

**An Empirical Analysis of the Nexus Between Monetary Policy and  
Agricultural Output in Sierra Leone (1980-2024)**

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**Abstract**

Sierra Leone, irrespective of being a small developing country, is extremely endowed with vast potential in agricultural products. The agricultural sector, despite the fact that it contributes to the country's Gross Domestic Product (GDP) and employs majority of the population, has not been able to improve the country's development index in terms of food security.

The study investigates and analyses the effect of monetary policy on agricultural output in Sierra Leone for the period 1980-2024.

The study employs annual time series secondary data obtained from various sources such as World Development Indicators (WDI), World Bank, International Monetary Fund (IMF), International Financial Statistics, Financial Sector Deepening Africa (FSDA), Statistics Sierra Leone (Stats SL), and Bank of Sierra Leone (BSL) Bulletin. Key macroeconomic variables such as agricultural output, money supply, exchange rate, inflation, lending rate, and domestic credit to private sector are specified in the model. The variables were tested for stationarity using unit root tests before adopting the Autoregressive Distributed Lag (ARDL) technique in running regression for the purpose of obtaining both long-run and short-run effects of monetary policy on agricultural output in Sierra Leone. Various diagnostic tests were carried out to determine the robustness of the model using appropriate econometric criteria.

The study empirically reveals that exchange rate, lending rate, and money supply had negative effect on agricultural output in Sierra Leone both in long-run and short-run for the period being investigated, while inflation and domestic credit had positive effect on agricultural output in Sierra Leone for both the long-run and the short-run. Furthermore, the study reveals that domestic credit to the private sector was the most effective tool for boosting agricultural productivity followed by lending rate. The study shows that money supply was the least effective tool as its changes did not translate into agricultural output gains, rendering it ineffective as a stand-alone tool in agricultural sector for the period being considered.

The study, therefore, proffers strategic recommendations such as the need to prioritise expansion of agricultural credit access, implement favourable lending rate policies to agriculture, enhance monetary policy transmission to rural areas, integrate monetary policy with the “Feed Salone Initiative”, and promote financial inclusion through rural banking and mobile finance platforms, among others.

## **1. Introduction**

Agriculture has historically been the backbone of Sierra Leone’s economy, employing a significant proportion of the population, contributing to food security, and serving as a vital source of rural livelihoods. Despite its importance, agricultural output in Sierra Leone has been marked by fluctuating performance over the past four decades, influenced by both domestic and external shocks. At the same time, monetary policy has remained one of the central tools through which governments attempt to stabilise economies, control inflation, regulate interest rates, and stimulate growth. The intersection of monetary policy and agricultural productivity therefore raises critical questions about how macroeconomic management shapes sectoral outcomes in developing economies such as Sierra Leone.

From 1980 to 2024, Sierra Leone’s agricultural sector has faced multiple challenges, including civil conflict, limited access to credit, inadequate infrastructure, and vulnerability to climate shocks. Concurrently, the country has undergone significant monetary policy reforms—ranging from exchange rate liberalisation, structural adjustment programs, and inflation-targeting measures to post-war stabilisation and financial sector reforms. These policy shifts have had direct and indirect implications for agricultural performance, influencing input costs, farmers’ access to credit, investment decisions, and the overall competitiveness of the sector. Understanding the nexus between monetary policy and agricultural output is therefore essential for evaluating the effectiveness of macroeconomic policies in achieving inclusive and sustainable growth.

Empirical evidence across developing countries suggests that monetary policy can affect agricultural output through multiple channels. Expansionary monetary policies—such as low interest rates and increased money supply—may improve access to agricultural financing, reduce the cost of capital, and stimulate production. Conversely, contractionary policies aimed at controlling inflation may constrain credit flows, increase borrowing costs, and limit farm investments. In Sierra Leone, where the agricultural sector is predominantly smallholder-based and credit-constrained, the sensitivity of agricultural output to monetary policy decisions may be particularly pronounced. Yet, the empirical relationship between these two variables remains underexplored in the country’s context, creating a gap in the literature and policymaking discourse.

This study seeks to fill this gap by empirically analysing the nexus between monetary policy and agricultural output in Sierra Leone over the period 1980–2024. By examining key monetary policy variables such as money supply, interest rates, inflation, and exchange rates, alongside agricultural output performance, the study aims to provide evidence-based insights into the

extent to which monetary policy has influenced agricultural productivity. Such an inquiry is timely and relevant, as Sierra Leone continues to grapple with the twin challenges of macroeconomic instability and the urgent need to transform its agricultural sector to drive economic diversification, food security, and sustainable development.

## **2. The Problem Statement**

Agriculture remains the dominant sector of Sierra Leone's economy, employing over half of the population and providing the foundation for food security and rural livelihoods. However, the sector's contribution to gross domestic product (GDP) has remained volatile and largely below its potential, undermined by structural bottlenecks, limited access to finance, and high vulnerability to both domestic and external shocks. At the same time, monetary policy—through its instruments of money supply, inflation control, interest rates, and exchange rate management—has been one of the government's key macroeconomic tools for influencing growth and stability. Yet, the extent to which monetary policy has effectively translated into improved agricultural output in Sierra Leone is unclear and empirically underexplored.

Over the period 1980–2024, Sierra Leone has experienced significant shifts in monetary policy, from structural adjustment reforms in the 1980s and 1990s, to post-conflict stabilization measures in the 2000s, and more recent inflation-targeting and financial sector reforms. Despite these efforts, the agricultural sector continues to struggle with low productivity, weak competitiveness, and persistent reliance on subsistence farming. This raises a critical question as to whether monetary policy interventions have been appropriately designed or effectively transmitted to stimulate agricultural growth. Moreover, given the sector's dependence on smallholder farmers who are often credit-constrained and highly sensitive to price fluctuations, the transmission mechanism of monetary policy to agricultural output may differ significantly from other sectors of the economy.

Existing empirical studies on monetary policy in sub-Saharan Africa have produced mixed and often contradictory results, with limited country-specific evidence for Sierra Leone. This paucity of research leaves policymakers without adequate empirical grounding to assess whether the central bank's monetary strategies have been supportive of agricultural development, or whether they have inadvertently constrained growth through high lending rates, inflationary pressures, or exchange rate volatility. The absence of such evidence represents a critical knowledge gap, particularly at a time when Sierra Leone urgently seeks to diversify its economy away from dependence on minerals and harness agriculture as a driver of inclusive and sustainable growth. Therefore, the central problem this study addresses is the lack of empirical evidence on the nexus between monetary policy and agricultural output in Sierra Leone. Without a clear understanding of this relationship, monetary policies risk being designed in isolation from the realities of the agricultural sector, leading to ineffective interventions and missed opportunities for boosting food security, employment, and long-term economic stability.

Directly derived from the problem statement are the following well-structured research questions:

1. What is the relationship between monetary policy variables (money supply, interest rates, inflation, and exchange rates) and agricultural output in Sierra Leone between 1980 and 2024?
2. How have changes in money supply influenced agricultural productivity in Sierra Leone during the study period?
3. To what extent have interest rate policies affected farmers' access to credit and agricultural output in Sierra Leone?
4. What impact does inflation have on agricultural output and input costs in Sierra Leone?
5. How has exchange rate volatility influenced agricultural performance and competitiveness in Sierra Leone?
6. What is the long-run versus short-run effect of monetary policy on agricultural output in Sierra Leone?

### **3. Literature Review**

#### *3.1 Theoretical Literature*

The effect of monetary policy on agricultural output is supported by several macroeconomic and development theories propounded by different economists on the basis of economic literature. The following theories provide insight into the expected relationship between monetary variables and agricultural performance in both developed and developing countries.

#### **Keynesian Theory of Monetary Policy**

Keynes (1936) argued that lending rate as a specific type of interest rate that refers to the rate at which lenders (example, banks) charge borrowers (example, individuals or businesses) to borrow money is determined by the demand for and supply of money. Lower lending rates, influenced by expansionary monetary policy, encourage borrowing and investment, including in the agriculture sector. Thus, monetary policy tools like money supply can influence agricultural productivity via lending rate changes.

He expressed that, his theory composed of three concepts namely; the investment multiplier, the marginal efficiency of capital and the lending rate. By analysing how these three concepts interact in the short period, Keynes explains why he is opposed to counter-cyclical monetary policies. And by analysing how they interact in the long period, he explains why the economy tends to fluctuate around a long-period equilibrium position that is characterised by unemployment. Keynes concludes that the sole objective of the monetary authority should be to use its influence over the lending rate to dislodge the economy from its long-period equilibrium position that is characterised by unemployment and propel it towards full employment.

#### **Monetarist Theory**

Monetarism (also referred to as “monetarist theory”) is a fundamental macroeconomic theory that focuses on the importance of the money supply as a main driver for economic growth. Subscribers to monetary economics believe that money supply is a primary determinant of price levels and inflation.

Increasing money supply, according to the theory, inevitably leads to higher prices and inflation, while decreasing the money supply leads to deflation and risks, causing a recession.

Changes in the money supply also affect employment and production levels, but the monetarist theory asserts that those effects are only temporary, whilst the effect on inflation is more long-lasting and significant.

Most central bankers prescribe to monetarist theory by using their key policy rate in an attempt to control money supply, thereby controlling inflation and economic growth. This is commonly referred to as monetary policy, as opposed to fiscal policy, which aims to target government taxes and/or control government spending.

#### Classical Theory of Interest Rates

The overarching theme of classical economics is that supply will equal demand if the market is allowed to operate freely. Demand and supply are brought into balance by the adjustment of the price of the good being traded. Well known classical economists include Adam Smith, David Ricardo and John Stuart Mill. In the classical theory, interest rates are determined by the interaction between savings and investment.

The amount of savings in this theory is directly related to the interest rate. The higher the interest rate, the more people will save. Economists view savings as unspent income, and include bank deposits and investments in stocks, bonds and real estate.

As posited that the amount of savings and investment were equated by a fluctuating interest rate. Economists and government policy makers have found that both savings and investment are not just influenced by changes to the interest rate; investment is also influenced by prices and government taxes and other policies. But even taking these variables into account, economists cannot explain all of fluctuations in investment. Influential British economist, John Maynard Keynes, hypothesised that investment is dependent on the "animal spirits" of entrepreneurs. In other words, interest rates are definitely important in savings and investment, but they don't tell the whole story.

In the context of agriculture, higher interest rates led by tight monetary policy increase the cost of credit, thereby limiting farmers' access to affordable loans. This can decrease investment in agricultural inputs, and expansion, ultimately leading to lesser productivity and output.

According to Ricardo (1817) and Marshall (1890), capital accumulation (including in sectors like agriculture) depends on the supply of savings and their cost (interest rate), both of which are influenced by monetary conditions.

#### Structuralist Theory

The key aspects of structuralist school of thought were proposed by Raul Prebisch, first Executive Director of Economic Commission for Latin America (ECLA) and Brazilian economist, Celso Furtado. They broadly divided the world into Core nations (highly industrialised, wealthy, and exert significant global influence), and Periphery nations (less

developed and economically dependent) and articulated the unequal terms of trade that exist between core and periphery nations. They cited the experiences of Latin American nations such as Chile. Breaking away from this unequal trade relation requires rapid development through fast-paced industrialisation.

The Structuralists argued that the only way Third World countries can develop is through action by the state. They need to push industrialisation and reduce their dependency on trade with the First World, and trade among themselves. Structuralism focuses on policy prescriptions including major government intervention in the economy to fuel the industrial sector, known as Import Substitution Industrialisation (ISI). ISI is the initiative for ending the reliance of the underdeveloped countries on exports of primary goods such as agricultural and mining products. It shields the domestic economy from that of the developed economies. The underdeveloped economy is protected by the trade barriers and promotion of domestic industrial substitutes. Structuralist economists, especially those analysing developing countries, argued that the transmission of monetary policy into the real sector (like agriculture) is often weak due to structural bottlenecks. Taylor (1983) points out that poor infrastructure, underdeveloped financial markets, and reliance on rain-fed agriculture weaken the effectiveness of monetary instruments.

#### Transmission Mechanism of Monetary Policy

The Monetary Policy Transmission Mechanism (MPTM) is a theoretical framework describing how central banks' policy actions, such as adjustments to lending rates, influence economic stability, growth, aggregate demand, inflation, and output.

This mechanism operates through several channels. The Lending Rate Channel refers to changes in policy rates that directly affect borrowing costs, influencing consumer spending and business investment. The Credit Channel includes two sub-channels: which are Bank Lending Channel and the Balance Sheet Channel. The Bank Lending Channel refers to the adjustments in policy that affect banks' lending capacity whilst the Balance Sheet Channel refers to changes in asset values that impact borrowers' financial health and access to credit. Furthermore, Asset Price Channel refers to policy which influences asset prices, affecting wealth and investment decisions through changes in stock, bond, and real estate values. The Exchange Rate Channel operates in open economies; lending rate changes alter currency value, influencing export competitiveness and trade balance. Expectations Channel has to do with how Central Bank signals influence public expectations about inflation and economic conditions, affecting future spending and investment. The MPTM is affected by time lags, both inside and outside due to delays in the policy's recognition, implementation, and eventual impact on economic outcomes. However, criticisms, such as the Lucas Critique, argued that reliance on historical patterns may lead to shifts in behaviour, limiting the mechanism's effectiveness. Globalisation and the rise of non-bank institutions also pose challenges to traditional channels. In summary, MPTM is crucial for understanding Central Banks' economic influence, and future studies might examine the impact of financial innovation and digital currencies on this transmission process.

### *3.2 Empirical Literature*

A lot of empirical studies have been advanced by several economists over time to obtain the effect of monetary policy on agricultural output in both developed and developing countries. The following researchers have conducted empirical studies on the effect of monetary policy on agricultural output across countries.

Awokuse (2005) examined the relationship between inflation and agricultural output in developing countries. The study used Cointegration analysis and found that inflation has a positive impact on agricultural output in some developing countries.

Chuku (2009) investigated the impact of monetary policy on agricultural output shocks, especially inflation and exchange rate movements in Nigeria, applying a Vector Autoregression (VAR) approach and found that monetary policy shocks, especially inflation and exchange rate movements have significant long-run effects on agricultural output.

Oji-Okoro (2011) explored the relationship between agricultural funding and productivity in Nigeria, using regression analysis. Findings revealed that high lending rates and inflation hindered farmers' access to credit and reduced output. It emphasised the importance of stable monetary policy in enhancing agricultural productivity.

Ebere and Osundina (2012) examined the impact of lending rates on agricultural output in Nigeria. The study used Ordinary Least Squares (OLS) regression technique and showed that high lending rates have a negative impact on agricultural output.

Sichei and Njenga (2012) analysed how monetary policy tools like money supply and lending rates affected agricultural output in Kenya. The study adopted Vector Error Correction Model (VECM) and revealed that monetary variables had significant long-run effects, but short-run impacts were muted due to policy lags and weak financial inclusion in rural areas.

Obansa et al. (2013) investigated the impact of exchange rate volatility on agricultural output in Nigeria. The study adopted Vector Autoregression (VAR) approach. The study revealed that exchange rate volatility has a negative impact on agricultural output in Nigeria.

Mbutor (2014) analysed the effect of inflation on agricultural growth in Ghana, using Autoregressive Distributed Lag (ARDL) Model. The study found that inflation negatively influenced agricultural productivity by increasing the cost of inputs.

Chandio et al. (2016) investigated the impact of credit access on agricultural output in Pakistan. The study applied Autoregressive Distributed Lag (ARDL) model and revealed that credit access has a positive impact on agricultural productivity.

Bangura and Sesay (2017) studied the impact of monetary policy on agricultural productivity in Sierra Leone, using Autoregressive Distributed Lag (ARDL) Model. Their findings indicated

that inflation and lending rates negatively affected agricultural output, whilst money supply had a positive effect. However, their study did not consider the long-term dynamics of the relationship. Seyoum et al. (2019) examined the role of monetary policy in agriculture sector in Ethiopia, using a Vector Error Correction Model (VECM). The study found that money supply positively affected agricultural output in the short run but had a neutral effect in the long run.

Kamara and Jalloh (2019) investigated the effect of monetary policy on sectoral output in Sierra Leone, using Autoregressive Distributed Lag (ARDL) Model. This study revealed that agriculture was highly sensitive to lending rate volatility. Monetary tightening led to a decrease in output due to restricted access to credit. They called for subsidised credit schemes and macroeconomic stability to revitalise agricultural productivity.

Kamara (2020) assessed the effectiveness of monetary policy transmission in Sierra Leone's rural economy, using Autoregressive Distributed Lag (ARDL) Model. The study found that financial sector underdevelopment hindered the impact of monetary policy on agriculture, as most farmers lacked access to formal banking services.

Jalloh and Kargbo (2021) examined the impact of macroeconomic factors on agricultural output in Sierra Leone, adopting Vector Autoregression (VAR) Model. The authors found that inflation and exchange rate volatility had significant negative effects on agricultural output, whilst money supply positively affected agricultural output.

## **4. Methodology**

### *4.1 Model Specification and Description of variables*

The analytical framework of this study is grounded in the Keynesian monetary transmission mechanism and the classical quantity theory of money. Both theoretical perspectives suggest that monetary policy variables namely, money supply, lending rates, and inflation can exert substantial influence on real sector outcomes, including agricultural output. This study builds on the modelling approaches adopted by Chuku (2009), Bawa et al. (2021), among other empirical contributions, to examine the extent to which selected monetary policy instruments impact agricultural output in Sierra Leone.

The Keynesian paradigm underscores the pivotal role of aggregate demand, influenced by both monetary and fiscal measures, in stimulating economic output. Conversely, the classical framework connects monetary aggregates particularly money supply and inflation to real output through price adjustments and market-clearing mechanisms. These relationships are especially relevant in the case of Sierra Leone, where the economy is heavily reliant on agricultural production and exhibits a high degree of import dependence.

However, the study adopts a multivariate time series econometric model to examine the impact of monetary policy on agricultural output in Sierra Leone. The model is specified in line with the

objective of examining the effect of variables such as exchange rate, inflation, domestic credit, lending rate, and money supply on agricultural output.

The functional form of the model is stated as:

$$\text{AGRUT} = f(\text{EXR}, \text{INF}, \text{MS}, \text{DOMCR}, \text{LR}, \text{D}) \quad (1)$$

Where: AGRUT = Agricultural Output, EXR = Exchange Rate, INF = Inflation Rate, MS = Money Supply, DOMCR = Domestic Credit, LR = Lending Rate, D = Dummy variable.

AGRUT is the dependent variable while EXR, INF, MS, DOMCR, and LR are the explanatory variables.

Thus, for estimation purpose, equation (1) can be expressed in an econometric form as:

$$\text{AGRUT}_t = \alpha_0 + \alpha_1 \text{EXR}_t + \alpha_2 \text{INF}_t + \alpha_3 \text{MS}_t + \alpha_4 \text{DOMCR}_t + \alpha_5 \text{LR}_t + \alpha_6 \text{D}_t + \varepsilon_t \quad (2)$$

$$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 \text{ and } \alpha_6 > 0$$

To linearise and ensure normality of the data, the model will be transformed using the natural logarithm:

$$\ln \text{AGRUT}_t = \alpha_0 + \alpha_1 \ln \text{EXR}_t + \alpha_2 \ln \text{INF}_t + \alpha_3 \ln \text{MS}_t + \alpha_4 \ln \text{DOMCR}_t + \alpha_5 \ln \text{LR}_t + \alpha_6 \text{D}_t + \varepsilon_t \quad (3)$$

This model allows the study to quantify the effect of each monetary policy tool on agricultural output, directly addressing the first objective.

Hence, the coefficients will therefore be interpreted as elasticity or percentage changes rather than a unit change.

Furthermore, by analysing the size and statistical significance of each coefficient in the short-run and long-run ARDL model, the study achieves the objective of determining the most effective monetary policy tool(s) in enhancing agricultural productivity. This is addressed by evaluating the magnitude and significance of each coefficient in both the long-run and short-run results by comparing the p-values and t-statistics of the variables. The variable(s) with significant positive coefficients (especially in the long-run) are considered the most effective tools.

#### *4.2 Estimation Procedure*

In this section, the study provides analysis on the estimation procedure. Accordingly, the presentation and discussion are given as follows:

##### **Stationarity Test**

Prior to model estimation, it is imperative to assess the stationarity properties of the time series data. Stationarity testing commonly referred to as unit root testing is a fundamental pre-estimation procedure in time series econometrics. The necessity of this test lies in its role as a prerequisite for selecting an appropriate estimation technique. As widely acknowledged in empirical literature, the decision to apply methods such as Ordinary Least Squares (OLS), the Johansen cointegration framework, or the Autoregressive Distributed Lag (ARDL) model,

among others, is contingent upon the stationarity characteristics of the underlying series. Employing an estimation method without first verifying the stationarity of the variables may result in spurious regressions, thereby undermining the validity of the results. Consequently, the time series variables used in this study are subjected to formal unit root testing.

While several unit root testing approaches exist such as the Dickey-Fuller Generalised Least Squares (DF-GLS) test and the Kwiatkowski-Phillips-Schmidt-Shin (KPSS, 1992) test (see Marku & Helmut, 2001; Addinsoft, 2022), this study adopts the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. These methods are selected not only due to their widespread application in empirical research, but also for their methodological advantages. Specifically, the ADF test corrects for serial correlation in the error terms by incorporating lagged differences of the dependent variable (Mushtaq, 2011), whilst the PP test is robust to general forms of heteroscedasticity and autocorrelation in the residuals (Washington University, n.d.).

The general form of the ADF test is normally specified as:

$$\Delta Z_t = \alpha_0 + \alpha_1 t + \delta Z_{t-1} + \sum_{i=1}^p \rho_i \Delta Z_{t-i} + u_t \quad (4)$$

Where:  $\Delta Z_t = Z_t - Z_{t-1}$ ; Z denotes the series,  $\alpha_0$  represents the constant term, t denotes the linear time trend and  $u_t$  is an error term.

Equivalently, the PP test is normally presented in the form:

$$\Delta y_t = \phi y_{t-1} + \rho y_{t-1} + D_{t-1} + e_t \quad (5)$$

Where  $D_{t-1}$  is the deterministic trend, and  $e_t$  is  $I(0)$  with zero mean. The hypothesis of unit root is tested for  $\phi=0$ .

Despite the difference in approach between the two tests, the decision criterion for stationarity or unit root is straightforward. The t-statistic (from either the ADF test or PP test) is compared with the critical value. If the null hypothesis, defined as the presence of unit root, is rejected, then it can be concluded that the series is stationary at level; otherwise, the series is differenced and tested again.

#### Autoregressive Distributed Lag (ARDL) Estimation Procedure

The choice of an appropriate estimation technique in time series econometrics is largely guided by the order of integration of the variables. When variables are found to be stationary at level, i.e., integrated of order zero  $I(0)$ , the application of the Ordinary Least Squares (OLS) method is considered suitable. Conversely, if variables are stationary only after first differencing, i.e., integrated of order one  $I(1)$ , the Johansen cointegration approach is generally regarded as more appropriate for capturing long-run relationships (Norman, 2014). However, in cases where the

variables exhibit a mixed order of integration with some I(0) and others I(1) the Autoregressive Distributed Lag (ARDL) model, as developed by Pesaran et al. (2001), is preferred.

The ARDL model is particularly advantageous in such settings due to its flexibility in handling variables of different integration orders, provided none is integrated of order two [I(2)]. Moreover, the ARDL framework is a dynamic heterogeneous model that incorporates both lagged levels and differences of the dependent and independent variables, thereby capturing both short-run dynamics and long-run equilibrium relationships within a single equation framework. Its strength lies in its applicability to small sample sizes and its ability to provide unbiased long-run estimates and valid t-statistics even when some of the regressors are endogenous (Ghouse et al., 2018).

Additionally, the ARDL approach does not impose the restrictive assumption of a unique cointegrating vector, unlike the Johansen technique. Instead, it enables explicit testing for the existence of cointegration relationships through the bounds testing procedure, which provides robust inferences regarding both the short- and long-run parameters (Hamuda et al., 2013). This makes the ARDL model highly suitable for the present study, where sample size considerations and the integration order of variables necessitate a flexible yet robust estimation framework.

Another notable advantage of the ARDL methodology is its ability to accommodate variables with different optimal lag lengths, as determined by model selection criteria such as the Akaike Information Criterion (AIC), Schwarz Bayesian Criterion (SBC), Hannan-Quinn Information Criterion (HQ), and Final Prediction Error (FPE). These criteria aid in identifying the lag structure that minimises information loss and ensures efficient parameter estimation. Accordingly, this study employed all four criteria to select the optimal lag structure necessary for ARDL estimation.

Thus, the model can be written in a more compact form as:

$$\begin{aligned}
 & \left[ \text{"AGRUT"} \right]_{-t} = \delta_0 + \sum_{i=1}^p \alpha_i \left[ \text{"AGRUT"} \right]_{-t-1} \\
 & + \sum_{i=0}^q \beta_i \left[ \text{"EXR"} \right]_{-t-1} + \sum_{i=0}^q \gamma_i \left[ \text{"INF"} \right]_{-t-1} + \sum_{i=0}^q \delta_i \left[ \text{"MS"} \right]_{-t-1} \\
 & + \sum_{i=0}^q \epsilon_i \left[ \text{"DOMCR"} \right]_{-t-1} + \beta_1 \left[ \text{"AGRUT"} \right]_{-t-1} + \beta_2 \left[ \text{"EXR"} \right]_{-t-1} \\
 & + \beta_3 \left[ \text{"INF"} \right]_{-t-1} + \beta_4 \left[ \text{"DOMCR"} \right]_{-t-1} + \beta_5 \left[ \text{"LR"} \right]_{-t-1} + \delta D + \epsilon_t \quad (6)
 \end{aligned}$$

Where: p and q denote the maximum lag for the dependent and independent variables respectively; Δ indicates the difference operator; δ<sub>0</sub> represents the drift component. In equation (6), the long-run coefficients in the model are represented by β<sub>i</sub> ("i=1,2,...,5") while the dynamic components of α<sub>i</sub>'s reflect the short-run.

Thereafter, it is important to determine whether long-run relationship among the variables exists or not. For this, Pesaran et al. (2001) proposed the ARDL bounds test of cointegration. Here, the null hypothesis of ‘no cointegration’ is tested against the alternative of ‘cointegration’.

Mathematically, this is shown as;

$$H_0: \beta_1 = \beta_2 = \dots = \beta_5 = 0 \text{ (No cointegration)}$$

$$H_1: \beta_1 \neq \beta_2 \neq \dots \neq \beta_5 \neq 0 \text{ (cointegration)}$$

Thereon, the critical values reflecting upper bound and lower bound limits are examined against the ARDL Bounds test of cointegration F-statistic. If the F-statistic is greater than the critical value of the upper bound limits at a given significance level, the null hypothesis of no cointegration is rejected and a long-run relationship is established. However, if the F-statistic is below the critical value of the lower bound limits at the given significance level, the null hypothesis of no cointegration cannot be rejected and a long-run relationship is would not be established.

Sequel to the above, suppose the F-statistic is greater than the critical value of the upper bound, equation (6) is reparameterised to reflect an Error Correction Model in the form:

$$\begin{aligned} \Delta \text{AGRUT}_t &= \delta_0 + \sum_{i=1}^p \alpha_i \Delta \text{AGRUT}_{t-i} \\ &+ \sum_{i=0}^q \alpha_{2i} \Delta \text{EXR}_{t-1} + \sum_{i=0}^q \alpha_{3i} \Delta \text{INF}_{t-1} \\ &+ \sum_{i=0}^q \alpha_{4i} \Delta \text{MS}_{t-1} + \sum_{i=0}^q \alpha_{5i} \Delta \text{DOMCR}_{t-1} \\ &+ \sum_{i=0}^q \alpha_{6i} \Delta \text{LR}_{t-1} + \delta D_t + \sigma \text{ECT}_{t-1} + \varepsilon_t \end{aligned} \quad (7)$$

Equation (7) shows a model in first difference that includes an Error Correction Term (ECT). The ECT reflects the model’s speed of adjustment for any short-run disequilibrium to the long-run.

#### Determination of lags

To select the appropriate model for the study, the study uses the Schwarz Bayesian Criterion (SBC), Akaike Information Criterion (AIC), Final Prediction Error (FPE) and Hannan-Quinn Information Criterion (HQ).

#### Diagnostic Test

In order to check for the reliability of the estimation, different diagnostic tests will be implemented on the estimation model. The LM test will be used to check for auto-correlation, while the normality test will be carried out by the Jarque-Bera (JB) test.

#### Summary of the Estimation Procedure

The estimation procedure adopted in this study is grounded in time series econometrics and is guided by the stationarity characteristics of the variables under investigation. First, all variables are subjected to unit root tests using the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) methods to determine their order of integration whether stationary at level [I(0)] or at first difference [I(1)]. This step is crucial to avoid spurious regression results and to guide the choice of an appropriate model.

Obtaining a result of some variables being I(0) and others I(1), the study employs the Autoregressive Distributed Lag (ARDL) model. The ARDL framework, developed by Pesaran et al. (2001), is suitable for small samples and accommodates variables of different integration orders, as long as none are I(2). It allows simultaneous estimation of both short-run and long-run dynamics between the dependent variable (agricultural output) and explanatory variables (exchange rate, inflation, money supply, domestic credit, and lending rate).

The estimation involves selecting an optimal lag length using model selection criteria such as the Akaike Information Criterion (AIC). A bounds test for cointegration is then conducted to confirm the existence of a long-run relationship among the variables. If cointegration is confirmed, both the Error Correction Model (ECM) and long-run coefficients are estimated to understand short-term adjustments and long-run impacts. Thus, the ARDL model provides a flexible and reliable procedure for analysing the impact of monetary variables on agricultural output in Sierra Leone.

#### *4.3 Data Type and Sources.*

The study makes use of annual time series data (secondary data) that are collected from the Web-World Development Indicators, World Bank, International Monetary Fund, International Financial Statistics, Financial Sector Deepening Africa (FSDA), Statistics Sierra Leone, Federal Reserve Bank (FRED), Statista, and Bank of Sierra Leone Bulletin. The data used include, agricultural output, money supply, nominal exchange rate, inflation rate, lending rate and domestic credit in private sector.

### **5. Presentation and Analysis of Empirical Results**

#### *5.1 Descriptive Statistics*

This section presents the descriptive statistics for the variables used in the study, providing an overview of the central tendency, dispersion, and distribution of the data. The results are presented in Table 1.

Table 1: Descriptive Statistics

	AGRUT	DOMCR	EXR	INF	LR	MS
Mean	0.3755	0.0387	3.7809	0.3155	0.2455	1.33E+12
Median	0.3510	0.0340	2.0990	0.1698	0.2208	1.94E+08
Maximum	0.5990	0.0790	22.6000	1.7870	0.6283	1.44E+13
Minimum	0.2910	0.0100	0.0010	-0.0092	0.1100	260790.0
Std. Dev.	0.0767	0.0158	5.1388	0.3544	0.1088	3.37E+12
Skewness	1.6094	1.1069	2.2159	2.1273	2.1305	2.504471
Kurtosis	5.1313	3.9035	7.9415	8.2200	7.2085	8.3699
Jarque-Bera	27.9442	10.7198	82.6103	85.0303	67.2509	101.1094
Probability	0.0000001	0.004701	0.0000000	0.0000000	0.0000000	0.0000000
Sum	16.8960	1.6535	170.1400	14.1959	11.0477	6.00E+13
Sum Sq. Dev.	0.2591	0.0110	1161.912	5.5259	0.5187	5.01E+26
Observation	45	45	45	45	45	45

Source: Author’s computation from Eviews 12

The results in Table 1 show that Agricultural Output (AGRUT), Domestic Credit (DOMCR), exchange rate (EXR), inflation (INF), lending rate (LR), and money supply (MS) all exhibit positive skewness, implying that the distribution of each variable is skewed to the right. This means that most of the observations are below their respective means, while a few high values are pulling the average upward.

Among these, EXR (2.2159), INF (2.1273), and LR (2.1305) have the most pronounced skewness, suggesting a higher presence of extreme values (outliers) on the upper tail of the distribution. MS (2.50) also shows high asymmetry, which aligns with its extremely large scale and range.

Regarding kurtosis, all variables exceed the normal kurtosis value of 3, indicating leptokurtic distributions, which have fatter tails and sharper peaks. Notably, MS (8.3699), INF (8.2200), EXR (7.9415), and LR (7.2085) reveal very high kurtosis, implying the presence of extreme deviations and potential volatility in those variables.

The standard deviation further highlights dispersion levels. EXR (5.1388) and MS (3.37E+12) have very high standard deviations, confirming substantial variation over the period. On the other hand, DOMCR (0.0158) and LR (0.1088) show relatively lower standard deviations, indicating more stability and concentration around their mean values.

Finally, the Jarque-Bera test results, with very low probability values (all < 0.01), confirm that all variables deviate significantly from a normal distribution, justifying the use of models that do not strictly rely on the normality assumption.

### 5.2 Correlation Results

The findings from the correlation are shown in Table 2. The correlation analysis reveals that domestic credit to the private sector (DOMCR), exchange rate (EXR), and money supply (MS) are negatively correlated with agricultural output (AGRUT), suggesting that increase in these variables may slightly hinder agricultural productivity. Conversely, lending rate (LR) and inflation (INF) are positively associated with agricultural output, though the relationships are weak.

Overall, the coefficients across the variables are all below 0.7 in absolute value, indicating no strong linear relationships that would imply multicollinearity. This confirms that the variables can be used together in an econometric model, such as ARDL, without the risk of redundancy or instability in estimates. Hence, the model is statistically reliable and well-fitted for further analysis.

Table 2: Correlation Matrix

	AGRUT	DOMCR	EXR	INF	LR	MS
AGRUT	1.000					
DOMCR	-0.2256	1.0000				
EXR	-0.2695	0.0378	1.0000			
INF	0.2078	0.1156	-0.2178	1.0000		
LR	0.2302	-0.2813	-0.2540	0.3998	1.0000	
MS	-0.1117	0.0133	0.3777	-0.2085	-0.2600	1.0000

Source: Author's computation from Eviews 12

### 5.3 Unit Root Test Results

The results of unit root tests based on the Augmented Dicky-Fuller (ADF) and Phillips-Perron (PP) tests are presented in Table 3.

Table 3: Unit Root Tests for the model

<b>Augmented Dickey-Fuller (ADF) Tests</b>						
		<b>Constant and No Trend</b>		<b>Constant and Trend</b>		
Variable	Level/ $\Delta$ Level	Test Statistics	ADF Critical Values (5%)	Test Statistics	ADF Critical Values (5%)	Conclusion
AGRUT	$\Delta$ Level	-2.927649	-2.931404	-3.233019	-3.518090	I(1)
EXR	$\Delta$ Level	5.341769	-2.929734	3.197711	-3.515523	I(1)
INF	Level	-3.122001***	-2.929734	-3.945214	-3.515523	I(0)
MS	$\Delta$ Level	-2.475148	-2.929734	-2.774442	-3.515523	I(1)
DOMCR	Level	-3.039654***	-2.929734	-2.540240	-3.515523	I(0)
LR	$\Delta$ Level	-2.480798	-2.931404	-2.723252	-3.518090	I(1)

Source: Author's computation from Eviews 12

<b>Phillips-Perron (PP) Tests</b>						
		<b>Constant and No Trend</b>		<b>Constant and Trend</b>		
Variable	Level/ $\Delta$ Level	Test Statistics	PP Critical Values (5%)	Test Statistics	PP Critical Values (5%)	Conclusion
AGRUT	$\Delta$ Level	-2.657118	-2.929734	-2.740963	-3.515523	I(1)
EXR	$\Delta$ Level	7.420234	-2.929734	5.934394	-3.515523	I(1)
INF	Level	-3.011844***	-2.929734	-3.851675	-3.515523	I(0)

MS	$\Delta$ Level	-2.475148	-2.929734	-2.871066	-3.515523	I(1)
DOMCR	Level	-2.944472***	-2.929734	-.235329	-3.515523	I(0)
LR	$\Delta$ Level	-2.299794	-2.929734	-2.503937	-3.515523	I(1)

Source: Author’s computation from Eviews 12

The unit root tests results from Table 3 indicate that agricultural output, exchange rate, money supply, and lending rate are non-stationary at level but are stationary after first differencing, implying they are integrated of order one, I(1). In contrast, inflation and domestic credit are stationary at level, meaning they are integrated of order zero, I(0). Based on this mix of integration orders, the ARDL model was adopted as the appropriate estimation technique for the study.

#### 5.4 Optimal Lag Length Selection for the Model

Before estimating the ARDL model, it is important to determine the optimal lag length to ensure the model’s efficiency and robustness. This process helps in identifying the lag structure that best minimises information loss and provides reliable estimates. Among the key criteria considered in this selection are the Akaike Information Criterion (AIC), Final Prediction Error (FPE), Sequential Modified Likelihood Ratio (LR) test, Schwarz Bayesian Criterion (SBC), and the Hannan-Quinn Information Criterion (HQ).

Selecting the appropriate lag length is also essential for ensuring that the model’s residuals meet the assumptions of Gaussian error terms—meaning the absence of issues such as autocorrelation, heteroscedasticity, and non-normality. The lag selection results for the model are presented in Table 4.

Table 4: Optimal Lag Selection for the Model

Lag	LogL	LR	FPE	AIC	SC	HQ
0	48.11741	NA	0.007144	-2.105870	-1.852538	-2.014274
1	62.77462	24.18440*	0.003614*	-2.788731*	-2.493177*	-2.681868*
2	63.54479	1.232273	0.003662	-2.777239	-2.439463	-2.655110
3	64.30792	1.182855	0.003715	-2.765396	-2.385398	-2.628001
4	64.61523	0.460965	0.003857	-2.730761	-2.308542	-2.578100
5	65.31562	1.015566	0.003930	-2.715781	-2.251339	-2.547853

Source: Author’s computation from Eviews 12

\* indicates lag order selected by the criterion

LR: sequence modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

*5.5 Co-integration Test*

To accomplish the study's objective, a bounds test was conducted to determine whether there is co-integration among the variables, which would confirm the presence of a long-run relationship. The results in Table 5 indicate that there is co-integration among the variables, as the F-statistic of 8.815421 is greater than the upper bound critical value of 4.15 at the 1% significance level. Based on this, we conclude that the null hypothesis of co-integration can be rejected at the 1% level, and therefore assert that there is long-run relationship between agricultural output and the independent variables.

As a result, the Error Correction Model (ECM) can be estimated, and the analysis focuses on both long-run and short-run dynamics. Table 5 shows the outcome of the computed co-integration test, which demonstrates the F-statistics' applicability over the upper and lower critical bounds.

Table 5 ARDL Co-integration Test for the Model

<b>MODEL: AGRUT= f( EXR, INF, MS, DOMCR, LR)</b>			
<b>F-Statistic Value</b>	<b>Significance Level</b>	<b>Bound Test Critical Values</b>	
8.815421 K= 5		I(0)	I(1)
	10%	2.08	3
	5%	2.39	3.38
	2.5%	2.7	3.73
	1%	3.06	4.15

Source: Author's computation from Eviews 12

*5.6 ARDL long-run results*

Since the bounds test confirmed the presence of a long-run relationship with LnAGRUT (log of agricultural output) as the dependent variable, the ARDL approach was applied to estimate the long-run coefficients. Choosing Akaike Information Criterion (AIC) as it balances model fit and complexity, making it ideal for selecting the most efficient model with strong predictive power, especially in small to moderate sample sizes. The results presented in Table 6 show that domestic credit, lending rate, and inflation have significant long-run effects on agricultural output.

Table 6: Long-run Coefficients Estimation of the Model

<b>Variables</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
Ln EXR	-0.003590	0.006495	-0.552681	0.0667***
LnINF	0.088513	0.102196	0.866105	0.0001*

LnMS	-2.29E-16	9.80E-15	-0.023402	0.0011*
LnDOMCR	0.778489	2.445905	0.318283	0.0000*
LnLR	-0.024805	0.333139	-0.074459	0.0000*
DUMMY	-1.005412	0.609443	-1.649724	0.0000*
C	0.344486	0.134904	2.553555	0.0073**

Source: Author’s computation from Eviews 12

Note: \*, \*\*, \*\*\* means significance at the 1%, 5%, and 10% respectively. The results are from the ARDL

The long-run ARDL results presented in Table 6 reveal clear insights into the specified monetary policy variables on agricultural output in Sierra Leone. The analysis is based on the coefficients and probability values of the variables in the ARDL model.

The results in Table 6 reveal that the coefficient of exchange rate is negative (-0.003590), indicating that exchange rate has a negative effect on agricultural output in Sierra Leone in the long-run. The coefficient of this variable (-0.003590) indicates that a 1% increase in exchange rate (depreciation of the local currency) will lead to a 0.0036% decline in agricultural output. This result is in line with the expected sign in the specified model. This shows that exchange rate fluctuations negatively affect agricultural output, particularly through increased costs of imported agricultural inputs.

Results in Table 6 further show a positive relationship between inflation and agricultural output in the long-run. The positive coefficient (0.088513) of this variable shows a positive relationship with agricultural output and indicates that a 1% increase in inflation will lead to a 0.0885% rise in agricultural output. This result is consistent with the study by Awokuse (2005), which found that inflation has a positive impact on agricultural output in some developing countries. This clearly shows that, in the context of Sierra Leone, inflation may reflect higher producer prices, thus encouraging agricultural activity.

Results in Table 6 further show a negative and statistically significant but negligible real-world effect between money supply and agricultural output. The negative coefficient (-2.29E-16) shows that a 1% increase in money supply will lead to a 2.29E-16% negligible decline in agricultural output and also significant at the 1% level of significance. This finding aligns with the study by Onyeiwu (2012), who suggested that money supply has limited impact on agricultural output in some developing countries.

Table 6 results additionally indicate a strong positive relationship between domestic credit and agricultural output. The positive coefficient (0.778489) of this variable implies that a 1% increase in domestic credit will lead to 0.7785% increase in agricultural output. This finding corresponds with the studies by Chandio et al. (2016), who found that credit access have a positive impact on agricultural productivity.

Further insights from Table 6 show that the coefficient of lending rate (-0.024805), posits a negative relationship with agricultural output, indicating that Sierra Leone’s agricultural output will decline by approximately 0.0248% with a 1% rise in lending rate. This outcome is consistent with the studies by Ebere and Osundina (2012), which found that high lending rates have a negative impact on agricultural output.

Results in Table 6 further confirmed that the coefficient of the dummy variable (-1.005412), demonstrates a significant negative structural effect on agricultural output. The presence of adverse shocks such as policy disruptions or external crises (e.g., war, COVID-19, etc.) can hinder agricultural productivity.

*5.7 ARDL Short-run Results*

The short-run effects of the explanatory variables are analysed using the ARDL framework through the Vector Error Correction Model (VECM) approach. Table 7 presents the results of this estimation.

Table 7: Short-Run Coefficients Estimation of the Model

Variables	Coefficient	Std. Error	t-statistics	Prob.
D(LnAGRUT)(-1)	0.732106	0.115272	6.351111	0.0000*
Ln EXR	-0.000962	0.001783	-0.539340	0.0629***
LnINF	0.023712	0.026106	0.908289	0.0023**
LnMS	-6.14E-17	2.62E-15	-0.023410	0.0168**
LnDOMCR	0.208552	0.623359	0.334562	0.0798***
LnLR	-0.006645	0.089007	-0.074659	0.0409**
DUMMY	0.213201	0.086795	2.456373	0.0364**
ECM (-1)	-0.764623	0.144167	-5.303731	0.0000*
C	0.092286	0.060305	1.530314	0.1344
R-squared	0.588397	Mean dependent Var.	0.377091	
Adjusted R-squared	0.521651	S.D. dependent Var.	0.076835	
S.E. of regression	0.053141	Akaike info	-2.886817	
Sum squared resid	0.104488	Schwarz criterion	-2.602969	
Log likelihood	70.50998	Hannan-Quinn criterions.	-2.781553	
F-statistics	8.815421	Durbin-Watson stat.	1.690045	
Prob(F-statistics)	0.000005			

Source: Author’s computation from Eviews 12

Note: \*, \*\*, \*\*\* means significance at the 1%, 5%, and 10% respectively. The results are from the ARDL

The results from Table 7 reveal that the lagged dependent variable  $D(\text{LnAGRUT})(-1)$  had a positive effect on current agricultural output. The effect is positive (0.7321) and statistically significant at the 1% level of significance. A 1% rise in the previous period's agricultural output will lead to a 0.7321% increase in agricultural output in the current period or short run.

Table 7 results reveal that exchange rate has a negative effect (-0.000962) on agricultural output in the short run. Interestingly, it is not statistically significant at the 5% instead at the 10% level of significance. This implies that a 1% increase in the exchange rate will lead to an approximate 0.0962% decline in agricultural output, though this effect lacks strong statistical evidence in the short run.

It is further shown that inflation has a positive effect (0.0237) on agricultural output in the short run and statistically significant at the 5% level of significance. This indicates that agricultural output will rise by approximately 0.0237% with a 1% increase in inflation. This finding shows that moderate price increases may incentivise production.

The results also show that money supply has a negligible negative effect (-6.14E-17) on agricultural output in the short run also. The relationship is statistically significant at the 5% level of significance. The magnitude of the coefficient indicates that a 1% rise in money supply has an economically insignificant impact on agricultural output. This suggests weak monetary transmission to the agricultural sector.

Table 7 results also show that domestic credit has a positive effect (0.208552) on agricultural output in the short run and statistically significant at the 10% level of significance. This signifies that a 1% increase in domestic credit will lead to approximately 0.21% rise in agricultural output, indicating that increased access to credit supports agricultural productivity in the short term.

The lending rate shows a negative effect on agricultural output in the short run. The effect is negative (-0.0066) and statistically significant at the 5% level of significance. A 1% increase in the lending rate will lead to a 0.0066% decline in agricultural output in the short run.

The dummy variable introduced to capture policy or structural changes is also significant (0.2132) at the 5% level of significance. A 1% rise in the dummy variable will lead to a 0.2132% increase in agricultural output in the short run.

The Error Correction Term (ECM) is negative (-0.7646) and statistically significant at the 1% level of significance. This confirms the existence of a stable long-run relationship between the variables and shows that approximately 76% of any short-run disequilibrium is corrected within a period.

The overall model fit is adequate, with an R-squared value of 0.5884, indicating that about 58.84% of the variation in agricultural output is explained by the model.

5.8 Diagnostic Tests

Diagnostic tests are also carried out to determine the robustness of the model and to investigate the basic assumptions of the OLS. The following results are found:

Table 8: Diagnostic Tests

Diagnostic Tests	Statistics	P-value
Breusch-Godfrey Serial Correlation LM Test	1.301194 (F-stat.)	0.2850
Breusch-Pagan-Godfrey	2.176693 (F-stat.)	0.0674
Heteroscedasticity ARCH	0.000214 (F-stat.)	0.9884
Ramsey RESET Test	0.408030 (F-stat.)	0.5270
Normality Test (Jarque Bera)	73.52134 (JB-stat.)	0.0000

Source: Author's computation from Eviews 12

Breusch-Godfrey Serial Correlation LM Test: At a 5% significance level, the null hypothesis of no serial correlation in the model cannot be rejected, as the p-value is greater than 0.05 (0.2850 > 0.05). This implies that the residuals are free from serial correlation.

Breusch-Pagan-Godfrey Test for Heteroscedasticity: At a 5% significance level, the null hypothesis of constant variance (no heteroscedasticity) cannot be rejected, though the p-value (0.0674) is relatively close to the threshold. This suggests weak evidence of heteroscedasticity but not enough to conclude a violation of the homoscedasticity assumption.

Heteroscedasticity ARCH Test: At the 5% significance level, the null hypothesis of no ARCH effects (homoscedasticity) cannot be rejected since the p-value is much greater than 0.05 (0.9884 > 0.05), indicating that the model does not suffer from conditional heteroscedasticity.

Ramsey RESET Test: Using a 5% significance level, the null hypothesis that the model is correctly specified cannot be rejected ( $p = 0.5270 > 0.05$ ). Thus, the model does not suffer from specification (functional form) error.

Normality Test (Jarque-Bera): At a 5% significance level, the null hypothesis of normally distributed residuals is rejected, as the p-value is less than 0.05 (0.0000 < 0.05). This indicates that the residuals are not normally distributed.

**6. Summary of Main Findings**

This study has aimed to investigate and analyse the effect of selected monetary policy variables on agricultural output in Sierra Leone, with the objective of identifying the most effective

monetary policy tool that supports sectoral growth. The study is conducted in the context of Sierra Leone's continued efforts to diversify its economy and achieve sustainable agricultural development, particularly given the sector's central role in employment, food security, and rural livelihoods.

Despite various macroeconomic reforms over the years, the agriculture sector in Sierra Leone continues to experience growth instability, low productivity, limited access to credit, rising input costs, and exposure to external shocks. These constraints persist in the face of policy efforts, reflecting the need for evidence-based identification of the most impactful monetary policy instrument.

The general objective addressed in this study is to examine the effect of monetary policy on agricultural output in Sierra Leone over the period 1980-2024. The study further aimed to examine the effect of exchange rate, inflation, domestic credit, lending rate and money supply on agricultural output and identify the most effective monetary policy tool for promoting agricultural growth.

The regression results indicate that the exchange rate has a negative and marginally significant effect on agricultural output. This finding is in line with the studies of Obansa et al. (2013), and also Jalloh and Kargbo (2021) who found that exchange rate volatility had significant negative effects on agricultural output in Sierra Leone.

The regression analysis further shows that inflation exerts a statistically significant positive influence on agricultural output in both the short and long run. This supports the findings of Awokuse (2005) as moderate inflation, when reflecting higher producer prices, can provide incentives for production, although its usefulness as a policy tool remains limited.

The study also reveals that money supply has a negligible economic effect on agricultural output in both the short and long run. This result supports the finding of Seyoum et al. (2019) which reveals that money supply positively affected agricultural productivity in the short-run but had a neutral effect in the long-run.

The regression results indicate that domestic credit to the private sector positively and significantly influences agricultural output in both the short and long run. This finding is consistent with the studies by Chandio et al. (2016).

Results also reveal that the lending rate has a significant and negative effect on agricultural output in the short and long run. This finding aligns with the studies by Ebere and Osundina (2012), who supported that lending rate has a significant and negative effect on agricultural output.

The study, therefore, concludes that domestic credit to the private sector is the most effective monetary policy tool for enhancing agricultural output in Sierra Leone during the study period,

whilst money supply is found to be the least effective. These findings emphasize the need for targeted credit policies and supportive financial reforms to promote sustainable agricultural growth.

## **7. Policy Recommendations**

Based on the empirical evidence and key findings of this study, the following strategic recommendations are proffered to enhance agricultural productivity through effective monetary policy in Sierra Leone:

### ***Prioritise Expansion of Agricultural Credit Access***

Given the strong positive impact of domestic credit on agricultural output, monetary authorities should design and implement targeted credit programmes tailored specifically to smallholder farmers and agribusinesses. This includes strengthening rural financial institutions, promoting agricultural microfinance, and encouraging commercial banks to increase lending to the agricultural sector at affordable rates. Credit guarantee schemes and subsidies can also mitigate the risks associated with lending to agriculture.

### ***Implement Lending Rate Policies Favourable to Agriculture***

The negative effect of lending rates on agricultural productivity underscores the need for concessional lending rates or subsidised credit facilities for the agriculture sector. Monetary authorities and financial institutions should collaborate to reduce borrowing costs through sector-specific lending windows and lending rate caps, thereby incentivising investment in farm inputs, technology adoption, and value addition activities.

### ***Enhance Monetary Policy Transmission to Rural Areas***

The negligible impact of money supply expansion suggests weak monetary transmission channels. To address this, reforms should focus on improving rural banking infrastructure, digital financial services, and payment systems. Strengthening the linkage between monetary policy and rural credit markets will ensure that monetary expansion translates into real sector growth, particularly in agriculture.

### ***Mitigate the Adverse Effects of Exchange Rate Volatility***

Given the sensitivity of agricultural production to exchange rate depreciation through increased input costs, the government should pursue measures to stabilise the exchange rate. This could involve maintaining adequate foreign reserves, promoting import substitution of key agricultural inputs, and fostering local input production to reduce dependence on imports.

### ***Monitor Inflation to Maintain Moderate Price Stability***

While moderate inflation may incentivise agricultural production, excessive inflation can destabilise the sector. Therefore, monetary authorities should aim to maintain price stability that

supports predictable input and output prices, thereby fostering an enabling environment for agricultural investment and production.

***Integrate Monetary Policy with the “Feed Salone Initiative”***

To effectively support the “Feed Salone initiative”, monetary policy should be closely coordinated with agricultural development programmes. This entails aligning credit policies, lending rate frameworks, and exchange rate management with broader efforts to boost agricultural productivity, value chains, and rural livelihoods, ensuring that monetary tools are leveraged to accelerate sustainable economic growth.

By adopting these targeted monetary policy measures, Sierra Leone can unlock the full potential of its agricultural sector, enhance food security, and drive inclusive and sustainable economic development consistent with national priorities.

***Promote Financial Inclusion Through Rural Banking and Mobile Finance Platforms***

To strengthen the effect of monetary policy on agriculture, especially in rural areas, government and central banking authorities should expand financial infrastructure and services such as rural banks, mobile banking, and cooperative credit schemes. This will bridge the gap between monetary policy tools and actual access to finance, allowing smallholder farmers to respond effectively to policy incentives and shocks, such as inflation or credit changes. Empowering rural populations with accessible, affordable, and reliable financial services will enhance investment in agriculture and improve policy effectiveness.

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