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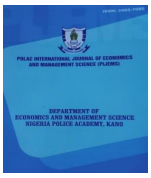

MONETARY POLICY AND FOOD SECURITY IN NIGERIA

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Abstract

The study analyzed monetary policy and its effect on food security in Nigeria from 1986 to 2022. ARDL modelling was utilized to assess this linkage between food production, money supply, lending rate, credit to private sector, and inflation over the period. The result revealed the presence of long run cointegrating relationship between food production and monetary policy in Nigeria, findings from the short and long run estimation revealed that monetary policy was not significantly affecting food production in Nigeria within the period under review. Prioritizing lending to the agricultural sector, reducing lending rate to the agricultural sector and curtailing inflation was recommended to ensure significant contribution of monetary policy to food security in Nigeria.

Keywords: Monetary Policy, Food Security, Agricultural Sector, Nigeria and Time Series Analysis

JEL Classification: E52, Q10, Q18, C22

1. Introduction

Monetary policy plays a pivotal role in macroeconomic management and stability worldwide. Following the 2008 global financial crisis, many central banks aggressively eased monetary conditions through interest rate cuts and quantitative easing programs (International Monetary Fund [IMF], 2020). Over a decade later, rates remain historically low across developed economies as authorities continue supporting economic recoveries (IMF, 2020).

In the United States, the Federal Reserve has kept its target federal funds rate near zero since March 2020 due to the COVID-19 pandemic (Board of Governors of the Federal Reserve System, 2022). Other major central banks like the European Central Bank and Bank of Japan also maintain ultra-accommodative stances to stimulate growth (IMF, 2020). Meanwhile, emerging markets face challenges balancing domestic needs with capital flow volatility from divergent monetary policies in the West (IMF, 2022).

Amid high inflation pressures in 2022, central banks are beginning to tighten the reins of monetary accommodation. Federal reserve has embarked on an aggressive rate hiking cycle, raising rates over 3 percentage points so far, with more hikes expected (Board of Governors of the Federal Reserve System, 2022). Other central banks are following suit or considering tighter stances to combat inflation (IMF, 2022). However, aggressive tightening also risks tipping economies into recession, highlighting the delicate balancing act of monetary policy (IMF, 2022). Synchronized tightening across borders could further stress emerging markets reliant on foreign capital (IMF, 2022).

Food insecurity remains a pressing global challenge in the modern era. The most recent data from the United Nations indicates over 800 million people worldwide do not have enough to eat (Food and Agricultural

Organization [FAO], 2020). While progress has been made in reducing undernourishment since 2000, the COVID-19 pandemic threatens to reverse gains or exacerbate existing vulnerabilities. Sub-Saharan Africa faces some of the greatest food insecurity, with over 250 million people affected. Conflict, poverty, and climate-related shocks continue hindering food system stability and resilience across much of the region (Food Security Information Network, 2020). South Asia also has high levels of undernourishment at approximately 280 million, though India has seen improvements in recent decades (FAO 2020).

In Latin America and the Caribbean, around 48 million people experience food insecurity despite overall economic and agricultural development (FAO 2020). Natural disasters frequently disrupt livelihoods and food supplies, as seen with the impacts of hurricanes in Central America and the Caribbean (Food Security Information Network, 2020). Even in high-income nations, an estimated 53 million citizens face moderate to severe food insecurity due to poverty, unemployment, and rising food costs (FAO 2020). The United States has one of the highest rates among wealthy countries at over 37 million people (Food Security Information Network, 2020).

Overall achieving Zero Hunger globally by 2030 as envisioned by the United Nations remains an immense challenge requiring coordinated efforts across sectors and regions (FAO 2020). Conflict, climate change, economic downturns, and now the pandemic threaten to further undermine food security progress if not adequately addressed through policy and investment (Food Security Information Network, 2020). Food security is a critical concern for developing countries, including Nigeria where a significant proportion of the population relies on agriculture for their livelihoods and the country is classified as one of the 82 low-income food deficit countries according to (FAO 1996). Monetary policy as a tool for managing the money supply and interest rates, can have a profound impact on various sectors of the economy, including agriculture (Asalaye, Maimako, Lawal, Inegbedion & Olabisi 2021).

Monetary policy plays an important role in shaping macroeconomic conditions that influence food security outcomes. Interest rate adjustments, money supply management, and exchange rate policies can impact agriculture through various channels (Adepoju & Obayelu, 2013). Lower interest rates may boost investment in agriculture by increasing access to credit for inputs and machinery (Jayne, Mather & Mghenyi 2010). However, easy monetary conditions can also fuel inflation, raising production costs and food prices. Food inflation disproportionately burdens low-income households with little ability to absorb higher prices (Minten, Tamru & Kuma 2013). Loose monetary policy can stimulate the broader economy and rural job markets, supporting farm incomes. Yet, excess liquidity risks generating price pressures that undermine food affordability if not properly managed (Galí, 2015). Exchange rate policies shape the competitiveness of agricultural exports and costs of imported food supplies (Jayne, Mather & Mghenyi 2010). Overall, stable macroeconomic conditions anchored by prudent monetary stances tend to promote investment and productivity in agriculture over the long-run, enhancing food security (Adepoju & Obayelu, 2013). However, the effects are complex, varying according to economic conditions, policy transmission channels, and food system dynamics (Minten, Tamru & Kuma 2013).

Nigeria with a population of over 200 million people faces a challenge of feeding such a population which is mostly constituted by young people (National Population Commission [NPC], 2019). Malnutrition is widespread in the country especially in the rural areas that are vulnerable to food shortages, malnutrition, unbalanced nutrition, limited food supply, poor quality foods, high food costs and total lack of food Akinyele (2009) as cited in Chinezulum, Akanegbu & Muhammed 2023. According to the latest data from (FAO, 2020), over 40% of Nigerians are undernourished. Food insecurity disproportionately impacts rural areas where over 80% of the poor reside (FAO, 2020) Other factors fueling the escalating food crisis in Nigeria includes the farmers-herders clash especially in the northern region of the country, institutional weaknesses, lack of financial inclusion and climate change.

Over the years, the federal government and Central Bank of Nigeria (CBN) in collaboration with World Bank and several development finance institutions has implemented policies and programmes like; FADAMA, Agricultural Credit Guarantee Scheme, Presidential Initiative on

Agriculture, National Special Programme for food security among others via monetary policy to boost agricultural productivity to stimulate economic growth and development. However, these attempts have not yielded significant result because the country is still faced with the problem of food insecurity, high cost of food stuff in the market and over dependence on food importation (CBN 2021; World Bank 2019).

The study aims to explore the relationship between monetary policy and food security in Nigeria, shedding light on the effectiveness of monetary policy in addressing food security challenges. Previous studies like Vizek (2006), Khan & Gill (2007), Gomez (2008), Onyeiwu (2012), Ahsan, Iftikhar & Kemal (2020), examined the relationship between monetary policy and various economic variables like food inflation, agricultural output and agricultural production. However, no research has focused specifically on the link between monetary policy and food security. This study particularly focused on the supply side which is food production and availability. The rest of the study consists of a literature review, methodology, results and discussion, conclusion and policy recommendations.

2. Literature Review

2.1 Conceptual Clarifications

Concept of Monetary Policy

Monetary policy refers to the measures executed by central banks to manipulate the availability and cost of money and credit, with the intention of advancing national economic goals such as price stability, full employment, and economic growth (Mishkin, 2015). The primary tools employed in monetary policy encompass open market operations, the discount rate, reserve requirements, and interest on reserves (Bernanke & Reinhart, 2015). Through the utilization of these instruments, monetary authorities influence short-term interest rates and the money supply in the pursuit of macroeconomic goals (Mishkin, 2015). To illustrate, a decrease in the money supply achieved through the sale of government bonds in the open market restricts monetary conditions by elevating short-term interest rates (Bernanke & Reinhart, 2015). Conversely, expanding the money supply and reducing interest rates through bond purchases eases monetary policy (Mishkin, 2015). The transmission mechanism of monetary policy operates through various channels, including interest rates, asset prices, exchange rates, and bank lending, all of which collectively influence aggregate demand, output, employment, and prices in the economy (Mishkin, 2015). While the goal of monetary policy is to foster long-term stability and growth, its effects are subject to variable time delays and uncertainties (Bernanke & Reinhart, 2015). Coordination with other macroeconomic policies, such as fiscal policy, is also crucial in achieving desired macroeconomic outcomes (Mishkin, 2015). A comprehensive understanding of this concept serves as the basis for analyzing the policy approach and implications of a central bank. The study adopts this explanation on the concept of monetary policy..

Concept of Food Security

The notion of food security has undergone a transformation over time, acknowledging its multifaceted essence. The current widely accepted definition of food security entails the existence of "when all individuals, at all times, possess physical and economic means to access adequate, safe, and nutritious food that satisfies their dietary requirements and preferences, enabling them to lead an active and healthy lifestyle" (FAO, 2010).

This particular definition underscores four pivotal dimensions of food security, namely availability, access, utilization, and stability (FAO, 2010). Food availability refers to the presence of sufficient quantities of food that are consistently obtainable through domestic production, commercial imports, or food assistance programs. Access to food encompasses both physical and economic accessibility, wherein individuals possess the necessary resources to procure suitable food for a nourishing diet (FAO, 2010). Utilization pertains to the aspects of adequate nutrient intake and absorption, food preparation, and distribution within households. Stability addresses the capability to acquire food consistently over time, without significant disruptions resulting from unexpected shocks or cyclical events (FAO, 2010; Food Security Information Network, 2020).

The achievement of food security necessitates a synchronized and multisectoral approach in light of its multifaceted nature (FAO, 2010). Interventions must tackle concerns related to agricultural productivity, household incomes, market accessibility, nutritional

programs, social safety nets, and the underlying policy framework. A comprehensive comprehension of this concept furnishes a framework for effective and targeted policy measures that aim to enhance both national and global food security (FAO, 2010). The study adopts the explanation given above on the concept.

2.2 Theoretical Framework

The quantity theory of money was formulated by Fisher (1911), the theory asserts that any alterations in the amount of money supply will result in a corresponding change in the overall price level of goods and services. This theory is built upon the underlying assumption that, at a state of full employment, the level of transactions or national output, as well as the velocity of money, remains constant or changes at a sluggish pace. Consequently, the theory posits that cost of goods and services will be directly proportional to the quantity of money in circulation. This implies that when the federal government and financial institutions give out grants and loans to farmers, it will boost food production in the country thereby forcing the prices of food stuffs to fall vice-versa. The theory further postulates that inadequate availability of credit facility to farmers could lead to shortage of food production in the country and when demand for food stuff out weighs its supply it will lead to food stuff hike in the market. Summarily, the theory postulated that the quantity of money supply to farmers determines the cost of food stuff in the market. This theory of money finds its roots in the well-known identity that serves as its starting point.

$$MV=PY \qquad (1)$$

Where M = money supply, V = velocity of money in circulation, Y = real national output, and P = aggregate price level. From equation above, it can derive another equation as follows:

$$P=MV/Y \text{ or } V=PY/M \qquad (2)$$

Sequel to the above, the proportional relationship between the money stock and general price level of goods and services (inflation) can be shown in the elasticity of the price level with respect to the money supply is:

$$E_{pm}=\partial P/\partial M.M/P \qquad (3)$$

Differentiating equation 1totally yields:

$$M\partial V+V\partial M=P\partial Y+Y\partial P \quad (4)$$

But Y and V are constant at full employment. That is, change in Y and V is zero at full employment. Thus equation 4 yields:

$$V\partial M=Y\partial P \qquad (5)$$

$$\partial P/\partial M=V/Y \qquad (6)$$

Substituting equation 6 into 3 yields:

$$E_{pm}=V/Y.\ M/P \qquad (7)$$

From equation 2, V =PY/M. Substituting this into equation 7 yelds:

$$E_{pm}=1/Y.\ PY/M.\ M/P=1 \qquad (8)$$

Equation 8 above illustrates the existence of a direct proportional relationship between the general price level of goods and services, also known as inflation, and the growth rate of money supply, assuming velocity and output remain constant. This proportionality relationship implies that any permanent increase in money supply will inevitably result in an equal increase in the rate of food stuffs, goods and services (inflation), thus affecting the general price level.

2.3 Empirical Literature

Ahsan, Iftikhar, and Kemal (2020) conducted a study on the variables that influence the prices of food in Pakistan during the year 2019. They examined the factors that impact both the supply and demand of food, thereby affecting its prices in the country. The researchers analyzed this relationship over a considerable time span, spanning from 1970 to 2018, by utilizing an autoregressive distributed lag model. Based on their findings, the main determinant of food costs, both in the long and short term, is the money supply. Additionally, they discovered that subsidies, while initially having a negligible effect, can eventually contribute to the reduction of food prices. In the absence of imports, the domestic market is subjected to pressure from rising global food prices, which consequently leads to an increase in domestic food prices. However, there is a

possibility of imported inflation if food crops are imported at higher prices from overseas. These statistics hold significant importance.

Bhatt and Kishor (2015) conducted an investigation to analyze the influence of exchange rate, money supply, interest rate, and agricultural commodities in specific countries of Sub-Saharan Africa. The findings of the study demonstrated that all of these variables possess a noteworthy impact on agricultural commodities. Furthermore, the research also highlighted that the exchange rate significantly affects the cost of agricultural goods. It contributes to a long-term measure of inflation that encompasses permanent considerations of agricultural food and energy prices.

Imoughele and Ismaila (2014) conducted an investigation into the nexus between the output of the agricultural and manufacturing sectors, as well as the variables pertaining to monetary policy (specifically, exchange rate, interest rate, broad money, external reserve, and inflation rate). Their findings revealed the existence of a prolonged association between the aforementioned sectors and monetary policy variables within their study, thereby suggesting the presence of a self-correcting mechanism to rectify any disparities in the variables from a state of equilibrium.

Oyinbo and Rekwot (2014) examined the linkages among Nigeria's inclination towards inflation, agricultural production, and GDP expansion through the utilization of time series information spanning from 1970 to 2011. The findings of the study reveal the existence of a unidirectional causation between inflationary patterns and agricultural efficiency, as well as between agricultural efficiency and GDP growth, yet no such relationship is observed between inflationary patterns and GDP growth.

Onyeiwu (2012) conducted an investigation into the influence of monetary policies on key macroeconomic indicators, namely GDP, inflation rate, and balance of payment, within a specific subset of African nations during the period spanning from 1981 to 2008. Employing the Ordinary Least Squares technique, the researcher discovered that the implementation of monetary policy yielded a favorable effect on the growth of GDP and the balance of payment, while adversely impacting the inflation rate.

Ditimi, Nwosa, and Olaiya (2011) conducted an analysis on the impact of monetary policy on agricultural output prices and macroeconomic variables in Nigeria from 1986 to 2009, employing the Ordinary Least Square method. The findings of the study revealed that monetary policy played a noteworthy role in ensuring price stability in the Nigerian economy.

Abdulrahman (2010) empirical investigation scrutinized the influence of monetary policy on agricultural production within the confines of Sudan from 1990 to 2004, utilizing the Generalized Method of Moments (GMM). The findings of this study unveiled a minimal effect of monetary policy on economic activity during the period under scrutiny. Furthermore, this investigation divulged that the impact of monetary policy on agricultural output within the economy is not statistically significant.

Gómez (2008) explored the significance of money supply, inflation, and exchange rates in China and India in relation to the explanation of agricultural output and food inflation in Colombia. Moreover, the researcher took into account the spike in food inflation in Colombia in 2007, attributing it to a combination of drought and an expansionary monetary policy. However, the impacts of this spike were relatively short-lived. The alteration in consumption patterns in the nation, characterized by an increase in meat demand compared to cereal demand, leading to food inflation, can be attributed to the rising per capita income in the country. Enhancing the agriculture sector would be advantageous for underdeveloped nations and would help mitigate food inflation.

Trostle (2008) conducted an investigation into the role played by monetary policies in the upward trend of global food commodity prices in the United States of America. Utilizing the method of ordinary least squares (OLS), Trostle points out that both the money supply and the exchange rate are indicative of a deceleration in food production growth and acceleration in demand, resulting in an increase in food prices. Recent factors affecting food prices include the global demand for feedstock for biofuels and adverse weather conditions experienced in 2006 and 2007. In addition, the depreciation of the US

dollar, the surge in energy costs, the rise in agricultural production expenses, the increase in food imports by significant households, and recent alterations in trade policies by exporting and importing nations have all contributed to food inflation.

In their study conducted in 2007, Khan and Gill conducted an analysis to examine the influence exerted by the money supply on both the food and general price indices during the period spanning from 1975 to 2007, utilizing the ordinary least squares method. They place a great emphasis on comparing the CPI (food) to the overall CPI and found that M1 is strongly more connected with the latter than the former. It was discovered that money supply in an economy influences food production. They concluded that food production and food prices are driven by money supply and value added of imported agricultural goods in the economy.

Vizek's (2006) examination of the monetary transmission mechanism and its impact on the agricultural and industrial sectors in Croatia was conducted by employing the Granger causality test and error correction model. The findings of their investigation suggest that alterations in the exchange rate and money supply, stemming from monetary policy measures, have a discernible effect on both agricultural and industrial output. Conversely, the study reveals that modifications in the interest rate do not exert a significant influence on agricultural output

3. Methodology

3.1 Data and Sources

This paper used secondary data sourced from World Bank development indicators 2022 to carry out its analysis. Secondary data was obtained for the variables; food production index, money supply, lending rate, credit to private sector and inflation rate spanning 1986 to 2022. The choice of 1986 as the base year is because the structural adjustment programme started in 1986 and 2022 as the terminal year is based on the availability of data.

3.2 Method of Data Analysis

The Auto-regressive Distributed Lag (ARDL) method, proposed by Pesaran, Shin, and Smith (2001), would be used to achieve the objectives of the study in determining the effect of monetary policy on food security in Nigeria. It is autoregressive in the sense that the predictand is explained by its lag, as well as a distributive lag component in the style of sequence lag exogenous variables. ARDL is suitable due to its ability to handle any form of stationarity within I(0) and I(1).

3.3 Model Specification

Following the theoretical framework of the study and adapting the empirical work of Imoughele and Ismaila (2014) using the variables; food production index as proxy for food security, broad money as proxy for money supply, lending rate of banks, credit to private sector and inflation rate as control variable. The functional form of the model is given below;

FPI= F (M2t, LRt, CRPt INFt) (9)

The econometric form of the model is given as;

$$LNFPI_t = \delta_0 + \delta_1 LNM2t + \delta_2 LNLR_t + \delta_3 LNCRP_t + \delta_4 LNINF_t + \mathcal{E}_t \quad (10)$$

The ARDL form of the model is given as;

$$LNFPI_t = \delta_0 + \sum_i^p = i + \delta_1 LNFPI_{t-1} + \sum_i^q = i \ \delta_2 LNM2_{t-1} + \sum_i^q = i \ \delta_3 LNLR_{t-1} + \sum_i^q = i \ \delta_4 LNCRP_{t-1} + \sum_i^q = i \ \delta_5 LNINF_{t-1} + \mathcal{E}_t \quad (11)$$

A priori Expectation; M2, CRP>0, LR, INF<0

Where δ_0 is the intercept; and, δ_1 to δ_4 are the coefficients of the variables, $\mathcal{E}_t$ represents the error term and, p and q are the lags of the dependent and independent variables. Where LNFPI is the log of food production index which is a proxy for food security, LNM2 is the log of money supply, LNLR is the log of lending rate, LNCRP is the log of credit to private sector, are the variables that pertain to monetary policy and LNINF is the log of inflation which is the control variable.

3.4 Estimation Procedure

Test for Stationarity:

The Phillips-Perron (PP) stationarity test would be carried out to inspect for the presence of non-stationarity in the data. Here, the PP test represent an advancement on the Augmented Dickey-Fuller test, that is, the null hypothesis of there is unit root: $H^0 = \propto = 0$, but it proposes a nonparametric approach. Therefore, following Phillips and Perron (1988), it is also suitable to a wider category of time series, which includes the ARMA model, and also the moving average models.

The ARDL Co-integration Approach

In the ARDL method, the procedures are as follows; the first step after stationarity test is to ascertain the existence of co-integration using the bounds testing procedure (Pesaran and Pesaran, 1997; Pesaran, Shin and Smith, 2001). The magmitude of the long-run associations found in the previous phase is estimated in the second step. Following the discovery of long-run relationships among the variables, the long-run relationship is estimated using an appropriate lag selection criterion based on either the Akaike Information Criterion (AIC), the Schwarz Information Criterion (SBC), or the log-likelihood ratio test (LR), as only an appropriate lag selection criterion will be able to determine the true dynamics of the model. The third step is to estimate the short-run dynamic coefficients. The fourth stage involves testing for the stability of the model, by using the Cumulative sum of recursive residuals (CUSUM) and the Cumulative sum of squares of recursive residuals (CUSUMSQ).

Bound Test

The process is used to determine the presence of long-run connection in a model, the *F*-statistics test is conducted for the collective significance of the coefficient of the lagged variables, $H_0 : \phi_1 = \phi_2 = \phi_3 = \phi_4 = \phi_5 = 0$ against the alternative of $H_1 : \phi_1 \neq \phi_2 \neq \phi_3 \neq \phi_4 = \phi_5 \neq 0$. The calculated F-statistics is compared to the critical value. The null hypothesis is rejected if the calculated F-statistics exceeds the upper limit of critical value. The null hypothesis cannot be rebuffed if the F-statistic goes below the lower limit of critical value, implying that there is no long-run association between the variables; however, if the F-statistic falls inside the upper and lower limit, the result is not conclusive.

Residual Diagnostic Tests

The Breusch-Godfrey serial correlation LM test would be used to validate the ARDL model's results, and the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares of recursive residuals (CUSUMSQ) tests were used to test for serial correlation and the ARDL model's stability, respectively.

4. Result and Discussions

4.1 Descriptive Statistics

Table 1: Descriptive Statistics Result

	LNFPI	LNM2	LNLR	LNCRP	LNINF
Mean	4.234650	28.30519	2.880341	2.258434	2.696223
Median	4.334280	28.38769	2.867046	2.187116	2.555410
Maximum	4.681644	31.50553	3.454738	2.976835	4.288204
Minimum	3.397858	23.88473	2.287694	1.600906	1.684176
Std. Dev.	0.373331	2.437693	0.236361	0.362105	0.689160
Skewness	-0.711544	-0.319748	-0.400864	0.040639	0.895168
Kurtosis	2.560529	1.784595	4.038798	2.165854	2.948053
Jarque-Bera	3.419898	2.907835	2.654547	1.082876	4.945669
Probability	0.180875	0.233653	0.265199	0.581911	0.084345
Sum	156.6820	1047.292	106.5726	83.56207	99.76025
Sum Sq. Dev.	5.017547	213.9245	2.011192	4.720321	17.09790
Observations	37	37	37	37	37

Source: *Author's computation using E-views*

The average value of food production index, money supply, lending rate, credit to private sector, and inflation rate are; 4.234650, 28.30519, 2.880341, 2.258434 and 2.696223 respectively. The standard deviation which indicates the nature of dispersal in the worth of the variables is small, which shows there has not been much increase in the value of the variables over the years. The mean of the variables falls within the range defined by the minimum and maximum values of the variables. Credit to private sector and inflation rate have positive skewness indicating they have a long right tale, while food production index, money supply, and lending rate have negative skewness implying they have a long-left tale. The kurtosis of the variables except for lending rate is below 3 implying that most of the variable's distribution is flat and would turn platykurtic. The jarque bera

statistics means the series is not normally distributed with probability values greater than 0.05, but the normality assumption is not usually required for multivariate functions.

4.2 Unit Root Test Result

Table 2: Unit Root Test Result

Variable	Order	PP. Cal	Prob. Value	Conclusion
LNFPI	At Levels	-2.4159	0.3657	
	At First Difference	-9.8835	0.0000	1(1)
LNM2	At Levels	0.2288	0.9974	
	At First Difference	-4.2325	0.0103	1(1)
LNLR	At Levels	-3.9217	0.0212	1(0)
	At First Difference	-4.2325	0.0103	
LNCRP	At Levels	-2.6515	0.2615	1(1)
	At First Difference	-9.3580	0.0000	
LNINF	At Levels	-3.6724	0.0375	1(0)
	At First Difference	-7.0150	0.0000	

Conducted at 5% Critical level with constant and trend Source:
Source: Author's computation using E-views

The result of the Philips-Perron (PP) unit root test is presented on Table 2. In tandem with the result, LNLR and LNINF were stationary at levels, while LNFPI, LNM2, and LNCRP were stationary at first difference providing justification for use of ARDL.

ARDL Results: With the optimal lag structure automatically given by eviews, the result of the outcome of the ARDL bound test, short term and long-term results are presented below.

4.3 The ARDL Bound Test

Table 3: ARDL Bound Test Result

F-Bounds Test	**Null Hypothesis: No levels relationship**			
Test Statistic	**Value**	**Significance.**	**I (0)**	**I (1)**
F-statistic	7.486356	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Source: *Author's computation using E-views*

On table 3 is the ARDL bound test result, which establishes the existence of long-run relationship in the model. The test result showed that the F-statistics which is 7.48, is above the upper bound critical values (I (1) at all the levels of significance, indicating the existence of long-run relationship in the model. Based on this result, the study proceeded to conduct the short-run and long-run forms of the ARDL model.

4.4 ARDL Short-run and Long-run Estimation

Table 4: Short-Run and Long Run Coefficient Estimates

Variables	Coefficient	Std. Error	t-Statistic	Prob.
Short-run Estimates	0.347682	0.144898	2.399503	0.0245
LNFPI(-1)				
LNFPI(-2)	0.531350	0.141764	3.748144	0.0010
LNM2	-0.101102	0.083307	-1.213608	0.2367
LNM2(-1)	-0.011696	0.112160	-0.104278	0.9178
LNM2(-2)	0.114716	0.082448	1.391369	0.1769
LNLR	0.051243	0.048893	1.048062	0.3051
LNCRP	0.113142	0.063398	1.784633	0.0870
LNCRP(-1)	-0.110899	0.052922	-2.095523	0.0469
LNINF	0.030623	0.015434	1.984111	0.0588
LNINF(-1)	-0.024279	0.013894	-1.747429	0.0933
*CointEq(-1)**	-0.120968	0.018305	-6.608359	0.0000
Long-run Estimates				
LNM2	0.015851	0.157296	0.100771	0.9206
LNLR	0.423608	0.512343	0.826805	0.4165
LNCRP	0.018548	0.605420	0.030636	0.9758
LNINF	0.052442	0.141901	0.369568	0.7149

Source: *Author's computation using E-views*

The results of the short run and long run ARDL coefficients estimates on Table 4 showed that the error correction component is -0.12, this reveals that the speed of adjustment to reverse to equilibrium is -0.12 and it was highly significant. This implies that the deviation from the food production path was corrected by 12% annually in the model. The coefficient of food production index (LnFPI) had positive and significant effect in 1st and 2nd period lag in the short run. Money supply (LNM2) at levels and first difference had negative and insignificant effect on food production index, but at second difference its impact was positive though insignificant in the short run, the implication is reduced availability of funds for agricultural investment, which limit the ability of farmers to access capital for purchasing inputs, modernizing equipment and expanding their operations, leading to decreased productivity and food output, in the long run money supply had positive and insignificant effect on food production index, implying that funding was increased to agriculture in the long run but was low to make a significant contribution. Lending rate (LnLR) had positive and insignificant effect on food production in the short run and the long run, the positive implication of lending rate implies that the cost of borrowing for agricultural investment and activities is high, this hinders the ability of farmers and agribusinesses to access affordable credit for purchasing inputs, investing in technology and expanding their operations, leading to declining agricultural productivity and higher food prices. Credit to private sector (LnCRP) in the short run at levels had positive and weak significant effect, at first difference its impact was negative and significant, but in the long run its impact was positive but insignificant, implying that credit facilities given are not utilized for agricultural purposes but diverted for other purposes leading to declining agricultural productivity. Inflation (LnINF) in the short run had positive and significant effect at levels and negative and insignificant effect at first difference, but in the long run inflation had positive and insignificant effect, the positive effect of inflation in the short run and long run is that inflation leads to higher revenues for farmers in an inflationary environment but limits consumers ability to afford buying the produce. The implication of this short run and long run result is that monetary policy is not significantly affecting food production in Nigeria. This is inconsistent with, Imoughele & Ismaila (2014) which showed significant positive relationship between monetary policy and food production, but consistent with Vizek (2006) which showed negative relationship between monetary policy, agriculture and industrial output.

4.5 Residual Diagnostic Test Results **Serial Correlation Test-**

Table 5: Breusch-Godfrey Serial Correlation LM Test

:

F-statistic	0.970879	Prob. F(2,22)	0.3944
Obs*R-squared	2.838620	Prob. Chi-Square(2)	0.2419

Source: *Author's computation using E-views*

Presented on Table 5 is the outcome of the Breusch-Godfrey serial correlation LM test. The test accepted the null hypothesis of no serial correlation in the residual, since the probability of both the F-statistics and its Observed R-squared values were both greater than 5%, indicating the absence of serial autocorrelation from the model.

Stability Test Result: For the stability test, the result of the CUSUM and the CUSUMSQ tests are presented on Figures 1 and 2. The plots of both tests statistic on Figures 1 and 2 were all within the 95% confidence interval indicating the model was stable.

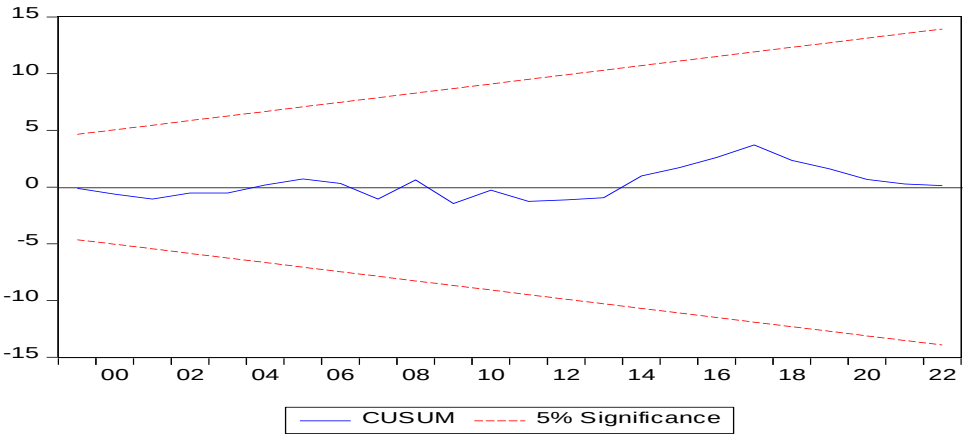

Figure 1: CUSUM Plot
Source: Author's computation using E-view 10

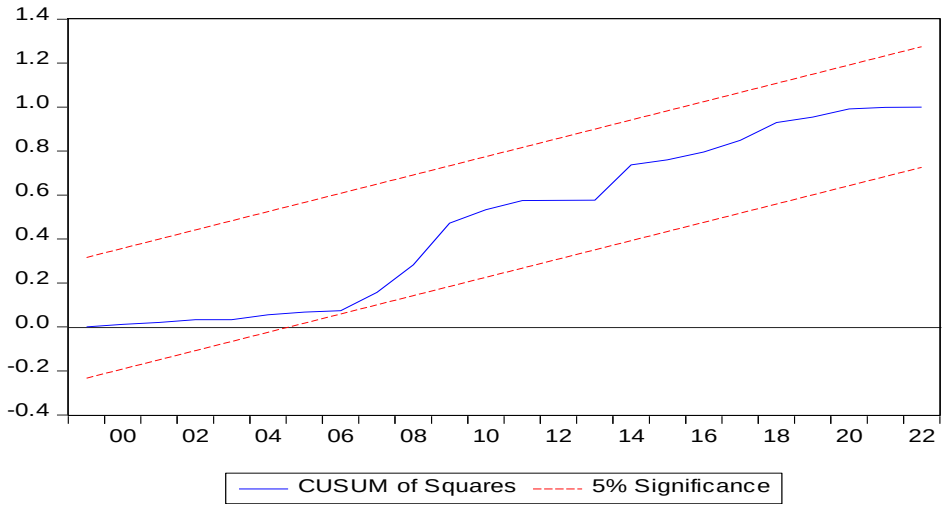

Figure 2: CUSUM Plot
Source: Author's computation using E-view 10

5. Conclusion and Recommendations

This study concludes that monetary policy is not making significant effect on food production in Nigeria in both the short run and long run. The implication of this is that governing bodies or institutions that hold the responsibility of regulating and managing the money supply and overall financial system over the years have not boosted food productivity in Nigeria and monetary policy needs to be rejig to boost food production and security in the country.

To ensure that monetary policy makes significant impact in boosting food production in Nigeria, the monetary authorities should make policies to boost lending to agricultural sector and boost money supply to the sector, also the lending rate should be low to encourage agriculturist lend from financial institutions to boost their production and inflation should be adequately managed to ensure stable macroeconomic environment and encourage agricultural production.

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