



**MACROECONOMIC DYNAMICS AND AGRICULTURAL SECTOR PERFORMANCE: A COMPARATIVE ANALYSIS OF SELECTED ECONOMIES IN AFRICA.**

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**Abstract**

*Agriculture is critical to numerous economies, particularly in Sub-Saharan Africa (SSA). It is essential for the socio-economic advancement of many countries due to its capacity to employ a significant portion of the population and its substantial contribution to national development. Despite its significant contribution to the economy of SSA, the performance of the agricultural sector has been poor in recent years, making it difficult for SSA nations to produce sufficient food needed for food security. Hence, this study investigated the impact of macroeconomic factors on agrarian output in selected African economies. The data for this study are secondary and were sourced from the World Development Indicator databases, covering the period from 2000 to 2023. The research utilised Least Square and the Dumitrescu and Hurlin Panel Causality Tests as estimation techniques. Findings indicated a positive and significant relationship between macroeconomic indicators like exchange rate, bank credit and FDI and agricultural output in the selected countries. Also, results showed a unidirectional causality between macroeconomic factors and agricultural output in the selected countries. Therefore, the study concluded that macroeconomic indicators like foreign direct investment, interest rates, exchange rates, and banking credit significantly impact agricultural output in emerging African economies. Consequently, the study recommended that governments in the selected countries should further strengthen and enhance the various components of macroeconomic conditions due to their significant impact on agricultural outputs in the selected economies.*

**Keywords:** Macroeconomic dynamics, Agricultural Performance, Least Square, Dumitrescu and Hurlin Panel Causality Tests.

GEL Classification: Q10, Q14, E3, E5, E6

**INTRODUCTION**

Agriculture fosters inclusive growth by propelling economic expansion, alleviating poverty, and generating employment opportunities, especially in emerging nations. Balie and Nelgen (2021), Mashinini *et al.* (2019) and Ahmad and Masron (2020) state that agriculture contributes significantly to the gross domestic product (GDP) and employs a substantial number of the workforce in developing countries. Furthermore, a larger percentage of the poor population in developing countries reside in rural regions, where most subsist either by direct or indirect agriculture (Gemayel *et al.*, 2025; Kargbo, 2000). The agricultural sector reigns supreme in many economies in Sub-Saharan Africa (SSA), substantially contributing to the regional Gross National Product (GNP) and employing the bulk of the workforce.

Significant part of the population in SSA countries resides in rural regions and relies on agriculture for subsistence. Akinwale (2023) emphasised that agriculture is a significant source of employment and foreign exchange in the SSA, significantly contributing to economic growth. Hence, agricultural productivity is crucial in these economies, serving as a major driver of long-term growth and a vital factor in maintaining food security. Given its contribution to employment, foreign exchange, food supply, poverty reduction, and linkage with other sectors of the economy, the agriculture sector is one of the most important sectors in SSA (Gemayel *et al.*, 2025). Undoubtedly, the performance of the agricultural sector in SSA closely reflects the performance of the economic system. Although agriculture is crucial to the region's economy, its performance has been less promising than other developing Asian countries. This is evident from the poor crop output and heavy dependence on grain imports. Nevertheless, poor natural soil fertility and growing population pressure have resulted in soil deterioration and nutrient depletion throughout the continent (Feyisa *et al.*, 2023).

The agricultural sector's underperformance, namely its decreasing productivity, has been recognised as a significant factor contributing to poverty in Africa (Hassan & Mohammed, 2024). Expanding the economy has emerged as the primary goal of most governments in emerging economies. Through the years, these governments have implemented various strategies to expedite the progress and advancement of the agricultural industry (Mukhebi *et al.*, 2024). To enhance the quality of life for the population, decrease unemployment rates, maximise capacity utilisation, and boost productivity, several economic strategies have been implemented in Sub-Saharan African countries to optimise the standard of living (Ozegbe & Oladele, 2024). Understanding how these macro policy changes have supported the enhancement of agricultural productivity and competitiveness in the region is crucial. Ubi and Udah (2019) stressed that exchange rates, interest rates, and the money supply level are crucial monetary factors that influence the expansion of the agriculture industry.

Moreover, the fluctuations in macroeconomic indicators are directly caused by the execution of monetary and fiscal policies, which impact agricultural production by influencing the exchange rate, inflation rate, net export, interest rate, government spending, and money supply (Bonny & Ayunku, 2024). The prevailing perspective is that implementing a tight monetary policy, which involves raising the interest rate, leads to a corresponding decline in the relative pricing of agricultural products. Conversely, a loose monetary policy has the opposite impact. The agricultural sector is undoubtedly influenced by fundamental economic factors such as exchange rates, money supplies, interest rates, absolute output levels, and the trade balance (Ibrahimov *et al.*, 2025; Cateia *et al.*, 2023). If effectively controlled, these factors can enhance the performance of the agricultural sector. Mukhebi *et al.* (2024) posited that money supply, central bank policies, and other purported factors would indeed contribute to predicting agriculture sector performance. Hence, this study investigated the influence of macroeconomic factors on the performance of the agricultural sector in Sub-Saharan African countries.

The agricultural industry in SSA countries has displayed remarkable success in the past decades, but its performance in recent years has been abysmal (Wudil *et al.*, 2022). The insufficient availability of economic resources for the agricultural sector in SSA has persistently hindered agricultural progress. Farmers in Sub-Saharan African countries consistently live below the

poverty line and have limited access to credit and employment opportunities in the agricultural sector (Cateia *et al.*, 2023). The agricultural industry consistently experienced smaller farm sizes, less output, lower revenue, and lower socio-economic status. Thus, this study aims to examine the influence of economic dynamics on the performance of the agricultural sector and assess the causal relationship between market risks and agriculture in Sub-Saharan Africa.

Several studies (Wudil *et al.*, 2022; Cateia *et al.*, 2023; Wanzala *et al.*, 2024; Bonny & Ayunku, 2024; Onakoya & Alayande, 2020; Ubi & Udah, 2019) have examined the impact of market risks on the performance of the agricultural sector. These studies employed numerous variables like inflation, interest, and exchange rates. However, external determinants such as government debt and foreign direct investment have not received specific focus. In addition, studies on the comparative analysis of market risks' effect on agricultural output are limited. Most of the studies (Ibrahimov *et al.*, 2025; Hassan & Mohammed, 2024; Cateia *et al.*, 2023; Onakoya & Alayande, 2020) focused on a single-country analysis, with only a handful of studying cross-countries, such as SSA states. This study's findings are crucial to the regulatory bodies responsible for policy development in the agricultural sector in SSA countries. Additionally, the industry's participants and regulators would consider this study's findings advantageous in determining the macroeconomic components that significantly affect agricultural outputs. The research is essential to the current body of knowledge on market risks and the agriculture sector's output in emerging economies.

## LITERATURE REVIEW

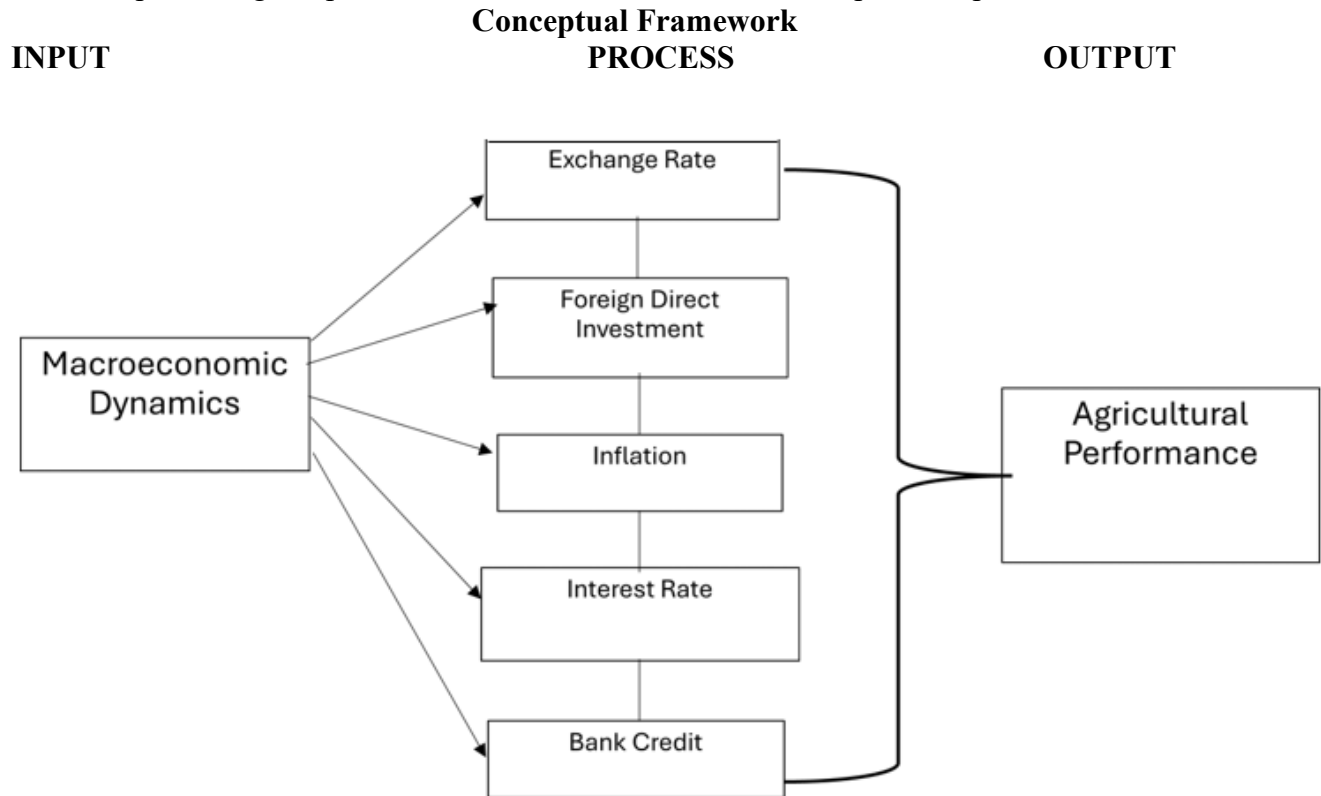
Macroeconomic indicators are economic parameters that describe an economy's structure, behaviour, and performance (Langemeier & DeBoer, 2022). They can be generally classified into real variables (e.g., output, employment, GDP), nominal variables (e.g., money supply, inflation), and policy variables (e.g., fiscal policy, interest rates). A macroeconomic factor examines economic phenomena such as aggregate production, income, employment rates, and the interconnectedness of many economic sectors (Wudil, 2022). These macroeconomic variables encompass gross domestic product (GDP) as a measure of economic growth, interest, currency, and inflation rates. A country's GDP quantifies the monetary worth of the goods and services produced by that country in a given year. Businesses can use the GDP as a benchmark to determine the optimal expansion or contraction of their production and other business operations since it represents the overall value of all produced goods and services. The GDP is a quantitative indicator of the total income and production of a specific country's economy (Hassan & Mohammed, 2024). Different theories have explained the relationship between macroeconomic dynamics and agricultural performance. For instance, the Keynesian Demand-Driven Theory explains how macroeconomic conditions like government spending, among others, boost consumer spending on agricultural products, which eventually improves agricultural performance. Similarly, the Monetary Policy and Interest Rate Theory explained the role of interest rate and money supply in shaping the demand for agricultural products. In addition, the Price Transmission Theory explains how Macroeconomic variables like inflation and global commodity prices influence agricultural output through price signals. Rising global crop prices can incentivise farmers to increase production, while high inflation in input costs (e.g., fuel and fertilisers) can reduce profitability, discouraging output.

Oluwatoyese *et al.* (2016) found a long-run relationship between macroeconomic variables and agricultural output. The study highlights the need for stable macroeconomic policies, improved

financial access, and targeted government support to enhance agricultural productivity in Nigeria. Onakoya and Alayande (2020) findings indicate that the oil sector positively influences agricultural output, contradicting the Dutch disease hypothesis. Additionally, exchange rate fluctuations positively affect agriculture, while interest and unemployment rates have negative impacts. Mashinini *et al.* (2019) relied on data from Eswatini to establish that, in the long run, agricultural GDP is negatively affected by exchange rates, inflation, broad money supply, and agricultural credit. In the short run, variations in agricultural GDP are primarily driven by lagged agricultural GDP, interest rates, exchange rates, and inflation. Boony and Ayunku (2024) relied on data from Nigeria while employing ARDL and the Cumulative Sum of Recursive Residuals as the estimation technique. Their findings revealed that macroeconomic factors significantly influence Nigeria's agricultural performance. Wanzala *et al.* (2024) established that macroeconomic components like the exchange rate significantly affect coffee exports in Kenya. Ubi and Udah (2019) study investigates the relationship between agricultural reforms, and agricultural productivity using the Autoregressive Distributed Lag (ARDL). The findings indicate that market size significantly influences agricultural productivity. However, real exchange rate fluctuations negatively impact productivity. Daudi and Muba (2025) rely on data from Tanzania to establish that market risks have a negative effect on agricultural growth. Higher exchange rates reduce competitiveness, high interest rates limit credit access for farmers, and inflation increases input costs, reducing productivity. Wudil *et al.* (2022), Cateia *et al.* (2023), and Ibrahimov *et al.* (2025) established that macroeconomic conditions significantly affect agricultural performance. While they established that each macroeconomic effect is different, they nonetheless established that macroeconomic variables are a major driver of agricultural performance. Salqaura *et al.* (2018) investigate the impact of fiscal policy on the agricultural sector in Java, Indonesia, using panel data regression with the Seemingly Unrelated Regressions (SUR) fixed-effect model. Results show that government expenditure positively influences food crops, plantation, livestock, and fishery subsectors. However, agricultural labour absorption negatively affects plantation and livestock, while foreign investment boosts livestock growth. Oyadeyi (2024) study on macroeconomic conditions and sectoral performance in Nigeria established that the agricultural sector is one of the main sectors that is greatly affected by the changes in the macroeconomic dynamics in Nigeria.

Relying on data from Malaysia, Kadir and Tunggal (2015) investigated whether the impact of market risks affects agricultural productivity. Findings show that no long-run relationship exists (except the exchange rate) among the variables considered. However, net exports, government expenditure, and interest rates significantly influence agricultural productivity in the short run. With data from Southern and Eastern Africa, Kargbo (2007) study revealed that local food production, income levels, trade policies, exchange rates, and money supply significantly influence real food prices. Exchange rate depreciation increases food prices, while restrictive trade policies create upward price pressures (Kargbo, 2010). The study highlights the need for stable macroeconomic policies, improved food production strategies, and better trade policies to enhance the region's food security and price stability. Mukhebi *et al.* (2024) investigate the impact of exchange rates on agricultural performance in Kenya. Their findings revealed that the exchange rate, which is a key macroeconomic component, has a significant effect on agricultural performance. Ahmad and Masron (2020) established that inflation statistically negatively affects Malaysian agricultural productivity. Inflation raises the prices of agricultural inputs like fertiliser, pesticides, and fuel, thus diminishing farmers' purchase power and profit levels. This is in line with both global and regional findings. For example, Langemeier and DeBoer (2022) illustrated that

inflation appreciably increases agricultural input prices in the United States, reducing profitability and production efficacy. Balie and Nelgen (2021) documented that macroeconomic trade policies and exchange rate movements strongly influence Sub-Saharan Africa's agricultural exports. Dercon and Gollin (2022) also established that persistent GDP expansion increases agricultural sector output through improved household demand and enhanced public expenditure.



Source: Author's Conceptualisation (2025).

### METHODOLOGY

*Ex post facto* research design was employed for the study. At the same time, secondary data was utilised, as data was drawn from the World Development Indicators (WDI) and the International Monetary Fund (IMF) databases covering 2000 to 2023. The focus of the study is the emerging economies in Africa. However, the sample size was restricted to Kenya, South Africa, and Nigeria. The countries were selected due to their high average number of agricultural companies in the region and the presence of Environment, Social, and Governance (ESG) reporting requirements on their respective stock exchanges, market development, and economic status. Least square and the Dumitrescu and Hurlin Panel Causality Tests were employed as the estimation technique.

#### Model Specification

The model of Kargbo (2007; 2010) was adopted for the study. The studies inferred that macroeconomic indicators significantly influence agricultural output. The original model is stated as follows:

$$AGROUT = f(INTR, EXRA) \dots \dots \dots (3.1)$$

Econometrically, it can be written thus:

$$AGROUT_{it} = \beta_0 + \beta_1 \Delta INTR_{it} + \beta_2 \Delta EXRA_{it} + \mu_i + \varepsilon_{it} \dots \dots \dots (3.2)$$

Where:

AGROUT= Agricultural Output (Proxy with the contribution of Agricultural Sector to GDP)

INTR= Interest Rate

EXRA= Exchange Rate

$\mu$ = Error term

$\beta_0$ = Constant

$\beta_1$  and  $\beta_2$  are the coefficients to be estimated.

$\mu$  = The unobserved country-specific effect

$\varepsilon$  = error term

Subscripts i and t indicate the country and time period.

The model was modified to address the research objectives. Other macroeconomic variables are crucial in agricultural output in emerging economies in Africa. Consequently, the modified model is specified as:

$$AGROUT = f(INTR, EXRA, INF, BC, FDI) \dots \dots \dots (3.3)$$

Econometrically, it can be written thus:

$$AGROUT_{it} = \beta_0 + \beta_1 \Delta INT_{it} + \beta_2 \Delta EXR_{it} + \beta_3 \Delta INF_{it} + \beta_4 \Delta BC_{it} + \beta_5 \Delta FDI_{it} + \mu_i \dots \dots \dots (3.4)$$

Where:

AGROUT= Agricultural Output (Proxy with the contribution of Agricultural Sector to GDP)

INTR= Interest Rate

EXRA= Exchange Rate

BC = Banking Credit (Proxy with Credit to the private sector to GDP)

INF = Inflation

FDI= Foreign Direct Investment

$\beta_1, \beta_2, \beta_3, \beta_4, \beta_5$  and  $\beta_6$  are the coefficients to be estimated

The Dumitrescu and Hurlin Panel Causality Tests were used to test for the direction of causality between agricultural output and components of macroeconomic variables specified in the model.

$$The\ model\ is\ specified\ as\ AGROUT_t = \alpha + \sum_{i=1}^n \beta_i MC_{t-i} + \sum_{i=0}^{b_1} \theta_i lnAGROUT_{t-i} + \Omega t \dots (3.5)$$

So for agricultural output, granger causality for macroeconomic variables is specified as:

$$MC_t = \alpha + \sum_{i=1}^n \beta_i AGROUT_{t-i} + \sum_{i=0}^{b_1} \theta_i lnMC_{t-i} + \Omega t \dots \dots \dots (3.6)$$

Where:

MC= Macroeconomic variables

AGROUT = Agricultural Output (Proxy with the contribution of Agricultural Sector to GDP)

In order to capture macro-economic variables that directly influence agricultural output, the model was converted to the ARDL-ECM as:

$$\begin{aligned} \Delta \ln AGROUT_t = & \beta_0 + \beta_1 \Delta \ln AGROUT_{t-1} + \beta_2 \Delta FDI_t + \beta_3 \Delta FDI_{t-1} + \beta_4 \Delta \ln EXR_t + \\ & \beta_5 \Delta \ln EXR_{t-1} + \beta_6 \Delta \ln BC_t + \beta_7 \Delta \ln BC_{t-1} + \beta_8 \ln FL_t + \beta_9 \ln FL_{t-1} + \beta_{10} \Delta \ln TRA_t + \\ & \beta_{11} \Delta \ln TRA_{t-1} + \beta_{12} ECM_{t-1} + \mu_t \dots \dots \dots (3.7) \end{aligned}$$

Note: All terms are as defined in model one.

## RESULTS AND DISCUSSION

**Table 1: Descriptive Statistics**

Statistics	AGROUT	EXRA	FDI	INF	INT	BC
Mean	1322.0	68.8	319210.5	21.2	13.7	2993.0
Median	620.2	22.1	110456.2	12.0	13.5	525.6
Maximum	7233.3	157.5	127877.0	76.8	26.0	15689.0
Minimum	27.1	0.8	721.8	0.2	6.0	23.4
Std. Dev.	1746.3	61.2	433180.2	20.0	4.2	4754.2
Skewness	1.9	0.2	1.2	1.5	0.7	1.7
Kurtosis	6.5	1.2	3.9	3.9	4.0	4.5
Jarque-Bera	32.6	3.9	7.4	11.8	3.3	16.4
Probability	0.0	0.1	0.0	0.0	0.2	0.0
Observations	27	27	27	27	27	27

Source: Authors computation (2025)

The descriptive statistics of the variables of this study is presented in table 1 It shows that the average AGROUT, EXRA, FDI, INF, INT, BC, and PD over 27 years are about 1322.0, 68.8, 319210.5, 21.2, 13.7, 2993.0 and 1224.4 in their respective units. It also shows that all the variables significantly varied over the period, as indicated by the large margins between the Minimum and maximum values of all the variables and the large Standard deviations. So, the study of their movements over the period becomes important. The Skewness shows that all variables are positively skewed. On kurtosis, the distribution of a series is leptokurtic when the kurtosis is more significant than three, and it is platykurtic when the kurtosis is less than three. So, the AGROUT, FDI, INF, INTR and BC series are leptokurtic (i.e., evidence of a fatter tail than the normal distribution). At the same time, EXR is platykurtic (i.e., evidence of a thinner tail than the normal distribution). The Jaque-Bera statistics is significant (probability value of the statistics is less than 5%) for AGROUT, FDI, INF and BC, while it is insignificant (probability value of the statistics is greater than 5%) for all other variables. This indicates that the dependent variable is not normally distributed. Since the appropriate statistics show that the dependent variable is not normally distributed, using the Ordinary Least Square estimator is inappropriate.

**Table 2: Correlation Coefficients**

EXRA	1.00				
FDI	0.06	1.00			
INF	-0.08	-0.05	1.00		
INT	-0.03	0.02	-0.02	1.00	
BC	0.19	0.13	0.01	0.06	1.00

Source: Author's Computation, (2025)

Multicollinearity, the interdependence among independent variables, poses a significant challenge in multiple regression models as it results in biased coefficient estimations, compromising the reliability of the regression outcomes. The study ran a pair-wise correlation test to assess the presence of multicollinearity. The correlation analysis results indicated that all correlation coefficients among the independent variables are below 0.5, signifying an absence of a significant multicollinearity among them.

**Table 3. Dumitrescu-Hurlin Panel Causality Tests for the Selected Economies in Africa**

Agricultural Output (AGROUT)			
Null Hypothesis:	W-Stat.	Zbar-Stat.	Prob.
AGROUT does not cause EXR	3.077	-1.665	0.006*
EXR does not cause AGROUT	5.673	-0.241	0.808
AGROUT does not cause FDI	4.711	-0.769	0.442
FDI does not cause AGROUT	5.362	-0.411	0.681
AGROUT does not cause INF	2.748	0.635	0.525
INF does not cause AGROUT	2.103	-0.144	0.885
AGROUT does not cause INT	2.608	0.347	0.000*
INT does not cause AGROUT	11.863	- 0.323	0.746
AGROUT does not cause BC	3.874	-0.915	0.3602
BC does not cause AGROUT	4.154	-0.801	0.4234

Source: Author's Computation (2025).

The Dumitrescu-Hurlin Panel Causality tests for the African emerging economies result in table 3 indicated that AGROUT has a causal relationship with macroeconomic variables except for EXR and INT while PD granger causes AGROUT. Hence, the null hypothesis is rejected because most of the P-values of Z-bar statistics are insignificant. Consequently, one can infer a causality between AGROUT and macroeconomic variables.

**Table 4: Result of Unit Root (Stationarity) Test**

Variables	Augmented dickey fuller (ADF)	5% Critical level	Philips-Perron (PP)	5% critical level	Order of integration	
					ADF	PP
AGROUT	-4.056	-3.558	-3.799	-3.553	I(1)	I(1)
EXR	-5.268	-3.553	-5.268	-3.553	I(1)	I(1)
FDI	-3.921	-3.603	-4.912	-3.574	I(0)	I(0)
INF	-3.875	-3.622	-4.080	-3.558	I(0)	I(0)
INT	-7.957	-3.553	-3.055	-2.951	I(1)	I(0)
BC	-2.112	-1.955	-203.199	-3.553	I(1)	I(1)

Source: Authors computation (2025)

The results of both the Augmented Dickey-Fuller and Phillips-Perron tests indicate that FDI, INF, and INT are stationary at levels. AGROUT, EXR, and BC are integrated of order one, denoted as I(1), indicating they are stationary at the first difference, whereas the former is integrated of order zero, I(0). However, the Augmented Dickey-Fuller test indicates that INT is I(1), whereas the Phillips-Perron test suggests that the variable is I(0). The Philips-Perron test is preferred in this instance as it addresses potential heteroscedasticity. FDI, INF, and INTR exhibit stationarity at the level. The ARDL Bound Test of cointegration is performed to provide further clarification, which combines I(0) and I(1), and the results are presented below.

**Table 5: Co integration Test (Bound Testing Approach)**

Model	Test F-Statistic	5% Critical Value Bounds	
		Lower Bound (I <sub>0</sub> )	Upper Bound (I <sub>1</sub> )
AGROUT model for Kenya	4.21	2.14	3.35
AGROUT model for Nigeria	3.63	2.14	3.35
AGROUT model for South Africa	4.04	2.14	3.35

Source: Authors computation (2025)

The results for the on-integration test in table 5 show that the F-statistics for the AGROUT models are 3.59, 4.21, 3.63, and 4.04, respectively, with a critical upper bound value of 3.35. The F-stat for the models exceeded the critical value of the upper bound across all models, indicating that the null hypothesis was rejected. Therefore, the result indicates the presence of cointegration across all models. The ARDL bound test of cointegration indicates a long-run relationship among the variables.

**Table 6: Result for Agricultural Output in Kenya**

$\Delta$ AGROUT	Coefficient	Std. Error	T-statistic	Prob.
C	1.343	1.729	0.776	0.450
$\Delta$ AGROUT (-1)	0.662	0.130	5.093	0.000*
$\Delta \ln$ EXR (-1)	-3.191	1.468	-2.175	0.045**
$\Delta \ln$ (EXR)	-4.049	2.058	-1.967	0.072***
$\Delta \ln$ BC	3.421	1.340	1.985	0.006*
$\Delta \ln$ BC (-1)	4.010	1.183	1.963	0.002*
$\Delta \ln$ FDI	-1.237	0.375	-2.900	0.033**
$\Delta \ln$ FDI (-1)	-1.946	0.459	-2.334	0.023*
$\Delta$ INFL	0.036	0.045	0.799	0.438
$\Delta$ INFL (-1)	-0.050	0.044	-1.161	0.265
$\Delta$ INTRA	0.379	0.281	1.347	0.199
$\Delta$ INTRA (-1))	0.547	0.314	1.742	0.103
ECTAGROUT (-1)	-0.250	0.109	-2.284	0.039**

R-squared	0.779	F-statistic	10.745
Adjusted R-squared	0.695	Prob(F-statistic)	0.000
Log-likelihood	-69.780	Durbin-Watson stat	2.049

Source: Authors computation (2025)

The result in table 6 revealed a positive relationship between the previous value of agricultural output (AGROUT (-1)) and its current value, with a coefficient of 0.662 and p-value of 0.000. The t-statistic of 5.094 indicates a statistically significant relationship at the 1% significance level. The findings show that agricultural outputs are inversely related to the exchange rate ( $\Delta \ln \text{EXR}$ ) and its first lag ( $\Delta \ln \text{EXR}(-1)$ ), exhibiting coefficients of -4.049 and -3.191 and a p-value of 0.072 and 0.045, respectively. An increase (depreciation) in the exchange rate would result in a decrease in agricultural output. This may be attributed to the decline in the purchasing power of the populace and the difficulty in accessing the necessary equipment to improve agricultural production. The result also shows that bank credit and the first lag of bank credit positively and significantly affect agricultural output in Kenya. However, FDI and its first lag negatively and significantly affect agricultural output in Kenya. This implies that as FDI increases, agricultural output in Kenya decreases. This may be attributed to the inability of the domestic companies to compete with their foreign counterpart. The increase in FDI may crowd out the local companies engaged in agricultural production and ultimately reduce agricultural performance.

**Table 7: Result for Agricultural Output in Nigeria**

$\Delta \ln \text{AGROUT}$	Coefficient	Std. Error	T-statistic	Prob.
C	-0.043	0.0715	-0.596	0.562
$\Delta \ln \text{AGROUT}(-1)$	0.897	0.319	2.811	0.016**
$\Delta \ln \text{EXR}$	-0.167	0.066	-2.524	0.006*
$\Delta \ln \text{EXR}(-1)$	0.140	0.099	1.418	0.182
$\Delta \ln \text{BC}$	2.816	8.925	3.146	0.008*
$\Delta \ln \text{BC}(-1)$	1.105	9.157	1.199	0.254
$\Delta \ln \text{FDI}$	0.107	0.059	1.812	0.085***
$\Delta \ln \text{FDI}(-1)$	0.098	0.050	1.966	0.073***
$\Delta \ln \text{NFL}$	-0.004	0.002	-2.263	0.043**
$\Delta \ln \text{NFL}(-1)$	-0.001	0.001	-0.341	0.739
$\Delta \ln \text{INTRA}$	-0.011	0.009	-1.221	0.246
$\Delta \ln \text{INTRA}(-1)$	-0.002	0.009	-0.143	0.889
$\text{ECTAGROUT}(-1)$	-0.621	0.260	-2.391	0.007*
R-squared	0.767	F-statistic	9.082	
Adjusted R-squared	0.739	Prob(F-statistic)	0.008	
Log-likelihood	48.307	Durbin-Watson stat	2.007	

Source: Authors computation (2025).

An analysis of the short-run relationship between agricultural output and market risk variables indicated that change in the natural logarithm of agricultural output ( $\Delta \ln \text{AGROUT}$ ) exhibits a

positive relationship with the first and second-period lags of the same variable ( $\Delta \ln \text{AGROUT}(-1)$ ) 0.897 with a p-value of 0.016. Also, the coefficient of the lagged exchange rate ( $\Delta \ln \text{EXRA}(-1)$ ) is -0.167 with a p-value of 0.006, exhibiting an inverse relationship. This implies that a 1% increase in the exchange rate (depreciation) shall lead to a 0.167% decrease in agricultural output in Nigeria, assuming all other factors remain constant. Also, in Table 7, the result further indicated that the change in the natural logarithm of agricultural output is positively related to the first and second lags of the change in the natural logarithm of foreign direct investment ( $\Delta \ln \text{FDI}$ ) 0.107 with a p-value of 0.085 and  $\Delta \ln \text{FDI}(-1)$  0.098 with a p-value of 0.073 respectively. Thus, an increase in FDI will lead to a positive and significant rise in Nigeria's agricultural output. This is contrary to what is obtainable in Kenya. The difference in result may be attributed to other factors, such as the resilience of the agricultural business in Nigeria, among others.

With a coefficient of 2.816 and a p-value of 0.006, bank credit (BC) shows a positive and statistically significant effect on agricultural output in Nigeria. This implies that with an increase in bank credit to agricultural firms and farmers, agricultural output in Nigeria will increase significantly, all this being equal. However, the inflation rate with a coefficient of -0.004 and p-value of 0.043 indicated that agricultural output declines significantly as the inflationary trend increases in Nigeria. The inverse relationship may be attributed to the decline in the purchasing power of the populace whenever inflationary pressure increases. A decline in the purchasing power of the populace may lead to their inability to afford some agricultural products, which may ultimately force farmers to reduce their production capacity.

**Table 8: Result for Agricultural Output in South Africa**

Variable	Coefficient	Std. Error	T-statistic	Prob.
C	-10.117	2.994	-3.379	0.012**
AGROUT(-1)	9.974	3.002	3.322	0.013**
FDI(-1)	9.400	2.933	3.205	0.016**
EXR	-2.130	0.093	-1.977	0.005*
EXR (-1)	-2.083	0.077	-1.975	0.005*
BC	0.336	0.413	0.814	0.443
BC(-1)	4.601	1.491	3.087	0.018**
INFL	-1.645	6.664	-2.462	0.043**
INFL(-1)	-7.694	2.400	-3.200	0.015**
INTRA	-3.313	1.554	-0.021	0.984
INTRA(-1)	-8.023	2.484	-3.229	0.015**
ECTAGROUT(-1)	-0.928	0.250	-3.705	0.008*
R-squared	0.705	Mean dependent var	5.571	
Adjusted R-squared	0.662	S.D. dependent var	3.732	
S.E. of regression	2.169	Akaike info criterion	4.535	
Sum squared resid	32.919	Schwarz criterion	5.455	
Log-likelihood	-39.960	Hannan-Quinn criterion.	4.800	
F-statistics	9.5261.935	Prob (F-stat)	0.003	

Durbin-Watson stat

Source: Author’s Computation, (2025).

Table 8 findings indicated a positive relationship between FDI and BC with AGROUT, whereas EXR, INFL, and INTRL exhibited an inverse relationship with AGROUT. The increase in foreign direct investment and banking credit shall positively enhance agricultural output, whereas rising exchange rates, inflation, and interest rates hinder agricultural output in South Africa. The results indicate that lagged AGROUT, FDI, EXR, BC, INFL, and INTRA are statistically significant. The results from the three economies (Kenya, Nigeria, and South Africa) in Africa examined give credence to the postulation that macroeconomic dynamics are a major driver of agricultural output in the emerging economies of Africa. Consequently, the postulation that macroeconomic variables do not significantly influence agricultural output in countries must be dismissed.

**Table 9: Diagnostic Test for the Models**

Models	Breusch-Pagan-Godfrey Heteroscedasticity Test:		Breusch-Godfrey Serial Correlation LM Test	
	F-statistic	P- value	F-statistic	P-value
AGROUT model for Kenya	2.825	0.102	0.479	0.631
AGROUT model for Nigeria	2.511	0.143	0.287	0.757
AGROUT model for South Africa	2.773	0.215	0.432	0.532

Source: Author’s computation, (2025).

The heteroscedasticity test is typically performed to determine whether heteroscedasticity, or the variability of variance within the series, exists in the model. The null hypothesis of the test shows that the series exhibits homoscedasticity, indicating the absence of heteroscedasticity. The null hypothesis is dismissed when the probability value of the F-statistics from the test falls below a significance level, typically set at 5%. The results of the Breusch-Pagan-Godfrey test for heteroscedasticity, as displayed in table 9, indicate F-statistics of 2.825, 2.511, and 2.773, with p-values of 0.102, 0.143, and 0.215 for the AGROUT model applied to Kenya, Nigeria, and South Africa, respectively. Given that the p-values exceeded 5%, the null hypothesis remains accepted. The test indicates the absence of heteroscedasticity across models.

The Serial Correlation LM test shows that the null hypothesis posits the absence of serial correlation. The error terms across various periods exhibits no correlation. The null hypothesis is rejected when the probability value of the F-statistics falls below a predetermined significance level, typically set at 5%. This study presents the F-statistics for serial correlation tests across the models: the AGROUT model for Kenya yields 0.479, the AGROUT model for Nigeria shows 0.287, and the AGROUT model for South Africa records 0.432. Given that the probability values of the F-statistics for the respective models exceed the 5% significance level, we accept the null hypothesis, leading us to conclude that no serial correlation is present in any of the models.

Consequently, the outcomes of the models are devoid of issues related to heteroscedasticity and serial correlation (autocorrelation).

The study examines the macroeconomic dynamics and agricultural sector performance in selected African countries. For Kenya, the lag value of FDI and FDI significantly and positively affect agricultural performance. This finding aligns with Cateia *et al.* (2023), Hassan and Mohammed and Salqaura *et al.* (2018) that FDI is a major driver of agricultural performance. Similarly, exchange rate (EXR), bank credit lag value, and exchange rate all significantly and positively affect agricultural performance. These findings also align with that of Mukhebi *et al.* (2024), Boony and Ayunku (2024) and Balie and Nelgen that bank credit and a favourable exchange stimulate agricultural sector growth.

Only the lag values of EXR and FDI significantly affect agricultural performance in Nigeria. These findings align with Oluwatoyese *et al.* (2016), Onakoya and Alayande (2020), Oyadeji (2024) and Wanzala *et al.* (2024) postulation that macroeconomic factors play a significant role in the performance of the agricultural sector. The Keynesian demand-driven, monetary and interest rate and price transmission theories also support the findings. Also, bank credit and inflation have a significant effect on agricultural performance. This is not surprising as access to bank credit can encourage farmers to expand their businesses to meet customer demands. Similarly, inflation may reduce people's purchasing power, ultimately reducing their spending on agricultural products. The finding also aligns with that of Bonny and Ayunku (2024).

For the role of macroeconomic dynamics on agricultural performance in South Africa, findings show that the lag value FDI, EXR, bank credit, inflation and interest rate all have a significant and positive effect on agricultural performance. These findings align with the findings of Ahmad and Hassan (20202), Daudi and Muba (2025) and Kargbo (2000, 2007) that macroeconomic dynamics is a major driver of agricultural performance because of its ability to influence the purchasing power of the people and also to encourage/discourage farmers. Also, inflation and EXR rates equally significantly affect agricultural performance. A high inflationary trend can reduce the purchasing power of the people, which ultimately reduces what they can spend their disposable income on. Similarly, a change in exchange rate may either encourage or discourage importation, making it difficult for farmers to import the equipment required for production. These findings also align with Ibrahim *et al.* (2025) macroeconomic conditions stimulate the growth of the agricultural sector. The findings of this study also revealed that there is a causal relationship between macroeconomic variables and agricultural performance in the selected economies. The study notably demonstrated a unidirectional causality between macroeconomic variables and agricultural performance.

## CONCLUSION AND RECOMMENDATIONS

Motivated by the economic challenges and food insecurity in SSA, this study examined the effect of macroeconomic components on agricultural output in selected African countries. Based on the findings, the study concluded that macroeconomic variables significantly affect agricultural output in the selected economies. The study infers further that causality exists between macroeconomic factors and agricultural output in selected economies. More importantly, a uni-directional effect runs between the selected countries. Consequently, this study recommended that greater measures be implemented to strengthen the macroeconomic variables like EXR, FDI, and inflation because

of their significant impact on agricultural performance across the three selected economies. A favourable exchange rate makes the importation of equipment easier, while lower inflation increases the resources available to the people to spend on agricultural products. Finally, the respective government should implement measures to make bank credit available to farmers, especially in rural areas where most farmers reside. Access to bank credit at a reasonable rate would encourage borrowing, which would, in turn, boost production.

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