

## Government Budgetary Allocation, Domestic Investment, and Food Security in Nigeria

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### Abstract:

Food security has become a global goal due to the increasing world population and agricultural challenges such as climate change, farming implements associated inflation, farmers' credit accessibility, land competition between food and bio-fuel production, and rural-urban migration among others. This study titled "government budgetary allocation, domestic investment, and food security in Nigeria" thus examined the impact of government budgetary allocation and domestic investment on food security in Nigeria. The study was based on the Harrod-Domar model with empirical analysis that span a period of 36years. The data used for the study were sourced from the Central Bank of Nigeria (CBN) and FAO database. The Augmented Dickey Fuller unit root test, Johansen cointegration test, Ordinary Least Square (OLS) and Quantile regressions, and Granger causality test were employed as methodologies. The study found a long run relationship among government budget allocation to agriculture, domestic investment, and food security in Nigeria. The empirical analysis showed that government budgetary allocation and money supply has significant positive impact on food security while domestic investment and agricultural credit does not. Furthermore, the study established that there is no causal relationship among government budget allocation to agriculture, domestic investment, and food security. The study thus recommends among others that government should increase agricultural budgetary allocation, agricultural sector stakeholders should ensure ethical food systems and agriculture investment, agricultural



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practices and farmers in rural areas should be prioritize, and policies should be formulated to prevent excessive volatility in food prices.

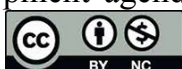
**Keywords:** Domestic Investment, Food Security, Government Budgetary Allocation, Agricultural Credit.

## 1. INTRODUCTION

The increased global need for food has become a problem for humanity (Osabohien et al., 2020; Jacobsen et al., 2013) because to raise food production to feed the teeming world population has and will continue to be a difficult task due to fewer arable land, high cost of farm production implements, climate change vulnerability, less credit access to farmers, land competition of food production with bio-fuel production, and rural-urban migration among others (Jacobsen, 2013). As a result of these, there is a strong on-going deliberation on the best approach to gain speed with world population growth and increasing food production to meet the United Nations Sustainable Development Goal (UNSDG 2) – which is to achieve food security at all levels, improve nutrition for all, and promote sustainable agriculture by 2030 (Osabohien et al., 2020; Osabohien et al., 2019).

Generally, the issue of food security was brought to limelight in 1974 during the world food conference when it dawned on the government that all nations of the world need to strategize on how best to improve agricultural production to match the per capita needs of the population (Metu et al., 2016). From various perceptions, inadequate food supply, due to fall in agricultural production and poor distribution channels, poverty and hunger have been identified as causes of insecurity in many developing countries. The United Nations Food and Agriculture Organization (FAO) has consistently cautioned about severe food shortages in Africa. This is due to the average per capita calorie intake in many African nations falling below the minimum nutritional standards, largely because of the underperformance of the agricultural sector. The FAO's warning highlights a significant challenge in agricultural development: the sector's neglect in the development agendas of African governments (Ahungwa, 2014). This situation has left the continent vulnerable to both extreme poverty and pronounced food insecurity.

Food and nutrition security are crucial components of the global sustainable development agenda. Despite worldwide initiatives aimed at ensuring sufficient food



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availability to eradicate hunger and enhance overall nutrition through sustainable agricultural practices, food insecurity remains widespread in Africa. According to FAO et al. (2019), the food situation in Africa has been particularly dire since 2015, with nearly all sub-regions experiencing high levels of undernourishment. The rising prevalence of undernourishment has begun to undo the progress made since 2015, potentially jeopardizing the goal of achieving zero hunger in Africa by 2030. This situation presents a significant challenge to the continent, threatening the realization of the Malabo Goals 2025 and the various targets of Goal 2 of the Sustainable Development Goals (SDGs).

Recent United Nations estimates put the number of people suffering from chronic undernutrition in Africa at 257 million with sub-Saharan Africa accounting for 237 million of this number (FAO & ECA, 2018). This highlights a deteriorating food security situation. An analysis of the current figure of undernourished people showed an exponential rise as 32.6 million more people slipped into undernourishment in sub-Saharan Africa with more than half of this figure residing in West Africa (FAO & ECA, 2018). The food security situation in West Africa is particularly concerning. Estimates suggest that between 36 and 40 million people in this sub-region are food insecure, experiencing both undernourishment and chronic malnutrition. The prevalence of undernourishment increased from 10.4 percent in 2010 to 14.7 percent in 2018 (FAO et al., 2019). The situation appears even more dire when considering the rapidly growing population, which drives up food demand, coupled with declining food productivity.

The projected population growth would widen the sub-region's food deficit and lead to the deterioration of its nutritional status. This food security gap constitutes a great challenge to the sub-regional body, the Economic Community of West African States (ECOWAS), in view of the thrust of the Chapter 4, Article 25 of its treaty, which recognizes agriculture and food security as one of the main areas of cooperation among member-states (ECOWAS Commission, 2010). It was principally to deal with food insecurity and achieve some level of food sovereignty that ECOWAS floated its common agricultural policy, ECOWAP in 2005. Nigeria has been making efforts in this direction as a major and active ECOWAS member. Several programs have been developed to restructure the agricultural sector with two main goals: achieving food



security and transforming agriculture into a significant source of foreign exchange for the country (Bisiriyu et al., 2021; Osinusi et al., 2022). The core idea is to diversify and strengthen the Nigerian economy, reducing its heavy reliance on crude oil for foreign exchange earnings.

Nigeria has undoubtedly launched numerous agricultural programs, even before the establishment of a continental agenda for agriculture. While there are many studies on food security concerning Africa, the West African sub-region, and Nigeria, they often take a general approach, emphasizing man-made or natural obstacles to achieving food sufficiency and sovereignty on the continent (Sasson, 2012; Jalloh et al., 2013; Mbow et al., 2014; Bini, 2016). Studies with narrower focus on countries in the West African sub-region as well as Nigeria have often evaluated food security within the context of national and subnational efforts at food production without considering the role of investment which is integral in modern day agriculture for mechanized and capital-intensive operations (Abu 2012; Dupraz & Postolle, 2013; Simson & Tang, 2016; Bini 2016; Nwozor et al., 2019). Thus, this study provides evidence of the impact of government budget allocation to agriculture and domestic investment on food security in Nigeria. Despite the concerted efforts of the government through the establishment of development financial institutions in the agricultural sector, in addition to the provision of different agricultural support services to its citizenry, attainment of food security appears to have remained largely unrealizable judging by the increasing food scarcity and sky rocketing food prices in Nigeria (CBN, 2023).

Therefore, this study was conducted to investigate the impact of the Nigerian government's budgetary allocation and domestic investment on achieving food security. It aims to answer the question: What is the relationship between government agricultural budgets, domestic investment, and food security in Nigeria? Does government agriculture budgetary allocation and domestic investment have impact on food security in Nigeria? And is there any causal link among government budget on agriculture, domestic investment, and food security in Nigeria? The remainder of the study is organized into literature review – section 2, theoretical framework and methodology – section 3, empirical findings and discussion – section 4, and conclusion – section 5.



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## **2. Empirical Literature**

Empirical results on the relationship between government budget, domestic investment and food security is very scanty. Whereas the little existing results are of divergent conclusions. Maduekwe et al. (2022) examined non-debt agriculture financing and its effect on food security in Nigeria from 1960 to 2017. The study utilized the dynamic ordinary least square method and the autoregressive distributed lag method for its analysis. The results indicated that there is no long-term relationship between non-debt agricultural financing and food security. However, it found that agricultural public domestic investment (negatively) and the previous year's food security index (positively) significantly influence food security.

Similarly, Lawal (2021) studied the budgetary allocation and central bank of Nigeria interventions to agricultural sector attainment of food security in Nigeria using data span from the year 2000 to 2018 using regression analysis. The study concluded that budgetary allocations to the agricultural sector do not significantly impact food security in Nigeria. Additionally, interventions by the Central Bank of Nigeria in agricultural sector financing also do not have a significant effect on achieving food security in the country. Another study by Ukpe et al. (2020) adopted the vector error correction model (VECM) to analyze the effects of Nigeria monetary and fiscal policies on sustainable food security using data from 1985 to 2016. The study result revealed that government expenditure on agriculture only impacts food production positively in the short run while it has a negative influence in the long run along interest and inflation rates.

Okorie et al. (2021) examined the effects of insufficient budgetary allocation within the Agricultural Promotion Policy (APP) framework on food sufficiency in Nigeria. The study argued that Nigeria's food security is compromised due to the government's ongoing reliance on oil, which discourages investment in the agricultural sector. Using documentary data collection and qualitative descriptive analysis, the study found that inadequate budgetary allocation within the APP framework undermines food sufficiency in Nigeria. Nwozor and Olanrewaju (2020) also assessed the complementarities of the measures adopted by Nigeria vis-à-vis the Economic Community of West African States Agricultural Policy and the Comprehensive Africa Agricultural Development Program (ECOWAP/CAADP). The authors used both



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primary and secondary data, analyzed through a logical inductive method, to assess Nigeria's progress in meeting the ECOWAP/CAADP commitments. They discovered that, despite the numerous programs initiated by the Nigerian government to harness its vast agricultural potential, the country is not on track to achieve food security or to become a significant player in the global food market.

Osabohien et al. (2020) employed a cointegration approach to examine the impact of agro-financing on food production in Nigeria, aligning with Goal 2 of the 2030 Sustainable Development Goals (SDGs), which aims to “end hunger, achieve food security, improve nutrition, and promote sustainable agriculture.” Covering the period from 1980 to 2018, the study found that increased access to agricultural finance for farmers positively affects food production. This is because more agro-funding at low interest rates encourages farmers to acquire high-yield seedlings, machinery, other farm implements, and organic inputs, all of which enhance total agricultural yield and boost food production. Additionally, Nwozor et al. (2019) explored the link between national insecurity and food production as a precursor to achieving food security. The study utilized primary and secondary data to assess the feasibility of achieving food security amidst ongoing insecurity across the country. The content analysis indicated that food security cannot be attained unless the pervasive insecurity affecting farming communities is addressed. Njoku et al. (2018), in their study of 21,576 dairy farmers in Kenya using the double-hurdle approach, found a positive and significant relationship between farmers' production capacity and access to credit. Similarly, Osabohien et al. (2018) employed the Autoregressive Distribution Lag (ARDL) econometric approach to investigate the impact of access to credit facilities on agricultural production and food security in Nigeria, concluding that credit facilities significantly enhance both agricultural production and food security in the country.

Tibebu and Sisay (2017) examined the determinants of food security in Ethiopia using primary data from 335 households. The study utilized logistic regression econometric analysis and determined that approximately 42 percent of the sampled households were food insecure. Additionally, the incidence of food insecurity, the food insecurity gap, and the severity of food insecurity were found to be 42 percent, 14 percent, and 7 percent, respectively. Ali et al. (2017) examined the effect of interest rates on access to



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agro-credit by farmers in Kaduna state, Nigeria. The study identified interest rate, credit awareness, and farm income as key factors influencing the amount of credit obtained by farmers in the study area. It found that lower interest rates from financial institutions led to higher volumes of credit being sourced by farmers, and vice versa. In a related study, Ukpe (2016) evaluated the effects of access to microcredit on the food security status of crop farm households in the Niger Delta. Interest rate was found to have a negative and significant influence on access to microcredit. Ezeanyejì (2014) result for assessing the impacts of interest rate deregulation in enhancing agricultural productivity in Nigeria showed that interest rate deregulation had significant and positive impact on agricultural productivity in Nigeria.

On the review of agricultural policy in Nigeria, Mallum (2016) noted that the role of credit in agricultural development is very paramount, and any shortcomings can affect a farmer's investment ability. The study further recommends that to build farmers' confidence and reduce the risk of credit default, loan diversification should be encouraged. Additionally, appointing specialized staff to mentor local farmers is essential. Empirical investigation on the impact of macroeconomic policies on agricultural output by Muftaudeen and Hussainatu (2014) showed a significant variation in Nigeria's agricultural food output due to changes in exchange rate and government expenditure movements. The results also showed that price instability due to inflation negatively impacted agricultural output. This implies that rising inflation increased the nominal prices of agricultural inputs through its multiplier effects, thereby discouraging agricultural investment and hindering increased food production. In a study by Oyinbo and Rekwot (2014) on the investigation of the links among inflationary trend, agricultural productivity, and economic growth in Nigeria, it was that indicated a unidirectional causality runs from inflationary trend to agricultural productivity.

Furthermore, Ahungwa et al. (2014) examined the food security challenges vis-à-vis the paradox of increased domestic food production and food import in Nigeria. The study analyzed data from 1960 to 2012 using trend analysis and multiple regression. The trend analysis revealed a decline in agriculture's share of the total gross domestic product (GDP), particularly from 1960-1979, with food imports accounting for around 2.92% of GDP from 1960-74 and rising to 9.85% in 1975-79. The data shows a fluctuating trend



in agriculture's contribution and food import values up to 2009, with food imports skyrocketing from N2.6 trillion (3.83%) in 2005-2009 to about N20.6 trillion (25.02%) in 2010-2012. Regression analysis results confirmed that agriculture positively correlates with GDP and makes a significant contribution. However, the paradox is that food imports, contrary to expectations, are also positively related to GDP; as food production increases slightly, food imports rise sharply.

Adofu et al. (2012) investigated the extent of national commitment to agricultural development through public expenditure and budgetary allocation, and its impact on agricultural output in Nigeria. Using the ordinary least square regression technique, they found that budgetary allocation to the agricultural sector significantly affects agricultural production, with a strong, positive, and significant relationship. This implies that increased public spending on agriculture leads to improvements in the sector's performance. A substantial portion of the change in agricultural output is attributed to changes in budgetary allocation. Therefore, budgetary allocation to agriculture has a significant impact on agricultural output. The study also highlighted that increased budgetary allocation to the agricultural sector ensures food security, employment, and overall economic growth and development in Nigeria.

Using the autoregressive distributed lag (ARDL) and error correction mechanism (ECM), Udoh (2011) found that the relationship between public expenditure, private investment and agricultural sector growth is asymmetric. While government public expenditure significantly boosts agricultural output, private investment has a negligible impact. This is not entirely unexpected, as private investors often perceive the agricultural sector as offering low returns and being highly volatile.

The review of the existing empirical literature shows there are little studies with conflicting evidence on the impact of government budgetary allocation and domestic investment on food security in Nigeria. In this regard, this study bridges the evidence and knowledge gaps to provide empirical evidence of the impact of government budget allocation to agriculture and domestic investment on food security in Nigeria using secondary data from 1986 to 2021.



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### 3. Theoretical framework and methodology

This study relies on the Harrod-Domar model (also known as capital only model). The model stated that saving is a certain proportion of national income, and net investment is defined as the change in capital stock (K). The model further assumes that there is some direct relationship between the size of the capital stock, (K), and total output, (Y). This follows that any addition to the capital stock in the form of new investment will bring about a corresponding increase in the flow of national output. This relationship is referred to as the capital output ratio. If the capital-output ratio is defined as  $k$  and assume further that the national savings ratio,  $s$ , is a fixed proportion of national output (e.g., 6%) and that total new investment is determined by the level of total savings, we can construct the following simple model of output growth.

Savings (S) is some proportion of national income (Y) such that we have the simple equation  $S = sY$  ----- (1)

Net investment (I) is defined as the change in the capital stock, K, and can be represented by  $\Delta K$  such that  $I = \Delta K$  ----- (2)

But because the total capital stock, K, bears a direct relationship to total national income or output, Y, as expressed by the capital-output ratio,  $k$ , it follows that  $K/Y = k$  or  $\Delta K / \Delta Y = k$ , therefore  $\Delta K = k\Delta Y$  ----- (3)

Finally, because net national savings, S, must equal net national investment, I, we can write this equality as  $S = I$  ----- (4)

But from equation (1) we know that  $S = sY$  and from equation (2) and (3) we also know that  $I = \Delta K = k\Delta Y$  it therefore follows that we can write the identity of savings equal to investment shown in equation (4) as:

$S = sY = k\Delta Y = \Delta K = I$  ----- (5) which can further be simplify as  $sY = k\Delta Y$  ----- (6)

Dividing both sides of equation (6) first by Y and then by k, we obtain the following expression:

$\Delta Y/Y = s/k$  ----- (7)



The left-hand side of equation (7),  $\Delta Y/Y$ , represents the rate of change or rate of growth of output (i.e., it is the percentage change in productivity). Equation (7) happen to be the simplified version of the famous equation in Harrod-Domar theory of economic growth, states simply that the rate of growth of GNP ( $\Delta Y/Y$ ) is determined jointly by the national savings ratio,  $s$ , and the national capital-output ratio,  $k$ . Therefore, to increase outputs, economies must save and invest a certain proportion of their GNP. The more an economy can save and invest, the faster it can grow its output.

Following the above theoretical framework and the objectives of the study, the study model is thus specified as:

$$FS_t = a_0 + a_1GBA_t + a_2DI_t + a_3AGC + a_4MS_t + \varepsilon_t \dots \dots \dots (8)$$

Where  $FS$  = food security (proxy by food production index),  $GBA$  = government budget on agriculture,  $DI$  = domestic investment (proxy by gross fixed capital formation),  $AGC$  = agricultural credit,  $MS$  = money supply,  $a_0 - a_4$  = coefficients, and  $\varepsilon$  = error term. The data of the variables in the model are secondary in nature and were extracted largely from the Central Bank of Nigeria (CBN) and FAO data base. The macroeconomic variables on which data were collected included government budget on agriculture, domestic investment, agricultural credit, money supply, and food production index in Nigeria from 1986 to 2021. The study was limited to this scope to cover the significant phases of agricultural reforms that started after the adoption of the Structural Adjustment Programme (SAP) of the World Bank which later led to the need to boost the country's economic base. In addition, the study scope was chosen to capture the recent investment and increasing budgetary allocation to agricultural sector in the recent decades as well as the increasing global warning on food insecurity amidst population increment.

The study adopts various econometric techniques of analysis to achieve the study objectives. The method of estimating the model includes the Augmented Dickey-Fuller test for stationary and other preliminary analysis while the quantile and ordinary least square (OLS) regression are adopted for the study main analyses. In addition, the study used the Granger causality test to ascertain the direction of causality among the variables.



## **4. Empirical findings and discussion**

### **4.1 Pre-estimation Results**

Conventionally, the statistics properties of variables are given first attention. This helps to understand dynamisms of the data series used briefly. All series are in their log form. Table 1 reveals that the most volatile series in this study is government budget on agriculture (GBA), as the standard deviation has a value of 67.61. The reason for this is not far-fetched as the allocation of budget to agriculture in an economy is exogenously determined by the government. As clearly indicated above, the average value of food security (FS) in Nigeria from 1986 to 2021 is 72.732 making it the next volatile variable in the series with its standard deviation value as 24.114; while agricultural credit has a mean of 8.169, domestic investment (DI) has a mean of 30.678, government budget on agriculture (GBA) has its average value to be 86.22 and money supply, 17.229. These statistics clearly show the interaction of the variables over the years. Within the same time frame, the maximum food security value in Nigeria is 111.740 compared to its minimum of 29.9, this depicts how the knowledge of food security within the country has increased. Of the series, government budget on agriculture has experienced a large increase over time because of the nature of the allocation as recorded a gargantuan increase with its maximum value to be 320.327 and its minimum as 4.124. This large difference between the maximum value of GBA and its minimum suggests that the variable is volatile, and this is further validated by the standard deviation. The skewness explains the asymmetry of the variables around its mean. From the descriptive statistics, the skewness values of AGC, DI, GBA and MS is 0.615, 0.309, 1.229 and 0.291 shows a long right tail because the values are positive. Contrastingly, is the negative value of FS (-0.104) which depicts a long-left tail distribution of this variable. The kurtosis value of FS, AGC, DI, and MS implies platykurtic (flat distribution) while for GBA, it is leptokurtic (has a higher peakedness).



**Table 1: Descriptive Statistics**

| <b>Variable<br/>s</b> | <b>Mean</b> | <b>Media<br/>n</b> | <b>Std<br/>Dev.</b> | <b>Min</b> | <b>Max</b>   | <b>Skewnes<br/>s</b> | <b>Kurtosi<br/>s</b> | <b>Ob<br/>s</b> |
|-----------------------|-------------|--------------------|---------------------|------------|--------------|----------------------|----------------------|-----------------|
| FS                    | 72.73<br>2  | 74.585             | 24.11<br>4          | 29.90<br>0 | 111.740      | -0.104               | 1.993                | 36              |
| AGC                   | 8.169       | 5.566              | 5.909               | 1.434      | 19.657       | 0.615                | 1.812                | 36              |
| DI                    | 30.67<br>8  | 27.569             | 12.89<br>4          | 14.16<br>8 | 54.948       | 0.309                | 1.857                | 36              |
| GBA                   | 86.22<br>2  | 91.655             | 67.61<br>5          | 4.124      | 320.327<br>0 | 1.229                | 5.332                | 36              |
| MS                    | 17.22<br>9  | 14.880             | 6.065               | 9.063      | 27.378       | 0.291                | 1.422                | 36              |

**Source:** Authors' computation.

From Table 2, the ADF shows that food security, agricultural credit, domestic investment, government budget on agriculture, and money supply are not stationary at level, thus there is non-rejection of null hypothesis of unit root at levels. However, after performing a first difference on the variables, it was discovered that all variables do not exhibit mean reverting, that is, the time series of food security, agricultural credit, domestic investment, government budget on agriculture and money supply were stationary. By extension, food security, agricultural credit, domestic investment, and money supply were statistically significant at 1% and government budget on agriculture was significant at 10% level of significance therefore, the null hypothesis of unit root was rejected. The results therefore further substantiate the use of Johansen Cointegration and Granger causality to assess the mode of causality in the time series.



**Table 2: ADF Unit Root Test Result.**

| Variables | At level  | At first difference | Order of Integration |
|-----------|-----------|---------------------|----------------------|
| FS        | -4.014321 | -1.804759*          | I(1)                 |
| AGC       | -1.212770 | -7.991162***        | I(1)                 |
| DI        | -1.978853 | -4.553757***        | I(1)                 |
| GBA       | -3.063421 | -8.961000*          | I(1)                 |
| MS        | 0.8283    | -4.740276***        | I(I)                 |

\*\*\*, \*\*, and \* represent 1%, 5%, and 10% level of significance

**Source:** Authors' Computation

From the Trace statistic and Max-Eigen statistics in Table 3, the null hypothesis of no cointegration is rejected at the 5% level because the value is greater than the critical value at  $\alpha = 0.05$ . Hence, it is concluded that a long-run relationship exists among the variables. This indicates that the variables, have a balance in the long-term relation during the period of the study. The result in Table 4 shows that agricultural credit and domestic investment are negatively correlated to food security. In other words, a unit change in agricultural credit will result in 0.867 units decrease in food security in Nigeria, while a unit change in domestic investment will result to 0.387 units decrease in food security. In the same vein, the probability values also indicate that the variables are not germane to explaining the effect of food security in Nigeria. Furthermore, the government budget on agriculture and money supply are positively related to food security in Nigeria. This implies that a unit change in government budget on agriculture will result to 5.98% increase in food security, while a unit change in money supply will result to 1.55 unit increase in food security. In addition, the government budget on agriculture and money supply probability values are significant at 5% and 1% levels of significance, respectively. This implies that the government budget on agriculture and money supply are key variables that affect food security in Nigeria, therefore, they are instrumental variables to explaining the effect of the time series.

The adjusted R-squared of the time series implies that the model explains about 83% of the factors affecting food security in Nigeria, while the remaining 27% is the stochastic



or error term. These are the other variables that affect food security in Nigeria but were not captured within the model. The F-statistics probability indicates that the model measures an overall goodness of fit. Likewise, the table also shows the post-estimation results of the ordinary least square and the test for normality reveals normal distribution of the error terms due to insignificance of the estimate. The Breusch-Godfrey LM test presents no evidence of serial dependence and homoscedasticity test also revealed the rejection of null hypothesis of homoscedasticity in the error terms. The Ramsey Regression Equation Specification Error Test (RESET) is significant which supports the rejection of null hypothesis of linear specification of the estimated model. To ascertain the stability of the estimated model, the blue line plot of the CUSUM and CUSUMSQ estimates must lie in-between the two red straight lines of 5% significance level. Based on the report of the stability tests, the estimated model is stable using the CUSUM test since the blue line lay in-between the straight red lines that denote 5% level of significance, while its otherwise for the CUSUMSQ.

**Table 3: Johansen Cointegration Test Results**

| Trace Test           |             |                     |                   |        |
|----------------------|-------------|---------------------|-------------------|--------|
| Null                 | Alternative | Trace Statistic     | 5% Critical value | Prob   |
| $r = 0$              | $r \geq 1$  | 86.18115***         | 69.81889          | 0.0014 |
| $r \leq 1$           | $r \leq 2$  | 44.88725*           | 47.85613          | 0.0925 |
| Max-Eigen value test |             |                     |                   |        |
| Null                 | Alternative | Max-Eigen Statistic | 5% critical value | Prob   |
| $r = 0$              | $r \geq 1$  | 41.29389***         | 33.87687          | 0.0054 |
| $r \leq 1$           | $r \leq 2$  | 24.18089            | 27.58434          | 0.1285 |

**Source:** Authors' computation.



**Table 4: Ordinary Least Squares results**

| <b>Dependent: FS</b> |                    |                       |                    |
|----------------------|--------------------|-----------------------|--------------------|
| <b>Variables</b>     | <b>Coefficient</b> | <b>Standard error</b> | <b>Probability</b> |
| AGC                  | -0.687939          | 0.612090              | 0.2697             |
| DI                   | -0.387468          | 0.347128              | 0.2729             |
| LGBA                 | 5.981238           | 2.696863              | 0.0340             |
| MS                   | 1.558285           | 0.454928              | 0.0017             |
| Adjusted R-squared   | 0.834757           |                       |                    |
| F-statistic          | 39.15070           |                       |                    |
| Prob(F-statistic)    | 0.000000           |                       |                    |
| Durbin-Watson stat   | 0.594710           |                       |                    |
| Homoscedasticity     | 5.745389           |                       | 0.0014             |
| Linearity            | 5.690318           |                       | 0.0236             |
| Breusch-Godfrey LM   | 17.36511           |                       | 0.0000             |
| Normality            | 0.258047           |                       | 0.8789             |

**Source:** Authors' computation

From Table 5, agricultural credit and gross capital fixed formation are negatively correlated with food security and the probability values indicate that the variables are not significant. This is in tandem with the ordinary least square estimation technique result. This corroborates the study of Ukpe et al. (2020), and Adofu et al. (2012) that government expenditure on agriculture impact food production positively in the short run. However, the government budget on agriculture and money supply are positively correlated to food security. This is not far-fetched because every activity of the government to increase food security will be aided with financial resources in the economy. The post-diagnostic result in the appendix shows that there exists a symmetrical relationship in the model because the probability value is not significant at any level of significance. From the causality result in Table 6, it is evident that FS and AGC granger causes MS, showing a unidirectional relationship, respectively. This is indicated by the probability of significant value statistically at  $\alpha = 0.05$ .



**Table 5: Quantile regression result**

| Variables          | Coefficient | Standard error | Probability |
|--------------------|-------------|----------------|-------------|
| AGC                | -0.359735   | 0.756512       | 0.6378      |
| DI                 | -1.063566   | 0.654968       | 0.1145      |
| LGBA               | 3.316383    | 3.984107       | 0.4115      |
| MS                 | 0.721196    | 1.099427       | 0.5167      |
| Quasi-LR statistic | 59.53497    |                | 0.0000      |
| Adjusted R-squared | 0.591598    |                |             |

**Source:** Authors' computation

**Table 6: Granger Causality Test**

| Null Hypothesis:                | Obs | F-Statistic | Prob.  |
|---------------------------------|-----|-------------|--------|
| AGC does not Granger Cause FS   | 34  | 0.01800     | 0.9822 |
| FS does not Granger Cause AGC   |     | 0.19585     | 0.8232 |
| DI does not Granger Cause FS    | 34  | 1.25008     | 0.3015 |
| FS does not Granger Cause DI    |     | 0.61823     | 0.5458 |
| LGBA does not Granger Cause FS  | 34  | 0.11702     | 0.8900 |
| FS does not Granger Cause LGBA  |     | 0.55843     | 0.5781 |
| MS does not Granger Cause FS    | 34  | 0.69581     | 0.5068 |
| FS does not Granger Cause MS    |     | 3.18710     | 0.0561 |
| DI does not Granger Cause AGC   | 34  | 1.46003     | 0.2488 |
| AGC does not Granger Cause DI   |     | 1.77678     | 0.1871 |
| LGBA does not Granger Cause AGC | 34  | 4.72844     | 0.0167 |
| AGC does not Granger Cause LGBA |     | 1.62218     | 0.2149 |
| MS does not Granger Cause AGC   | 34  | 1.12033     | 0.3399 |
| AGC does not Granger Cause MS   |     | 3.19042     | 0.0559 |
| LGBA does not Granger Cause DI  | 34  | 3.12923     | 0.0588 |
| DI does not Granger Cause LGBA  |     | 0.98910     | 0.3841 |
| MS does not Granger Cause DI    | 34  | 0.61346     | 0.5484 |
| DI does not Granger Cause MS    |     | 2.04509     | 0.1476 |
| MS does not Granger Cause LGBA  | 34  | 0.15073     | 0.8607 |



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|                                |         |        |
|--------------------------------|---------|--------|
| LGBA does not Granger Cause MS | 0.88143 | 0.4250 |
|--------------------------------|---------|--------|

**Source:** Authors' computation

## 5. Conclusion and recommendations

This study examined the impact of government budgetary allocation and domestic investment on food security in Nigeria. The study theoretical explanation is based on the Harrod-Domar capital only model to explain national income and net investment nexus in the Nigerian economy. This was investigated using the Johansen cointegration test method and it was revealed that agricultural credit and domestic investment are not significant to cause a change in food security in Nigeria. While the government budget on agriculture and money supply are positively correlated to food security and are key drivers of food security in the model. This is in tandem with the results of Okorie et al. (2021) and Ukpe et al. (2020). The positive effect implies that when the government invests in the agricultural sector of the country, there is every assurance that the food security in the economy will be heightened. Likewise, with the provision of money in circulation, individuals in the agricultural sector can have access to funds, get adequate materials needed for production, distribution and protection of food produced in the country. It is therefore expedient to boost the agriculture sector and its sub-systems to enable the achievement of food security in Nigeria.

In the light of the findings, it is recommended that there should be enough budgetary allocation to the agriculture sector. When this sector is known to affect virtually lives of economic agents, and the economy, then efforts to resuscitate and ensure complaints should be of utmost importance. In order to improve food and nutrition security, policies, programs, and investments must prioritize food availability and access, prevent excessive volatility in food prices, ensure easy access to the poor, make sure that the services support appropriate feeding and child care practices, mother and child health care services, and adequate access to clean water and sanitation to achieve Nigeria's goal of food security, it is expedient to treat all types of malnutrition, including obesity and dietary deficits. This entails addressing the global movement away from unhealthy food consumption patterns and toward diets high in energy and poor in nutrients. Also,



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smallholder farmers should be enabled to engage in and profit from national and international markets, there should be supply of public goods and assistance required to increase rural incomes and productive capacity, and promotion of agricultural development by investing in rural economies, both farm and non-farm. This is needed to achieve development, eliminate hunger in the country and eradicate hunger and malnutrition. Furthermore, concentrating on waste and food security along value chains is necessary to reduce food disease risks as a result of improved food-health system interfaces, particularly for food that is unfit for human consumption.

In addition, ensuring ethical food systems and agriculture investment can have a significant positive impact on Nigerian citizens by reducing inequality, promoting inclusive growth, and creating good jobs. Particularly, acknowledging that farmers are the primary investors in agriculture, involving small producers and their organizations fully in the development and implementation of national strategies for agriculture and food security, guaranteeing their secure tenure of land and enhancing their access to improved technology and innovation; and making sure they receive key public goods, such as functioning extension services, affordable financial services, market infrastructure, and price stabilization tools for both producers and consumers will strengthen agricultural investment. According to Igbiniedion and Aihie (2015), the government must implement rural finance policies that support alternative rural financial institutions, such as informal institutions that use financial intermediation rather than a purely credit approach, and savings mobilization that includes rural financial institutions, particularly in areas where it has been severely restricted. There is an immediate need to stop the rapid population expansion because of Nigeria's unsustainable pace of population increase. The country has to implement a plan of action that ensures family planning services are easily accessible. Additionally, the program ought to provide particular attention to rural areas, as these are home to the bulk of the impoverished who have been denied access to family planning services. The private sector of the economy must work together to achieve the specified objectives of agricultural development in Nigeria and, consequently, sufficient access to food for everybody. In this regard, the government must provide the favourable conditions for



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investment by formulating investment incentives and laws that would raise the purchasing power of the underprivileged and draw companies to rural areas.

In Nigeria, the administration and collection of oil rent and focus on other sectors in the country must be decentralized. This will improve Nigeria's food security position by holding the management of key sectors in the economy more accountable and ensuring appropriate divestment into other economic sectors, including agriculture.

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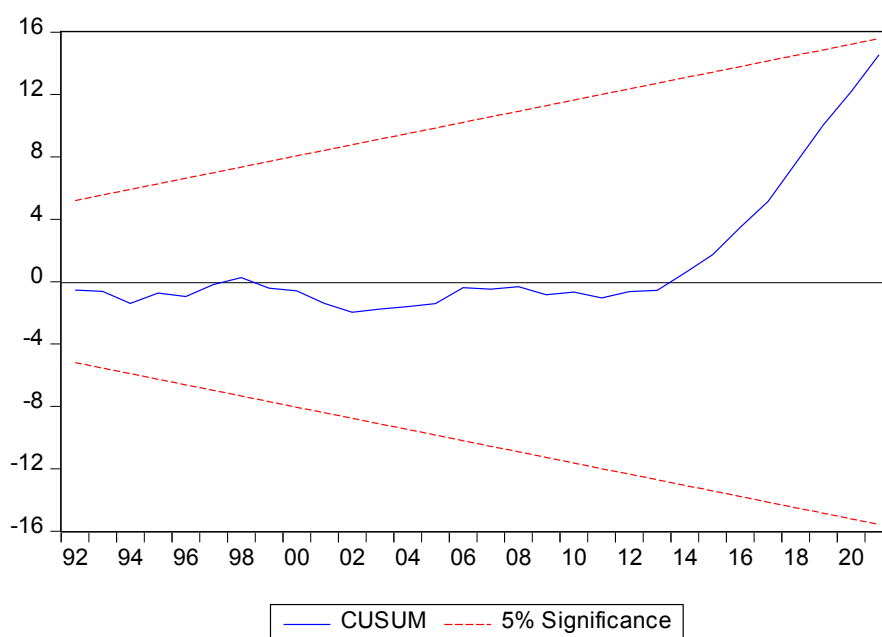


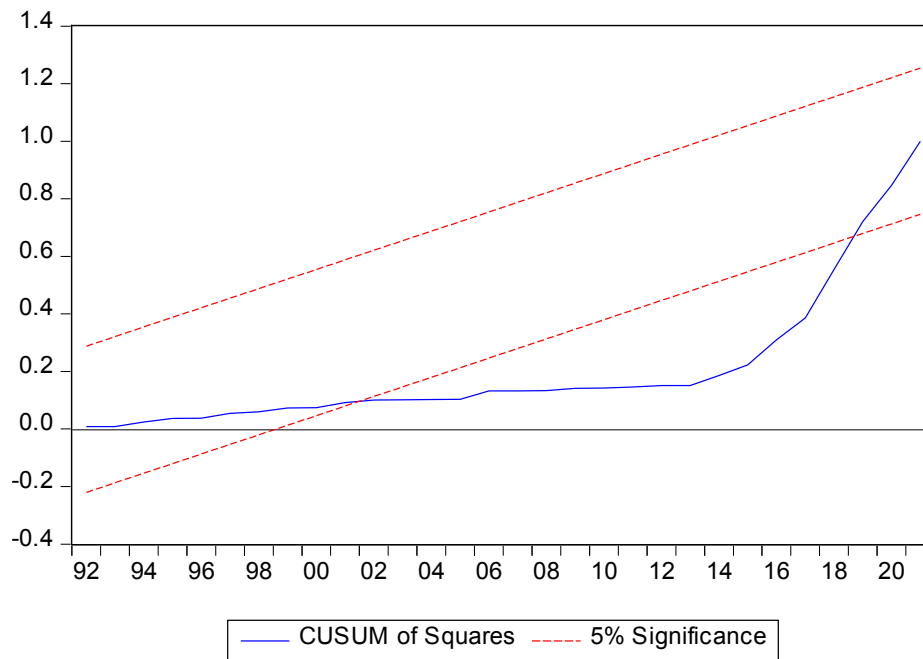
## Appendix

### Quantile Process result

| Quantile Slope Equality Test |          |                   |            |        |
|------------------------------|----------|-------------------|------------|--------|
|                              |          | Chi-Sq. Statistic |            | Prob.  |
| Wald Test                    |          | 10.71467          |            | 0.2184 |
| Symmetric Quantiles Test     |          |                   |            |        |
| Wald Test                    |          | 2.761649          |            | 0.7367 |
| Quantiles                    | Variable | Restr.<br>Value   | Std. Error | Prob.  |
| 0.25, 0.75                   | GFCF     | 1.145175          | 1.030624   | 0.2665 |
|                              | LGBA     | 7.459962          | 6.733127   | 0.2679 |
|                              | MS       | 1.169526          | 1.663772   | 0.4821 |
|                              | AGC      | 0.134364          | 1.130102   | 0.9054 |
|                              | C        | -81.94711         | 73.07724   | 0.2621 |

### Stability test





Quantile Process Estimates

