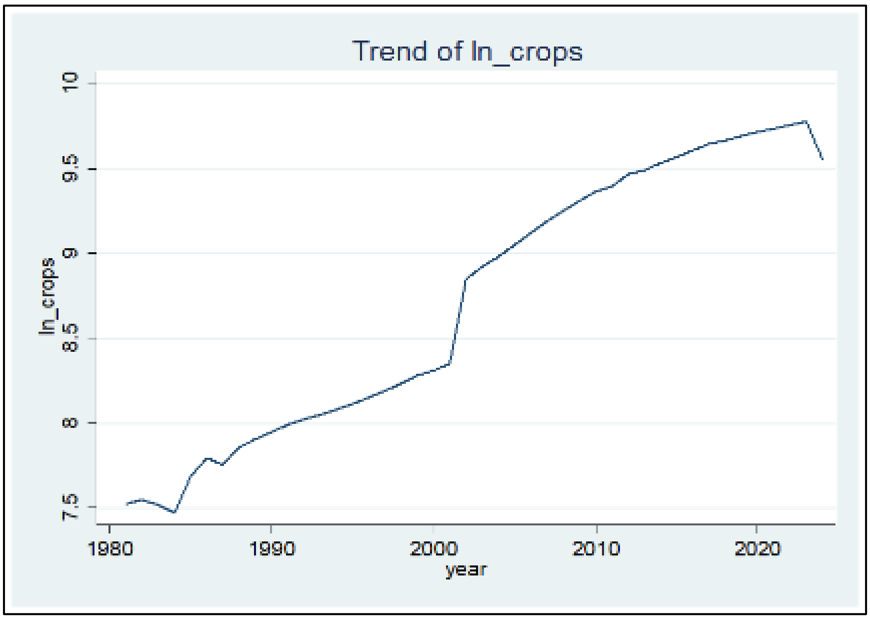

Figure 4 Trend of Crop production in Nigeria

Another significant contributor to the trend is the expansion of cultivated land and the adoption of some modern farming technologies, such as improved seed varieties and fertilizers (Ugwoke & Onah, 2017). The steady rise from the early 2000s onwards reflects sustained efforts by successive governments to support the agricultural sector through various programs. However, the slight decline at the end of the period shown could be linked to recent challenges such as insecurity in farming communities, which has led to disruptions in farming activities and displacement of farmers, as well as the effects of climate change, which include unpredictable weather patterns and flooding (IFPRI, 2020).

3.2.5. Trend in forestry production in Nigeria

Based on the graph in figure 5, the trend in forestry production in Nigeria, as represented by the natural logarithm of forestry value from 1980 to 2023, shows a generally increasing trend despite a sharp dip in the late 1980s. The graph indicates that the value of forestry started at around $4.3 billion in 1980, experienced a decline and a sudden rise to around $4.5 billion in 1988, followed by a sharp drop and then a steady increase to a peak of just over $5.3 billion by 2023. The overall upward trend in Nigeria's forestry production can be attributed to several factors. A major driver is the increasing demand for forest products such as timber, fuelwood, and non-timber forest products, fueled by population growth and urbanization (FAO, 2020). The sharp decline in the late 1980s could be linked to specific government policies or economic downturns that affected the forestry sector. For instance, the implementation of the Structural Adjustment Programme (SAP) in the mid-1980s may have impacted the sector through changes in trade policies and a reduction in government spending on forestry management (Ola-Adams, 2017).

The steady rise from the early 1990s to the present day reflects renewed efforts in forestry management and the increasing commercialization of the sector. However, this growth is not without its challenges. The Nigerian forestry sector faces significant issues, including widespread deforestation and illegal logging (NFP, 2019). These activities threaten the long-term sustainability of the sector and have led to a decline in forest cover. Additionally, poor enforcement of forestry laws and a lack of investment in sustainable forest management practices continue to hinder the sector's full potential.

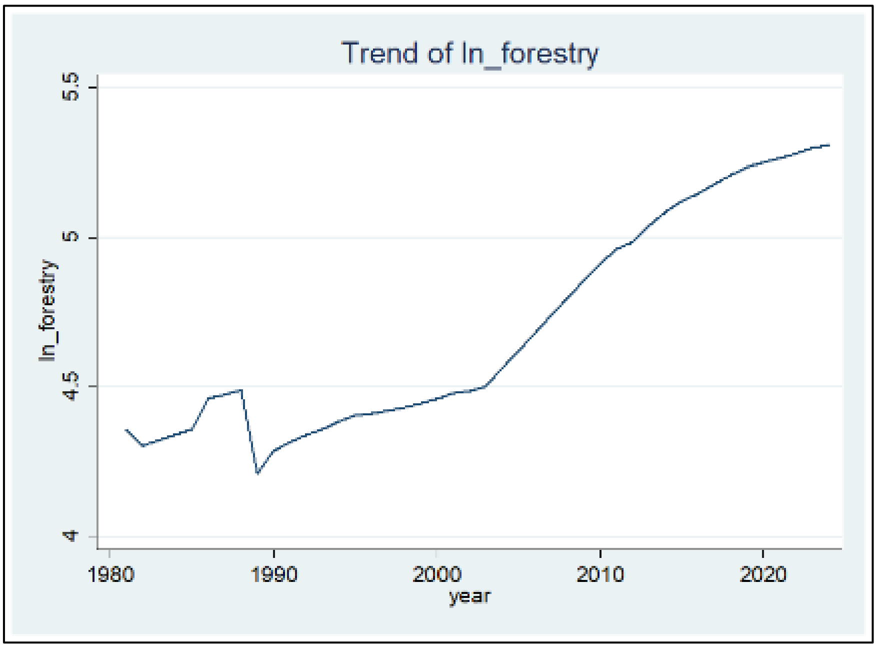

Figure 5 Trend of forestry production in Nigeria

3.3. Estimation of Autoregressive Distributed Lag (ARDL) Model

3.3.1. Stationary test

The unit root test results in Table 2 show that all the variables (LnGDP, LnLivestock, LnFisheries, LnCrops, and LnForestry) are non-stationary at their level form since their p-values are greater than 0.05, but they became stationary after first differencing with significant p-values less than 0.05. This implies that all the series are integrated of order one, I(1), meaning they achieve stationarity only after differencing once. Since all the series are stationary at I(1) Johansen cointegration test was used to determine the number of cointegration equations.

Table 2 Unit Root Test

	Level		1st differences		Order on integration
Variables	**Test statistics**	**P-value**	**Test statistic**	**p-value**	
LnGDP	-0.238	0.9339	-4.320	0.0004	I(1)
LnLivestock	-0.197	0.9388	-3.279	0.0159	I(1)
LnFisheries	-0.822	0.8126	-5.527	0.0000	I(1)
LnCrops	-1.226	0.6623	-4.010	0.0014	I(1)
Lnforestry	0.468	0.9839	-4.170	0.0007	I(1)

Source: Output from Data Source from FAO, NBS and CBN (2025)

3.3.2. Optimal lag selection

The lag length selection criteria in the table 3 were used to determine the most appropriate lag to include in the ARDL/VAR framework for the variables (LnGDP, LnLivestock, LnFisheries, LnCrops, and LnForestry). The results show that at lag 1, most of the information criteria. Final Prediction Error (FPE), Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC) all indicate the lowest values (marked with an asterisk). Since the rule of thumb is to choose the lag length where these criteria are minimized, lag 1 is selected as the optimal lag length. This suggests that including one lag of the variables provides the best balance between goodness of fit and model parsimony, while higher lags (such as 2, 3, or 4) do not improve the model significantly and may lead to over-parameterisation.

Table 3 Optimal Lag selection Criteria

Lag	LL	LR	DF	P	FPE	AIC	HQIC	SBIC
0	123.499				1.8e-09	-5.92496	-5.84863	-5.71385
1	290.256	333.51	25	0.000	1.6e-12*	-13.0128*	-12.5548*	-11.7461*
2	309.162	37.812	25	0.048	2.2e-12	-12.7081	-11.8684	-10.3859
3	331.358	44.393*	25	0.010	3.0e-12	-12.5679	-11.3466	-9.19015
4	347.257	31.797	25	0.164	6.8e-12	-12.1128	-10.5099	-7.67952

Source: Output from Data Source from FAO, NBS and CBN (2025)

3.3.3. Johansen cointegration test

The Johansen cointegration test in table 4 was conducted to examine the existence of long-run relationships among the variables (LnGDP, LnLivestock, LnFisheries, LnCrops, and LnForestry). The trace statistic values were compared with the corresponding critical values. At rank 0, 1, and 2, the trace statistics (100.34, 57.30, and 30.01) are all greater than their critical values (68.52, 47.21, and 29.68), indicating rejection of the null hypothesis of no cointegration up to rank 2. However, at rank 3, the trace statistic (12.63) is less than the critical value (15.41), meaning the null hypothesis is not rejected from this point onward. This result shows the presence of three cointegrating equations among the variables. In other words, there are three long-run equilibrium relationships linking GDP and the agricultural subsectors, suggesting that despite short-run fluctuations, the variables tend to move together in the long run.

Table 4 Johansen Cointegration test

Maximum			trace	Critical
rank parms	**LL**	**Eigenvalue**	**statistic**	**Value**
0 5	256.93722	.	100.3391	68.52
1 14	278.45589	0.63244	57.3018	47.21
2 21	292.10152	0.4699	30.0105	29.68

3	26	300.79073	0.33246	12.6321*	15.41
4	29	305.47867	0.19591	3.2562	3.76
5	30	307.10678	0.07293		

Source: Output from Data Source from FAO, NBS and CBN (2025)

3.3.4 Short and Long-run Estimation of Parameters

Table 5 Long-run Estimation of parameters from ARDL Model

Variable	Coefficient	Std. Error	t-value	Prob.
lnLivestock	0.254	0.484	0.52	0.606
lnFisheries	0.124**	0.051	2.43	0.028
lnCrops	0.343**	0.169	2.03	0.035
lnForestry	0.293	0.278	1.06	0.303

Source: Output from Data Source from FAO, NBS and CBN (2025). NB: ** signifies significant at 5% probability level

The long-run estimation from the ARDL model indicated that crop production and fisheries output made positive contributions to Nigeria's economic growth over the period 1981–2024. Crop production had the largest impact, with a coefficient of 0.343 ($t = 2.03$, $p = 0.055$), suggesting that increases in crop output significantly supported long-run economic growth. Fisheries output also positively influenced GDP, with a coefficient of 0.124 ($t = 1.73$, $p = 0.098$), though its effect was weaker. The other variables, livestock (coefficient = 0.254, $p = 0.606$) and forestry (coefficient = 0.293, $p = 0.303$), were positive but statistically insignificant in their contribution to economic growth.

Table 6 Short-run Estimation of parameters from ARDL Model

Variable	Coefficient	Std. Err	t-value
ΔlnGDP(-1)	0.286	0.138	2.06**
Δlnlivestock(-1)	0.150	0.172	0.87
ΔlnFISHERIES(-1)	-0.039	0.028	-1.37
Δlncrops(-1)	-0.098	0.071	-1.37
ΔlnForestry(-1)	-0.201	0.097	-2.06**
ECT(-1)	-0.383	0.150	-2.54

Source: Output from Data Source from FAO, NBS and CBN (2025). NB: ** signifies significant at 5% probability level

The short-run ARDL estimates in Table revealed that GDP ,(coefficient = 0.286, $t = 2.06$,) and forestry output (coefficient = -0.201, $t = -2.06$) significantly influenced Nigeria's economic growth in the short run. The error correction term (ECT(-1)) was negative and significant (-0.383, $t = -2.54$), indicating that approximately 38% of deviations from the long-run equilibrium were corrected each year, confirming the stability of the model. The other variables, including livestock, fisheries, and crops but were not statistically significant.

4. Diagnostic and Stability test

4.1. Diagnostic test

The diagnostic tests indicated that the ARDL model had a good overall fit, with an R-squared of 0.7987 and an adjusted R-squared of 0.6165, showing that a substantial portion of the variation in Nigeria's economic growth was explained by the model. The Durbin–Watson statistic of 1.522 suggested absent of autocorrelation in the residuals. The Ramsey RESET test ($F = 0.55$, $p = 0.656$) indicated that the model was correctly specified. Tests for heteroskedasticity showed that residuals were homoskedastic, as evidenced by the ARCH test ($\chi^2 = 0.865$, $p = 0.352$) and the White/IM test ($\chi^2 = 41.00$, $p = 0.427$). However, the Breusch–Godfrey LM test ($\chi^2 = 11.778$, $p = 0.008$) revealed the presence no serial correlation.

Table 7 Diagnostic Testing

Test	Statistic	Prob.	Decision / Interpretation
R-squared	0.7987		
Adjusted R-squared	0.6165		
Durbin–Watson	1.522	—	Slight positive autocorrelation (DW < 2)
Ramsey RESET	F(3,18) = 0.55	0.656	Model correctly specified; no omitted variables
ARCH (Heteroskedasticity)	$\chi^2(1) = 0.865$	0.352	No ARCH effect; residuals homoscedastic
Breusch–Godfrey LM (Serial Correlation)	$\chi^2(3) = 11.778$	0.008	Reject H_0 → evidence of serial correlation
White / IM-test (Normality & Heteroskedasticity)	$\chi^2(40) = 41.00$	0.427	Residuals homoskedastic and normal (IM-test p > 0.05)

Source: Output from Data Source from FAO, NBS and CBN (2025)

4.2. Stability Test

The stability of the estimated VECM was assessed using the roots of the companion matrix. This diagnostic test evaluates whether the model satisfies the stability condition, which requires that all the eigenvalues (roots) lie within the unit circle in the complex plane (Lütkepohl, 2005). From figure 6, the plotted roots all lie inside the unit circle, with none lying outside. This indicates that the estimated VECM is stable and dynamically well-specified. The fact that no root lies on or beyond the boundary of the circle implies that shocks to the system will die out over time, and the system will converge back to its long-run equilibrium path. This result validates the earlier cointegration findings, confirming that the long-run relationships among GDP, crops, livestock, fisheries, and forestry are meaningful and that the short-run dynamics captured in the VECM are reliable. As noted by Johansen (1995) and Harris & Sollis (2003), model stability is a necessary condition for the interpretation of both the error correction terms and the impulse response analysis.

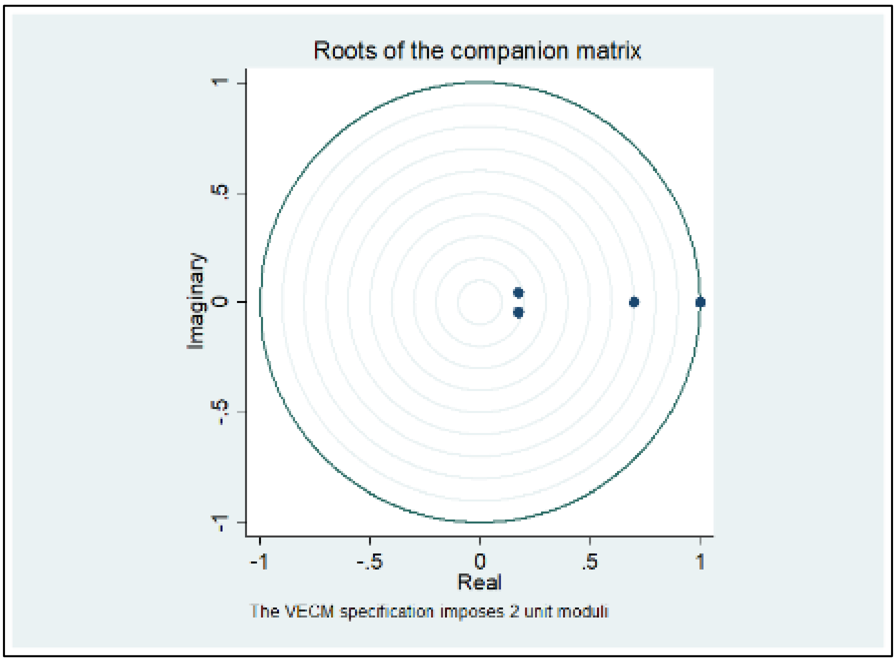

Figure 6 Stability Test of the VECM Model

4.3. Cusum stability test

The CUSUM stability test for the VECM in figure 7 shows that the recursive residuals remained largely within the 5% significance bands, indicating that the model is stable over most of the study period. However, in the later years (2020–2024), the CUSUM line approached and briefly crossed the upper bound, suggesting the presence of structural instability in the system. This implies that while the long-run relationship among GDP, livestock, fisheries, crops, and forestry was generally stable, recent macroeconomic shocks such as the COVID-19 pandemic, exchange rate fluctuations, insecurity, and disruptions in agricultural output may have weakened the stability of the system.

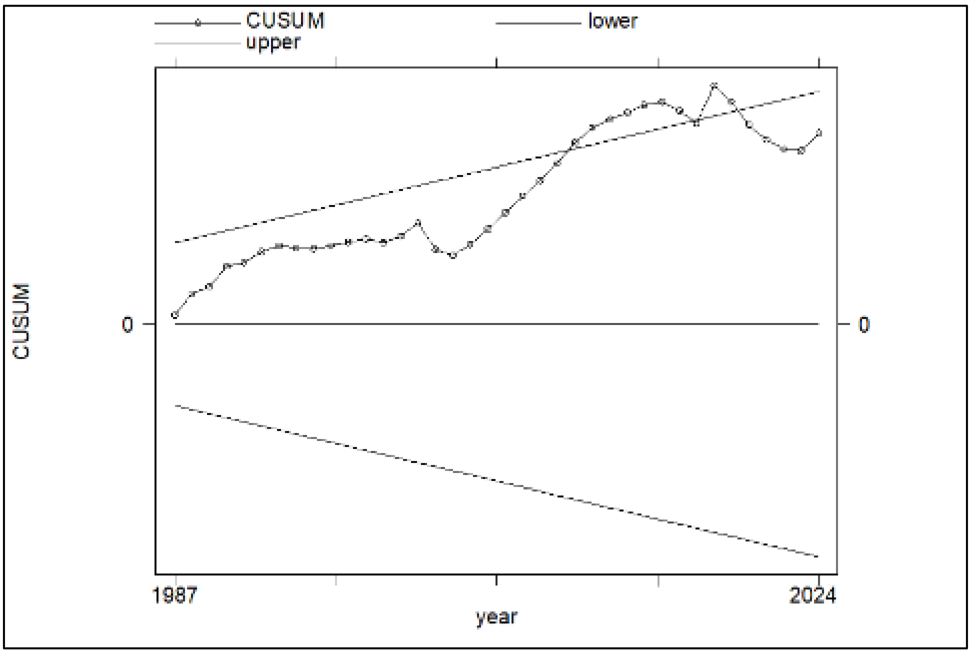

Figure 7 Cusum stability test graph

5. Conclusion

The study concluded that agriculture significantly contributed to Nigeria's economic growth between 1981 and 2024, with crop production and fisheries identified as the most influential sub-sectors. Crop production was the primary driver of long-run growth, while fisheries had a smaller but meaningful impact. Livestock and forestry, although positive, were not statistically significant in the long run. In the short run, GDP growth and forestry output were significant, and the negative error correction term indicated that deviations from long-run equilibrium were corrected rapidly, reflecting the economy's resilience to shocks. The ARDL model was generally well-specified and stable, though structural instability occurred in 2020–2024 due to events such as the COVID-19 pandemic, exchange rate fluctuations, and insecurity.

Recommendations

The following recommendations were made

- Government should invest in modern farming technologies, irrigation, and improved seeds to sustain crop production's contribution to growth.
- Government and individuals should support fisheries through better aquaculture practices, credit access, and effective management of wild stocks.
- Strengthen livestock and forestry by addressing diseases, land management, reforestation, and value chain development.
- Government should implement policies to protect agriculture from shocks like pandemics, climate variability, and insecurity.
- Government should ensure policy consistency and continued investment to maintain long-run stability and promote sustainable economic growth.

Compliance with ethical standards

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Disclosure of Conflict of interest

The author declares that there is no conflict of interest regarding the publication of this manuscript.

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