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Assessment of the Impact of Disaggregated Agricultural Subsectors' Output on Nigeria's Economic Growth

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Abstract

Agricultural sector had been the major contributor to GDP in Nigeria before the oil boom but was relegated to the background during the oil boom. The sector is striving hard to contribute the needed output despite efforts of government at both the federal and state levels. The contribution of the subsectors on the GDP keep declining and this has led to insufficient food provision, raw materials production and has also necessitated the country's heavy reliance on importation of food and other agricultural products. To this end, this paper investigates the impact of disaggregated agricultural subsectors' output on Nigeria's economic growth over the period of 1981-2022. The study uses Auto Regressive Distributed Lagged (ARDL) model to analyze the data. The findings of the paper indicate that forest output, livestock output and crop output have long-run and significant impacts on GDP while the fish output exerts insignificant but positive impact on GDP. Crop output exerts significant positive impact on GDP in the short run. The study recommends that land tenure reforms should be properly implemented to make more land available and accessible to farmers for agricultural production in all the subsectors, agricultural inputs should also be provided by government and NGOs at subsidized rates. These will improve agricultural value chain thereby improve sector's contributions to the Nigerian economy.

Keywords: Disaggregated, Subsectors, Economic growth, Agricultural output
JEL Classification: P32, Q1, Q18, Q22, Q23.

Contribution to/Originality Knowledge

1.0 Introduction

Agriculture is the oldest form of economic activity known to man as well as the mainstay of the Nigerian economy (Ekundare, 1973; Falola & Heaton, 2008). At the time Nigeria got her independence from the British colonial rule on 1st October, 1960, agriculture was at its peak, and constituted about 63.4% of gross national product (GNP) (Falola & Heaton, 2008). The sector is the major source of employment to about 70% of Nigeria's labour force in 1970 (Ekundare, 1973). Agriculture was the leading sector in the Nigerian economy throughout pre – independence and even post – independence, before the discovery of crude oil in commercial quantity in Nigeria. The country is blessed with a vast area of arable land on which almost all forms of tropical crops can be grown. In Nigeria, agricultural production consists of local crops for domestic consumption and a number of cash crops for export (Ekundare, 1973). However, the sector is largely dominated by small-scale farmers constituting 60 -70% who use obsolete

tools in fragmented land for agricultural production (Akpan & Udom, 2018). The utilization of such crude tools cut across all the subsectors of agriculture.

Agriculture is made up of four subsectors namely; crop, livestock, forestry and fishery. The forestry subsector's output is gotten from the produce from the various forests in the country these include: timber where logs, pulp veneer and other products are gotten from, medicinal herbs, charcoal and biomass, animal skins, and meat from wild animals among others. Adeniyi (2016), in his study explains the importance of the forestry sector to the country's economy as it ranks among the highest revenue and employment generating sectors and also provides a resource base for many forest industries. Timber has been exported from the pre - independence period and has yielded high foreign earnings for Nigeria. Idumah et al. (2019) posit that the contribution of forestry sector is being undermined. They explained these submissions in terms of climate change control and mitigation, pollution abatement, wild life maintenance and other intangible services of the forests which are rarely captured in the calculation of Gross Domestic Products (GDP). This subsector has the capacity to contribute immensely to GDP if well managed but the over exploitation of forest resources, decline in exports of forest products and insecurity being experienced has led to less activities in the forests which may have resulted in the subsector's low contribution to the GDP of the country.

The livestock subsector is an important component of the agricultural sector which contributes to the growth and development of any nation (Oloyede & Ojiako, 2015). This subsector provides meat, dairy products, hides and skin, eggs, farm energy, manure, biogas for industries and households in the country. Livestock production ensures food security as it provides dung/animal droppings which are either processed into biogas or are used as manure or organic fertilizer in the face of the rising cost of chemical fertilizer. The fisheries subsector deals with the rearing and domestication of fish referred to as aquaculture or fish farming which is done in closed water bodies under controlled environmental condition (Ejiola & Yinka, 2012) and fishing which is often carried out in open water bodies such as rivers, streams and seas. Nigeria has more than 14 million hectares of reservoirs, lakes, ponds, and major rivers that are capable of producing over 980,000 metric tonnes of fish annually (Oladimeji et al., 2013). Oladimeji et al. (2016) posit that the country has rich vegetation and abundant water resource capable of supporting a large population of livestock and fishes, with about 214 billion m3 of surface water and 87 km3 of ground water both of which can be used partly for aquaculture and artisanal fishing (Oladimeji et al., 2014). Therefore, the sector has the potential to produce the needed quantity of fish in Nigeria if properly harnessed.

The crop subsector deals with the production of crops which includes processing, marketing and distribution. Crop production accounts for 87.6% output while livestock, fishery and forestry accounts for 8.1%, 3.2%, and 1.1% output respectively (NBS, 2020). Most of the crops produced by subsistence farmers are the cereal crops which provide food for humans, raw materials for production in industries and forages for feeding animals. However, due to high demand for food due to rise in population and need for raw materials, Nigeria has become a net importer of food (cereals) which amounted to 5.6 million tonnes in 2019 to keep up to demand (International Grains Council, 2020). The dominant activities in the crop sector may

tend to mislead one in believing that food security is ensured in the country but on the other hand the high demand, insecurity and the importation of some of these crops and also the exportation of the cash crops in semi-finished form are loopholes which in turn affects the output of the sector.

Given the potentials and the challenges faced in the four subsectors of agriculture, the Nigeria's agricultural sector has been bedevilled by various challenges ranging from underfunding, subsistence agricultural practices, inadequate mechanized farming, and security challenges as a result of farmers-herders clashes, banditry, and kidnap for ransom which further impede their contribution to the national economy (Udemezue & Kanu, 2019; Gavrilova, 2021). In view of the above, various government at all levels have adopted series of policies and/or programmes such as; National Accelerated Food Production Programme (NAFPP) 1972, Operation Feed the Nation (OFN) 1976, Green Revolution Programme (GR) 1980, River Basin Development Authority (RBDA) 1976, Agricultural Development Programmes (ADPs) 1976, Directorate of Food, Road and Rural Infrastructure (DFRRI) 1986, and the Agriculture Promotion Policy, 2016 - 2020 to salvage the situation in order to guarantee food security and improve the economic fortune of the country but they have failed in most cases in achieving their desired objectives (Daneji, 2011; Federal Ministry of Agriculture and Rural Development Policy and Strategy Document, 2016).

More so, researchers have conducted series of research to better understand the impact of the sector on the Nigerian economic growth but with conflicting conclusions (Akadiri et al., 2022; Ceesay & Fanneh, 2022; Tahir, 2022; Matandare et al., 2021; Oyetade & Adeyeye, 2021; Nyamekye, et al. (2021)). Their conflicting views on the impact of agriculture on the Nigerian economic growth may be as result of the dichotomy in their respective methodology or data usage. To empirically investigate the impact of disaggregated agricultural subsectors' output on Nigeria's economic growth between 1981 and 2022, this study employs the ARDL model for analysis and builds upon existing empirical and theoretical literature, and thereby contributes to existing research on the impact of agriculture on the Nigerian economy. The paper is structured into five sections: section one is the introduction, section two gives the literature review, section three is the methodology, section four presents the discussion of findings while section five gives the conclusion and policy recommendations.

2.0 Literature Review

2.1 Conceptual Issues

Agriculture: Agriculture as defined by Iwena (2015) is the practice whereby farmers cultivate land for the purpose of producing crops and the rearing of animals in order to provide food for man and raw materials for industries. Agriculture in this study includes; food production, raw material provision to serve as inputs or output in the various subsectors (crop, livestock, forestry and fisheries) in Nigeria. The importance of agriculture to the country includes; food and raw materials provision for agro-based industries, income generation for the population engaged in the various sectors among others (Mouayadi et al., 2020).

Crop Production: Crop production involves the cultivation of different crops which can be used as food and raw materials for agro-allied industries. These crops may be food crops or cash crops (Ellah & Emeh, 2020). Crops produced other than for food or for sale can also provide raw materials for industries to produce finished products.

Livestock Production: Ellah and Emeh (2020) defined livestock production as the rearing of domestic animals for consumption which include: goat, ram sheep. Livestock production involves the rearing of domestic animals either for sale or for consumption. Such animals include: goat, sheep, cattle, poultry etc. The subsector also produce fur, leather, wool, milk, meat among others from the animals reared.

Fisheries/ Fish Farming: Fishery is a study that deals with breeding or rearing of fish and other aquatic animals. Fishing on the other hand is the catching of fish from the river or other water bodies. It is an occupation for many people especially in the developing countries such as Nigeria. Fish farming is the act of rearing or breeding fish for domestic consumption and commercial purposes. Fish farming also deals with the principles and practice of rearing selected species of fishes in a confined body of water popularly called fish pond which can be managed under controlled conditions.

Economic Growth: Economic growth is the increase in the monetary value of goods and services produced in a country over a defined period of time usually a fiscal year (Ewetan et al., 2017). Economic growth according to (Mladen, 2015) means changes in material production during a relatively short period, say one year. Economic growth, on the other hand also refers to an increase in the goods and services produced by an economy over a particular period of time. It is measured as a percentage increase in real gross domestic product which is (GDP) adjusted to inflation. GDP is the market value for all the final goods and services produced in an economy.

2.2 Theoretical Review

This study hinges on input-output model which was propounded by Leontief Wassily in 1936 and was adapted for the purpose of regional analysis by Walter Isard in the 1950s as cited by Darla and James, 2005. In 1984 Collett and Gardiner developed the theory as a way to treat the interaction of input and output within a system. The input–output theory is an adaptation of the neoclassical theory of general equilibrium to the empirical study of quantitative interdependence between interrelated economic activities. It was originally developed to analyze and measure the connections between the various producing and consuming sectors within a national economy. The theory explains the inter-relationship that exist between industries in an economy as input in one industry is regarded as output of another industry. The development of the theory therefore focuses towards evaluating and measuring the relationship that exist between major sectors of an economy (Tobechi, 2018). The theory propose that all sectors of an economy are mutually dependent on one another as the output produced from one sector makes up the input of another sector in the same economy as such, the four subsectors of the agricultural sector is viewed as the different industries existing in the country who mutually depend on one another in order to boost the production of produce and products in

the sectors. This mutual dependency will in turn boost production in the respective sectors and in the end contribute to the GDP of the economy. .

2.3 Empirical Review

Suren and Cecil (2021) examine the economic impact of cattle sector in Canada using descriptive statistics and analyzing data obtained from the regional province using input-output model. The findings reveal that cattle sector makes huge contribution to both the regional and the national economy in Canada but not without the help of other sectors. This implies that interdependence between various sectors could lead to a spiral effect and continuous increase in GDP. Idumah et al. (2019) using Vector Auto Regression (VAR), and Granger-Causality tests investigated the contribution or otherwise of forest sub-sector to Nigeria's GDP for the period between 1960 to 2011. The results of the analysis reveal that forest sub-sector contribute positively and significantly to the country's GDP during the period under investigation.

Rotawa et al. (2019) study examine the impact of economic analysis of agriculture, forestry and fisheries on the economic development of Nigeria between 1981 and 2016. Using descriptive statistics to analyze the data, the study finds that the fisheries and forestry sectors have continued to increase the GDP in Nigeria in the last three decades. This shows a positive impact on the growth of Nigerian economy.

Ella and Emehs (2020) study the determinants of macroeconomic variables that affect agricultural production in Nigeria covering the period between 1986 and 2016. Ordinary Least Squares (OLS) regression technique was used to analyze the data and the result shows that corn, rice, millet and palm oil output have positive relationship with GDP. Although the individual test reveals that corn has no significant impact while millet has a significant impact on GDP within the period under study.

Ahmed and Jie (2019) study the short run impact of livestock export on economic growth in Somalia for the period between 1990 to 2015 using cointegration analysis and vector error correction model (VECM). The results of the study indicate that, cattle and Sheep exports have a positive and significant relationship with economic growth, whereas exports of camel and goat were found to have a positive but insignificant effect on economic growth.

Isah and Umar (2019) study use the Johansen cointegration test to analyze the impact of subsectors of agriculture on Nigerian economic growth between 1981 and 2016. The crop, livestock and fisheries subsectors were found to have significant impact on the real GDP with the exception of the forestry subsector. In the long term, policies that foster agricultural production are essential for economic growth. For instance, Matandare et al. (2021) investigated the nexus between disintegrated agriculture components (crop production and livestock production) and economic growth in Botswana for the period between 1990 and 2017 using Auto-Regressive Distributed Lagged (ARDL) bounds testing approach. The findings confirm evidence of a long-run equilibrium relationship among crop production, livestock production and economic growth. More so, the results indicated that livestock production has a positive and significant impact on economic growth both in the short run and long run, while

crop production has a positive and significant impact on economic growth only in the long run. As a result of this, policy makers should support agricultural sector growth in order to promote agricultural sector productivity in a bid to forge a move away from dependence on imports of food in Botswana.

In addition, Akpan et al. (2021) provided empirical information on the relationship between agricultural subsector's production and the growth of Nigeria's economy. They used regression based on the autoregressive distributed lag (ARDL) testing bound model approach to co-integration and the result reveal that the agricultural subsectors have positive impact thereby significantly influence production movement of the subsectors per capita GDP of Nigeria in both the short and long-run period. The study on the impact of livestock and fisheries on economic growth in Pakistan was undertaken by Ilyas et al. (2021). They analyzed the impact of livestock and fisheries on economic growth in Pakistan from 1987 to 2017 using Johansen co-integration and the Vector-Correction Model. Their results showed that in the short run, livestock and fisheries have a negative and insignificant effect on growth, while the co-integration results show a positive relationship between the sub-sectors of agriculture and economic growth.

Nyamekye et al. (2021) empirically examine the impact of agricultural sector on the economic growth of Ghana using time series data spanning the period between 1984 and 2018. The study used co-integration test to analyze the data. The result showed non-existence of long-run relationship between the overall GDP and agricultural output. However, agricultural output has a significantly positive impact on the overall GDP growth of Ghana.

Tobechi (2018) examines the effect of agricultural output on the economic growth of Nigeria for the period spanning 1981 to 2016. The study uses ordinary least square, cointegration, error correction mechanism for the analysis and finds that crop, livestock, fisheries and forestry subsectors contribute positively and significantly to Nigeria's economic growth.

Duru, et al. (2018) examine comparatively the "impact of agricultural output on economic growth in Nigeria and Ghana for the period 1985 to 2014 using Vector Error Correction (VEC) Mechanism. Results show that there exists a significant difference in the impact of agricultural output on economic growth in Nigeria and Ghana within the study period.

Runganga and Mhaka (2021) studied the impact of agriculture on economic growth in Zimbabwe using the Autoregressive Distributed Lag (ARDL) estimation technique the data employed spanned from 1970 to 2018.The study found that agricultural production has a positive impact on economic growth in the short run, and no impact on economic growth was found in the long run. This result implies that the agricultural sector plays an important role in the early stages of economic development, and when the economy has developed, agriculture plays a minimal role.

Various studies in the literature show conflicting results of positive and negative impact of agricultural subsectors' output on economic growth. These conflicting results need to be verified. The reviewed studies also used different methodologies of which this study adopts the

ARDL model due to the data used. The data from the pre estimation test presents mixed results which was integrated of both order one and order zero which informed the use of ARDL Model.

3.0 Methodology

3.1 Model Specification

The Auto Regressive Distributed Lagged (ARDL) model specification was adapted with modification to show both short run and long run relationships between disaggregate agricultural output and Nigerian economic growth (Akadiri et al., 2022; Ceesay & Fanneh, 2022; Tahir, 2022; Matandare et al., 2021). The ARDL model in line with Pasaran, Shin and Smith (2001) can be specified as follows:

$$Yt = \alpha oi + \sum pi=1 d_i Yt\text{-}1 + diYt\text{-}1 + \sum qi=0 \beta i\ Xt\text{-}1 + \sum it \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

In equation 1; Yt denotes the dependent variable; α represents constant; p and q stand optimal lag orders; β, d are coefficients; I = 1….. k; ∑it is a vector of error terms; p is the lag of the dependent variable while q is the lag of the independent variable. This study therefore adapts the work of Akpan et al. (2021) as expressed in equation 2:

$$\Delta PCIt = \beta 0 + \beta 1 \sum \Delta PCIt{-}1\ n1\ i{=}1 + \beta 2 \sum \Delta CRPt{-}i\ n2\ i{=}1 + \beta 3 \sum \Delta LIVt{-}i\ n3\ i{=}1 + \beta 4 \sum \Delta FORt{-}i\ n4\ i{=}1 + \beta 5 \sum \Delta FISt{-}i\ n5\ i{=}1 + \delta 1 PCIt{-}i + \delta 2 CRPt{-}i + \delta 3 LIVt{-}i + \delta 4 FORt{-}i + \delta 5 FISt{-}i + U \ldots\ldots\ldots\ldots 2$$

The model however is modified to suit the variables used as follows:

$$\Delta LnGDPt = \alpha + i{=}0 m \beta 1i LnFOOt\text{-}i + i{=}0 m \beta 2i LnFIO + i{=}0 m \beta 3i LnCO + i{=}0 m \beta 4i LnLO + \epsilon t \ldots 3$$

The short-run dynamics (error correction model) as contained in model 2 above enables the determination of the speed of re-establishing the equilibrium position. In view of the above, the short-run dynamic format of equation 3 above is stated as follows in model 4:

$$\Delta LnGDPt = \alpha + i{=}0 m \beta 1i \Delta LnGDPt\text{-}i + i{=}0 m \beta 2i \Delta LnFOOt\text{-}i + i{=}0 m \beta 3i \Delta LnFIOt\text{-}i + i{=}0 m \beta 4i \Delta LnCOt\text{-}i + i{=}0 m \beta 5i \Delta LnLOt\text{-}i + ectt\text{-}1 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where:

GDP = Gross Domestic Product (proxy for economic growth), FOO = Forest output, FIO = Fish output, CO = Crop output, LO = Livestock output, β1-5 = Parameters to be estimated

ϵt = Error term.

4.0 Presentation and Discussion of Findings

Table 1 contains the estimated result of stationarity test using Augmented Dickey – Fuller approach. The ADF estimates at level are -1.4022, -1.4775, -4.6286, -0.1592 and -0.2380 for gross domestic product, forest output, fish output, livestock output and crop output respectively with only fish output exhibiting stationarity at 5% level significant.

Table 1: Augmented Dickey – Fuller Unit Root Test

Variables	Level	1st difference	order of Integration
GDP	-1.4022	-3.6639**	I(1)
FOO	-1.4775	-5.9290**	I(1)
FIO		-4.6286**	I(0)
LO	-0.1592	-5.0469**	I(1)
CO	-0.2380	-4.7206**	I(1)

Source: E-view output **Note**: (**) indicates significant at 5% level

The ADF estimates at first difference are -3.6639, -5.9290, -5.0469 and -4.7206 for GDP, forest output, livestock output and crop output respectively, and all exhibit significant stationarity at 5% level. The result shows that fish output is integrated of order zero, while GDP, forest output, livestock output and crop output are integrated of order one which is a precondition for the adoption of ARDL model (Pesaran & Shin, 1999).

This section presents the estimations of the study which covers ARDL Bound test of co-integration result, long – run and short – run results as follows.

Table 2: ARDL Bound Test of cointegration

F-Stat 7.4795 Decision Cointegrated Significant level	CRITICAL VALUES ARDL1(0) Bound (lower bound)	CRITICAL VALUES ARDL I(1) Bound (upper bound)
10%	2.5	3.09
5%	2.56	3.49
2.5%	2.88	3.87
1%	3.29	4.37

Source: E-view output

Table 2 presents the co-integration result. The result reveals a significant evidence of long run relationship among GDP, forest output, fish output, livestock output and crop output since the estimated F – statistics of 7.4795 is more than the Pesaran critical values of 2.56 – 3.49 at 5% level. This is an indication that the null hypothesis which states that "there is no long run relationship among GDP, forest output, fish output, livestock output and crop output" could not be rejected (Akadiri et al., 2022; Ceesay & Fanneh, 2022; Tahir, 2022; Matandare et al., 2021; Oyetade & Adeyeye, 2021) but contrary to the finding of Nyamekye, et al. (2021). Therefore, this result implies that these variables would uninterruptedly continue to exert significant impact on one another in the long - run period

Table 3: Estimated Long Run coefficients of ARDL

Variable	Coefficient	Std Error	T-Statistic	Prob.
GDP(-1)	0.47160	0.157047	3.002947	0.0054
LO	0.648584	0.157587	4.116253	0.0003
LO(-1)	-0.476611	0.100058	-4.763355	0.0000
FOO	0.039018	0.209199	0.186512	0.8533
FOO(-1)	-0.454241	0.317503	-1.430667	0.1629
FOO(-2)	0.494836	0.217645	2.273594	0.0303
FIO	0.018602	0.039505	0.470872	0.6411
CO	0.281217	0.051322	5.479472	0.0000
C	1.530021	0.609464	2.510437	0.0177
R-Squared	0.99957	Adjusted R-Squared 0.99945	F-Statistic 7.479453	

Source: E-view output

Table 3 shows the long – run results with the estimated coefficients of 0.4948, 0.6486 and 0.2812 for forest output, livestock output and crop output respectively exert significant positive impact on GDP at 5% level of significance, while only the coefficient (0.0186) of fish output exerts insignificant but positive impact on GDP. This implies that one percent increase in forest, livestock and crop output will lead to 49%, 64% and 28% increase on GDP. This further reveals that, there is vital impact of forest output, livestock output and crop output on the determination of economic growth (GDP) in Nigeria which corroborate the findings of Han and Lin (2021), Nyamekye et al. (2021), Suren and Cecil (2021), Akpan et al. (2021), Oyetade and Adeyeye (2021), Matandare et al. (2021), and Ceesay and Fanneh(2022) . The R-squared which gives the coefficient of determination is 0.999572. This means that about 99% of the GDP is explained by the explanatory variables while 1% is capture by the error term

Table 4: Estimated Short Run Coefficients of ARDL

Variable	Coefficient	Std Error	T-Statistic	Prob.
LO	0.325462	0.170893	1.904480	0.0665
FOO	0.150670	0.123914	1.215918	0.2335
FIO	0.035205	0.069598	0.505824	0.6167
CO	0.532209	0.172369	3.087623	0.0043
ECM(-1)	- 0.528395	0.073026	-7.235757	0.0000

Source: E-view output

Table 4 presents the short-run coefficients of the ARDL estimates. In the short-run, the estimated coefficients of 0.1507, 0.0352, and 0.3255 for forest output, fish output and livestock output respectively exert insignificant positive impact on GDP, while only the coefficient (0.5322) for crop output exerts significant positive impact on GDP at 5% level of significant which is supported by the findings of Nyamekye et al. (2021), Ilyas et al. (2021), Tahir (2022), and Akadiri et al. (2022).

The speed of adjustment to long run equilibrium is negative but significant at 5% level. This reveals that there is adjustment from short run to long run equilibrium among the variables although the speed of adjustment to the long run equilibrium is very slow at 53% yearly.

To consolidate the estimations of this study, post estimation diagnostics were conducted in section 4.4 to avoid making recommendations based on weak model.

Table 5: Serial Correlation Test

F-Statistics	3.1422	Prob. F(2.28)	0.0587
Obs R-squared	7.1488	Prob. Chi-Square	0.0280

Source: E-view output

The Breusch-Godfrey serial correlation test is presented in Table 5. It was conducted to ensure that residuals of the ARDL estimates are not correlated. The null hypothesis for the test states that "residuals are not serially correlated" could not be rejected since the p-value of 0.0587 is greater than the critical p-value of 0.05 at 5% with corresponding F-statistics of 3.1422. This shows that the model is not serially correlated.

Table 6: Heteroscedasticity Test

Breusch-Pagan-Godfrey		Heteroscedasticity Test	
F-statistics	1.9773	Prob. F(8.30)	0.0845
Obs. R-squared	13.4646	Prob. Chi-square (8)	0.0968
Scaled explained SS	9.3545	Prob. Chi-square (8)	0.3133

Source: E-view output

The Breusch-Pagan-Godfrey heteroscedasticity test in table 6 shows that the residuals of ARDL estimates exhibit constant variance. The null hypothesis which states that the "residuals are homoscedastic" could not be rejected since the estimated p-value of 0.0845 is more than the critical p-value of 0.05 at 5% with corresponding F-statistics of 1.9773. In summary, the result reveals that the residuals of the model exhibit constant variance over the periods under investigation.

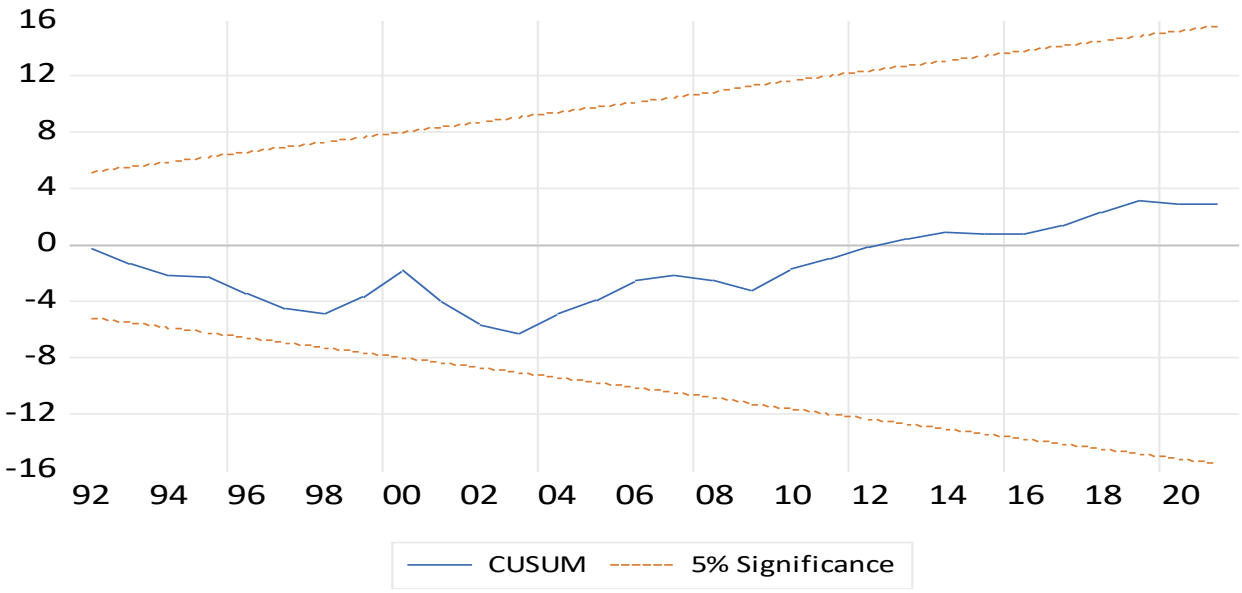
Table 7: Normality Test

	Normality Test	*p-value*
Jarque Bera Statistics	0.2632	0.8767

The Jarque Bera statistics for normality test is presented in table 7, and it was conducted to ensure that the residuals of the ARDL estimates are normally distributed. The null hypothesis states that "the residuals of the model are normally distributed" could not be rejected since the estimated p-value of 0.8767 surpassed the critical p-value of 0.05 at 5% with corresponding Jarque Bera statistics of 0.2632. It reveals that the residuals of the model are normally distributed.

The CUSUM Square stability test was conducted to examine if the parameters of the model are stable across various sub-samples of the data set employed in the analysis. If the cumulative sum goes outside the area between the two critical lines, the parameters are said to be unstable. Figure 1 below reveals that the cumulative sum of residuals is stable since the blue line falls within the critical bounds of 5% level of significance. The results shows that the coefficients of the model are stable, reliable and valid for policy recommendations.

Figure 1: Cumulative Sum of Recursive Residuals Test



Source: E-view output

5.0 Conclusion and Policy Recommendations

The study examines the impact of disaggregated agricultural subsectors output on Nigeria's economic growth spanning the period between 1981 to 2022, the study obtained secondary annual data from Central Bank of Nigeria Statistical Bulletin and employed the ARDL model to analyze the data. The result of the study shows that there is significant long run relationship among GDP, forest output, fish output, livestock output and crop output; only crop output exerts significant positive impact on GDP in the short run, while forest output, livestock output and crop output exert significant positive impact on GDP in the long run; and the model is free from serial correlation, homoscedastic, normally distributed and is stable indicating that the model is fit and can be used for forecasting and making policy recommendations. The study, therefore, concludes that there is significant long run relationship among GDP, forest output, fish output, livestock output and crop output where only crop output exerts significant positive impact on GDP in the short run, while forest output, livestock output and crop output exert significant positive impact on GDP in the long run.

In line with the findings, the study gives the following recommendations;

1. The crop output findings reveals a significant positive impact on GDP in the short run as such, government should properly implement land tenure system reforms for availability and accessibility of more land to farmers and also provide inputs such as improved seeds, chemicals, fertilizers, sprayers and other mechanized implements at subsidized rates in order to boost production

2. The fish output indicates a significant positive impact on GDP in the long run, this shows that the fish farmers need to be trained and retrained by the government and NGOs in order to keep abreast with the modern ways in aquaculture. In addition to this, loans should be provided more by government at low interest rates to encourage more people to venture into fish farming given the rising cost of feeds and fishery equipment.

3. The findings on livestock output shows a significant positive impact on GDP in the long run thus, farm power policy and mechanized farming should be properly implemented by government at all levels. This will reduce the heavy dependence on imported agricultural products for consumption and for use by industries while ensuring that the produced products are exported to provide foreign exchange earnings for the country.

4. Policies to guide against forest exploitation and ensure forest preservation by the government should be properly implemented and supervisions should also be done regularly to enable the subsector to thrive better and contribute immensely to the GDP of Nigeria.

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