Determinants of Inflation rate in Nigeria

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***Abstract*- The study undertook an assessment of the determinants of inflation rate in Nigeria. Unit root test using the Augmented Dicky Fuller (ADF) test, ARDL Bound test for cointergration, Granger Causality test and the VECM estimate to ascertain the factors responsible for the rising rate of inflation in Nigeria was used. The study adopted secondary data on inflation rate proxied by CPI, Total Federal Government Expenditure (TFGE), exchange rate and money supply represented by M_2, between 1995 and 2021 sourced from the Central Bank of Nigeria Statistical Bulletin. The result of the research indicates that M_2, and TFGE have no significant relationship with CPI while exchange rate shows a positive relationship with inflation rate in Nigeria. The Granger Causality test indicates that no causal relationship exists among all the variables in the model. Based on the findings, the study recommends that the Central Bank of Nigeria should review its exchange rate policy to improve the value of the Naira to foreign currencies especially the US Dollar to limit the pass-through effect of foreign on inflation rate in the country especially since Nigeria imports a large percentage of goods consumed in the economy.**

***Keywords*: Inflation, Exchange rate, Money Supply, Granger Causality Test.**

1.0 INTRODUCTION

The problem of inflationary rise in prices over time constitute a problem to most economies of the world causing many undesirable effects mainly affecting the medium of exchange characteristic of money since it continuously loses its real value. According to Abdullahi & Kime, (2016) inflation reflects erosion in the medium of exchange and unit of account function of money in an economy which is the currency's purchasing power. Persistent price increases are among the most serious problems affecting every economic unit (Iya & Aminu, 2014). This is evident with economic agents, especially fixed income earners perturbed about the effect of rising inflation rates on the purchasing power. Consequently, policymakers deploy multiple variants of decelerators to ensure price stability (Ebipre & Amaegberi, 2020).

In fact, it has been an issue of concern to policymakers in recent years given the need to stimulate domestic demand and to meet government's huge fiscal obligations in a post-recessionary period (Babatunde & Shuaibu, 2011). While prices have experienced an upward trend in some countries, price instability is yet to reach the hyperinflation conditions once experienced in some Latin American countries (Abdullahi & Kime, 2016). Inflation is a highly controversial term which has undergone modifications since it was first defined by the neo- classical economists (Abdullahi & Kime, 2016). Inflationary discourse still remains the most contentious Macroeconomic studies which have theoretical basis in the perspective of both the Monetarist and the Keynesian schools of thought (Iya & Aminu, 2014). Smith, (1776) attributed a rise in the general price level to an imbalance between the quantity of money and trade needs. Keynes (1936) viewed that inflation is as a result excess of aggregate demand over aggregate supply at full employment level of output. According to Keynes, inflation refers to an expansion in money supply relative to supply of goods and services. He approached the inflationary problem from the point of view of income analysis, rather than from the point of view of monetary analysis as the monetarists who view inflation as the consequence of excessive supply of money over its demand.

Money supply more or less influences or affects Economic growth positively or negatively (Inam, 2014). However, in Nigeria, there is a persistent debate among economists on the desirability or otherwise of expansionary monetary policy to fuel growth with some claiming that increase in money supply is valid only in the long run while in the short run growth in money supply only aggravates the price level of goods and services and therefore negatively affecting growth (Mukhtar & Muhammad 2017)

Some of the reasons adduced for the sustained and persistent inflation rates in many developing countries include: high public sector budget deficits, high military expenditure, the decision of economic agents owing to inflationary expectations; increase in money supply; increases in imported raw materials, inputs, and manufactured goods (Abdullahi & Kime, 2016). According to Abdullahi & Kime, (2016), other factors responsible for inflationary rise in prices include money supply, exchange rates, interest rates, government deficit budget and so on.

Inflation in itself is not necessarily evil if it remains at reasonable rates. It constitutes a necessary trigger for investment in an economy. However, there is no agreement as to the rate of inflation necessary to achieve growth. However, in practice, low inflation of 2-3% has been the norm for developed countries and 5-7% for developing countries (Ebipre & Amaegberi, 2020). Since independence in 1960, inflation rate has experiences upward and downward swings from 5.4% in 1960, to negative values of -2.7% and -3.7% in 1963 and 1967 respectively (WDI, 2023). Inflation rate rose to as high as 72.8% in 1995, the highest since independence and declined to 8.5% in 1997 (WDI, 2023). However, since 2014 inflation rate has experienced a steady rise from 8% in 2014 to 9% in 2015 and experienced a drastic rise to 15.7% in 2016 (WDI, 2023). In 2017 inflation rate further rose to 16.5%, 11.4%, 13.2 and 17% in 2019, 2020 and 2021 respectively (WDI, 2023). The growth rate of broad money and the rate of inflation seem to show a pattern with growth rate of broad money with -12.7% in 1967 corresponding to -3.7% rate of inflation. Similarly, the growth rate of broad money at 55.7%, 2%, 32.9%, 16%, 4.1%, 31.9% and 12.6% in 1975, 1986, 1988, 1997, 2015, 2016, and 2021 respectively.

However, monetary policy makers encounter different kind of problem trying to control inflation, because they have to establish the precise fraction of the changes in aggregate prices level that could be attributed to the growth in money supply; domestic and foreign currencies (Ebipre & Amaegberi, 2020). The study intends to ascertain the role of money supply in the persistent rise in prices Nigeria has been experiencing over the years.

2.0 LITERATURE REVIEW

2.1 Empirical Review

Many researchers have investigated the effect or money supply on economic growth in Nigeria using the various components of money supply as well as other related variables over different time periods. These researches have come out with varying outcomes as to the nature of relationship between money supply and inflation rate in Nigeria.

Williams, Oladeji & Bank-Ola (2022) studied the effect of money supply on inflation in Nigeria from 1981 to 2020 using money supply, Interest rate and Domestic and inflation. The result of the study indicates that money supply had a negative and significant effect on inflation in Nigeria. Interest rate had a positive and significant effect on inflation; while domestic credit has a positive but insignificant effect on inflation.

Olayinka (2021) examined the interrelationship between interest rate and inflation rate in Nigeria. The study established inability of interest rates to curb inflation in the short run while having a significant impact in the long run. The study recommended that the Central bank should strive to keep inflation and interest rates lower than the current rates while improving on macroeconomic policy management.

Ebipre & Amaegberi, (2020) examined the relationship between money supply and inflation in Nigeria using time series data of inflation rate, Real GDP growth rate, growth rate of broad money supply and government deficit financing from 1971-2015. The result of the analysis indicated a positive relationship between money supply and inflation as well as deficit financing and inflation in Nigeria. The study recommended prudent financial management of financial resources by the government to achieve price stability in the Nigeria.

Adelowokan, Adesoye & Ogunmuyiwa (2019) examined the impact of open market operations and money supply on inflation rate in Nigeria between 1981 and 2016. The result of the study revealed that Treasury bill, government bonds, and money supply had positive and significant relationship with inflation rate in Nigeria and concluded that open market operations while controlling the supply of money had significantly impacted on price stability in the long-run in the Nigerian economy.

Ikezam (2018) examined money supply and inflation in Nigeria. Regression result in the study shows that Currency in Circulation, Demand Deposit and Savings Deposit has negative relationship while Net Foreign Asset and Time Deposit have positive relationship with inflation. The Granger Causality Test reveals no casual relationship running through the variables. It therefore recommends effective management of money supply by the monetary authorities to achieve the monetary policy objectives of price stability.

Amassoma, Sunday, & Onyedikachi (2018) empirically investigated the influence of money supply on inflation in Nigeria. The results of the study showed that money supply does not considerably influence inflation both in the long and short run possibly because the country is in recession. The study recommends that the government should diversify the economy, minimise importation by encouraging local production of products and services.

Mukhtar & Muhammad (2017) examined the effect of money supply on Economic Growth in Nigeria using annual time series data from 1981 to 2015. The empirical result confirms long run relationship among the variables with a positive and significant relationship between money supply and interest rate while real exchange rate has negative significant impact on the economy. The study recommended expansionary monetary policy for achieving economic growth in Nigeria in addition to greater emphasis on the improvement of monetary policies and institutions for ensuring effective and efficient monetary system in Nigeria.

Obi & Uzodigwe (2015) assessed this dynamic link between money supply and inflation in ECOWAS member states. The random effect model for ECOWAS member indicates that the impact of money supply on inflation is effective in the current and first period while indicating significant specific-country effects on the variables. The research recommended that in measuring the effectiveness of monetary cooperation programme among ECOWAS member states, inflation should be used as an operational indicator.

Mbutor (2014) investigated the contribution of money supply to inflation rate in Nigeria. The impulse response function showed a persistent positive relationship between inflation and money supply. However, the variance decomposition of inflation shows that GDP was the strongest contributor to inflationary developments in Nigeria, and that money supply accounts for up to 34.5 per cent of aggregate price changes until the tenth period.

Iya & Aminu, (2014) investigated the determinants of inflation in Nigeria between 1980 and 2012. The results revealed that money supply and interest rate influenced inflation positively, while government expenditure and exchange rate influenced inflation negatively. The study concluded that to achieve price stability, money supply and interest rate should be reduced while increasing government expenditure and exchange rate in the country.

David & Ann (2014) investigated the dynamics between money supply and inflation in Nigeria using the TodaYamamoto causality test and the error correction methodology from 1980 to 2012. Within this period the study discovered that causality run from money stock to output and inflation in the Nigerian economy and that increase in money supply is proportional to inflation rate in Nigeria. The research concluded that inflation is a purely a monetary phenomenon in Nigeria as the coefficient of broad money supply is equals unity.

Inam (2014) investigated the role of money supply on economic growth in Nigeria between 1985- 2012. The study found that there exist a negative, strong and statistically significant relationship between money supply and economic growth in Nigeria. The study suggested that emphasis should be on the improvement of the monetary policies its instruments and institutions in Nigeria.

Sola & Peter (2013) investigated the relationship between money supply and inflation rate in Nigeria. The results from the causality test indicate that a unidirectional causality exists between money supply and inflation rate as well as interest rate and inflation rate.

The research concluded that government should judge the effectiveness of its monetary policy on the bases of the level of inflation in the country.

Akinbobola (2012) examined the dynamics of money supply, exchange rate and inflation in Nigeria. The result of the research finds that money supply and exchange rate are inversely related to inflation in the long run indicating a causal link between inflation, money supply and exchange rate in Nigeria. The study recommended effective inflation control in Nigeria, with the instrumentality of monetary and fiscal policy.

2.2 Theoretical Review

2.2.1. Monetarist Theory

This theory is credited to Milton Friedman illustrated the role of monetary policy in creating and arguably worsening the Great Depression. In his book "a monetary history of the United States, 1867-1960," Friedman developed his own economic theory called Monetarism; which expressed the real short-term and long-term effect of money supply on the economy as well as the importance of monetary policy. In broader sense, according to monetarists, inflation occurs when the monetary authority creates an excessive supply of money over its demand, thereby making so much credit available to households and propelling aggregate demand in the economy.

2.2.2. Keynesian Theory

John Maynard Keynes in 1936 disagreed with the quantity theorists' conclusion that a direct and proportional relationship exists between the quantity of money in an economy and prices. Keynes rejected the idea that the economy would return to a natural state of equilibrium through the forces of demand and supply. He proposed that government should increase their spending and reduce tax, to propel consumption, investment and stimulate growth. He also argued that the problems associated with cyclical fluctuations can be addressed by economic policy responses coordinated between fiscal and monetary authorities.

2.2.3. Globalist Theory

According to globalist school of thought, inflation in a country can be influenced through the 'imported price index' or 'Pass through'. This occurs when the price of goods and services in an economy is impacted by the price of goods and services of the importing country. 'Pass through' is influenced by exchange rate, which is the relationship between domestic currency and its foreign counterpart. Whenever the value of domestic currency depreciates and its foreign counterpart appreciates the prices of domestic goods and services in the domestic economy increases.

2.2.4. Demand pull inflation theory

J.M Keynes and his followers in 1936 emphasize the increase in aggregate demand as the main cause of demand-pull inflation. The Keynesians emphasise that when aggregate demand in an economy exceeds the aggregate supply at full employment level, we experience inflationary gap. The larger the gap between aggregate demand and aggregate supply, the more rapid is the inflation (Ebipre & Amaegberi, 2020). Keynes advocated the use of fiscal policy to slow down aggregate demand and inflation. In recent times in Nigeria, monetary authorities have adopted contractionary monetary policy to control demand pull inflation by reviewing MPR variables upward to mop up excess liquidity in the economy.

2.2. Cost push inflation theory

The cost push inflation is traced to Sir James Steuart who emphasized that 'commodities will still rise and fall according to the principle of competition and cost, but never upon the quantity of coin'. In his book titled *inquiry into the Principles of Political economy*, published in 1767, he clearly explained that cost and competition determine prices and that specifically cost and competition determine the standard price of everything. The cost-push inflation theory emphasizes the fact that prices are pushed up by rising costs of inputs such as increased wages, higher prices of inputs and imported raw materials among others and these costs are passed to the final consumers.

2.3 Theoretical framework

Theoretically, this study is hinged on Milton Friedman's theory of monetarism. According to him 'inflation is always and everywhere a monetary phenomenon'. The monetarist's view has its root in quantity theory of money which considers money supply as the cause of demand-pull inflation. According to the monetarists, the money supply is the "dominant, though not exclusive" determinant of both the level of output and price (Ebipre & Amaegberi, 2020)

The relationship between money supply and price level is given by Fisher's exchange equation:

MV = PT

Where,

M = Money in circulation and demand deposits.

V = Velocity of money in circulation.

P = Price level.

T = Volume of transaction of goods and services (Output).

The left-hand side of the equation represent money supply while the right-hand side indicates demand for money. In this form, VT is constant or changes slowly in the short run while M is related positively and proportionately to T hence an increase in money supply results to proportional change in prices. That is, if money supply increase, effectively, it means increase in the total money supply and with velocity being constant, and no corresponding increase in goods and services, people will want to spend the excess money on the same quantity of goods and services available since people are not expected to hoard money. (Ebipre & Amaegberi, 2020).

Hence the theory ties the occurrence of inflationary pressures to money supply changes within an economy and in the case of Nigeria, consistent changes in the monetary policy rate (MPR) by the Central Bank of Nigeria in response to inflationary pressures indicates a possible link between the inflationary pressures the economy is experiencing and the supply of money.

3.0 METHODOLOGY OF THE STUDY

3.1 Model Specification

This study intends to examine the effect of money supply on inflation rate in Nigeria. The data for the study was sourced from Central Bank of Nigerian Statistical Bulletin. The model for the study is expressed as;

$$CPI_t = \alpha_0 + \beta_1 EXRATE_t + \beta_2 M2_t + \beta_3 TFGE_t \quad \text{---------- (1)}$$

Where

CPI_t = Consumer price index

$EXRATE_t$ = Exchange Rate

$M2_t$ = Money Supply

$TFGE_t$ = Total Government Expenditure

$$\Delta CPI_t = \alpha_0 + \beta_{11} CPI_{t-i} + \beta_{21} EXRATE_{t-i} + \beta_{31} M2_{t-i} + \beta_{41} TFGE_{t-I} + \sum_{i=1}^{p} a_{1i} \Delta CPI_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=1}^{q} a_{3i} \Delta M2_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta TFGE_{t-I} + \mathcal{E}_{1t} \quad \text{---------- (2)}$$

$$\Delta EXRATE_t = \alpha_{02} + \beta_{12} CPI_{t-i} + \beta_{22} EXRATE_{t-i} + \beta_{32} M2_{t-i} + \beta_{42} TFGE_{t-I} + \sum_{i=1}^{q} a_{1i} \Delta CPI_{t-i} + \sum_{i=1}^{p} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=1}^{q} a_{3i} \Delta M2_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta TFGE_{t-I\,1} + \mathcal{E}_{2t} \quad \text{---------- (3)}$$

$$\Delta M2_t = \alpha_{03} + \beta_{13} CPI_{t-i} + \beta_{23} EXRATE_{t-i} + \beta_{33} M2_{t-i} + \beta_{43} TFGE_{t-I} + \sum_{i=1}^{q} a_{1i} \Delta CPI_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=1}^{p} a_{3i} \Delta M2_{t-i} + \sum_{i=1}^{q} a_{4i} \Delta TFGE_{t-I} + \mathcal{E}_{3t} \quad \text{---------- (4)}$$

$$\Delta TFGE_t = \alpha_{04} + \beta_{14} CPI_{t-i} + \beta_{24} EXRATE_{t-i} + \beta_{34} M2_{t-i} + \beta_{44} TFGE_{t-I} + \sum_{i=1}^{q} a_{1i} \Delta CPI_{t-i} + \sum_{i=1}^{q} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=1}^{q} a_{3i} \Delta M2_{t-i} + \sum_{i=1}^{p} a_{4i} \Delta TFGE_{t-I} + \mathcal{E}_{4t} \quad \text{---------- (5)}$$

$$\Delta CPI_t = \alpha_0 + \sum_{i=1}^{p-1} a_{1i} \Delta CPI_{t-i} + \sum_{i=0}^{q-1} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=0}^{q-1} a_{3i} \Delta M2_{t-i} + \sum_{i=0}^{q-1} a_{4i} \Delta TFGE_{t-I} + \lambda ECT_{t-1} + \mathcal{E}_{1t} \quad \text{---------- (6)}$$

$$\Delta EXRATE_t = \alpha_0 + \sum_{i=0}^{q-1} a_{1i} \Delta CPI_{t-i} + \sum_{i=1}^{p-1} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=0}^{q-1} a_{3i} \Delta M2_{t-i} + \sum_{i=0}^{q-1} a_{4i} \Delta TFGE_{t-I\,1} + \lambda ECT_{t-1} + \mathcal{E}_{2t} \quad \text{---------- (7)}$$

$$\Delta M2_t = \alpha_0 + \sum_{i=0}^{q-1} a_{1i} \Delta CPI_{t-i} + \sum_{i=0}^{q-1} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=1}^{p-1} a_{3i} \Delta M2_{t-i} + \sum_{i=0}^{q-1} a_{4i} \Delta TFGE_{t-I} + \lambda ECT_{t-1} + \mathcal{E}_{3t} \quad \text{---------- (8)}$$

$$\Delta TFGE_t = \alpha_0 + \sum_{i=0}^{q-1} a_{1i} \Delta CPI_{t-i} + \sum_{i=0}^{q-1} a_{2i} \Delta EXRATE_{t-i} + \sum_{i=0}^{q-1} a_{3i} \Delta M2_{t-i} + \sum_{i=1}^{p-1} a_{4i} \Delta TFGE_{t-I} + \lambda ECT_{t-1} + \mathcal{E}_{4t} \quad \text{---------- (9)}$$

3.2 Unit Root Test

Unit root test shows if the time series fulfil the assumption of stationarity of time series data.

Table 3.1 UNIT ROOT TEST

Level result

Variables	ADF Test Statistics	1%	5%	10%
CPI	1.263059	-3.7696	-3.00486	-2.64224
EXRATE	2.305117	-3.73785	-2.99188	-2.63554
M2	6.178969	-3.71146	-2.98104	-2.62991
TFGE	3.662924	-3.78803	-3.01236	-2.64612
First Difference				
Variables	**ADF Test Statistics**	**1%**	**5%**	**10%**
CPI	3.663390	-3.83151	-3.02997	-2.65519
EXRATE	-3.10096	-3.73785	-2.99188	-2.63554
M2	1.265740	-3.73785	-2.99188	-2.63554
TFGE	-0.5349	-3.80855	-3.02069	-2.65041

Source: Authors compilation

From table 4.1 above, M_2 and TFGE are stationary at level since the ADF Test statistic is greater than the critical value at 5%. CPI and EXRATE are stationary at first difference because the ADF Test statistic is greater than the critical value at 5%.

3.2 Co-integration Test

This study would employ the use of ARDL bounds test to check for co-integration.

Table 3.2 Bound Test for Cointegration

Bound Test							
CPI			**I(0)**			**I(1)**	
		1%	**5%**	**10%**	**1%**	**5%**	**10%**
F - Statistics	**116.1458**	**4.29**	**3.23**	**2.72**	**5.61**	**4.35**	**3.77**
t - Statistics	**-3.94572**	**-3.43**	**-2.86**	**-2.57**	**-4.37**	**-3.78**	**-3.46**
EXRATE			**I(0)**			**I(1)**	
		1%	**5%**	**10%**	**1%**	**5%**	**10%**
F - Statistics	**7.044902**	**4.29**	**3.23**	**2.72**	**5.61**	**4.35**	**3.77**
t - Statistics	**-2.83169**	**-3.43**	**-2.86**	**-2.57**	**-4.37**	**-3.78**	**-3.46**
M2			**I(0)**			**I(1)**	
		1%	**5%**	**10%**	**1%**	**5%**	**10%**
F - Statistics	**32.05206**	**4.29**	**3.23**	**2.72**	**5.61**	**4.35**	**3.77**
t - Statistics	**-5.58465**	**-3.43**	**-2.86**	**-2.57**	**-4.37**	**-3.78**	**-3.46**
TFGE			**I(0)**			**I(1)**	
		1%	**5%**	**10%**	**1%**	**5%**	**10%**
F - Statistics	**11.08073**	**4.29**	**3.23**	**2.72**	**5.61**	**4.35**	**3.77**
t - Statistics	**-2.58291**	**-3.43**	**-2.86**	**-2.57**	**-4.37**	**-3.78**	**-3.46**

Source: Authors compilation

From table 4.2 the value of F-statistic for CPI, EXRATE, M_2, and TFGE is greater than the upper bound value at 5%. This indicates that cointergartion exist among the variables of the model.

3.3 ARDL Error Correction Regression Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.44563	0.997918	-11.46951	0.0000
D(EX_RATE)	0.153096	0.025017	6.119618	0.0000
CointEq(-1)*	-0.348241	0.015066	-23.11429	0.0000

R-squared	0.976853	Mean dependent var	14.13885
Adjusted R-squared	0.974841	S.D. dependent var	13.39529
S.E. of regression	2.124719	Akaike info criterion	4.453324
Sum squared resid	103.8320	Schwarz criterion	4.598489
Log likelihood	-54.89321	Hannan-Quinn criter.	4.495126
F-statistic	485.3340	Durbin-Watson stat	1.456874
Prob(F-statistic)	0.000000		

The VECM result in table 4.3 above indicates that M_2, and TFGE have no significant relationship with CPI while exchange rate shows a positive relationship with inflation rate in Nigeria. The error correction coefficient – 0.348241 indicates the speed of adjustment back to equilibrium in a case of any distortions in the economy. The value of F-Statistic of 0.000000 which is less than 5% shows that the overall fit of the model is good.

3.4 Granger Causality Test

Pairwise Granger Causality Tests
Date: 05/31/23 Time: 20:59
Sample: 1 27
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
EX_RATE does not Granger Cause CPI	26	4.58690	0.0430

CPI does not Granger Cause EX_RATE		4.38093	0.0476
M2 does not Granger Cause CPI	26	0.04333	0.8369
CPI does not Granger Cause M2		9.37586	0.0055
TFGE does not Granger Cause CPI	26	1.16700	0.2912
CPI does not Granger Cause TFGE		12.6325	0.0017
M2 does not Granger Cause EX_RATE	26	5.54413	0.0275
EX_RATE does not Granger Cause M2		1.54445	0.2265
TFGE does not Granger Cause EX_RATE	26	1.80400	0.1923
EX_RATE does not Granger Cause TFGE		15.3806	0.0007
TFGE does not Granger Cause M2	26	18.2387	0.0003
M2 does not Granger Cause TFGE		1.38738	0.2509

The Granger Causality test indicates that no causal relationship exist between all the variables in the model.

4.0 Conclusion

The result of the study indicates that M_2, EXRATE and TFGE do not granger cause CPI. This implies that inflation rate in Nigeria over the period under review is not influenced by these variables. It however indicates a positive relationship between EXRATE and CPI indicating that an expansion in the disparity in exchange rate between the Naira and foreign currencies.

5.0 Recommendation

The study recommends that the Central Bank of Nigeria should review its exchange rate policy to improve the value of the Naira to foreign currencies especially the US Dollar to limit the pass through effect of foreign on inflation rate in the country especially since Nigeria imports a large percentage of goods consumed in the economy.

REFERENCES

1. Abdullahi Y. Z. & Kime M. M.,(2016). Money supply growth and its inflationary effects in Nigeria. *NDIC Quarterly* 29(3), 71 – 95.
2. Adelowokan A. O., Adesoye B.A., & Ogunmuyiwa T. M, (2019). Impact of open market operations and money supply on inflation in Nigeria. *Acta Universitatis Danubius: Oeconomica*, 15, 235-249.
3. Akinbobola T. O (2012). The dynamics of money supply, exchange rate and inflation in Nigeria. *Journal of Applied Finance & Banking*, 2(4), 117-141.
4. Amassoma D., Sunday K., & Onyedikachi E. (2018). The influence of money supply on inflation in Nigeria. *Journal of economics and management*, 31, 5 – 23.
5. David U. & Ann T. N. (2014). Causality Dynamics between Money Supply and Inflation in Nigeria: A Toda-Yamamoto Test and Error Correction Analysis. *Journal of Empirical Economics*, 3(2), 63-75.
6. Ebipre, P. & Amaegberi, M. A (2020). Money supply and inflation in Nigeria. *International Journal of Innovative Social Sciences & Humanities Research*, 8(3), 61 – 68.
7. Ikezam, N.D (2018). Money supply and inflation: Disaggregated time series evidence from Nigeria. *American Finance & Banking Review*, 2(1), 54 – 63.
8. Inam, U. (2014). Money Supply and Economic Growth in Nigeria: An Econometric Analysis. *Journal of Economics and Sustainable Development*, 5(12), 149 – 155.
9. Iya, I.B. and Aminu, U. (2014). 'An Empirical Analysis of the Determinants of Inflation in Nigeria'. Journal of Economics and Sustainable Development, 5 (1), 140 – 150.
10. Mbutor, O. M. (2014). Inflation in Nigeria: How much is the function of money? *Journal of Economics and International Finance*, 6(1), 21-27.
11. Mukhtar D. G. & Muhammad H. N., (2017). Impact of Money Supply on Economic Growth in Nigeria. *Dutse Journal of Economics & Development Studies*, 3(1), 133-144.
12. Obi K. O. & Uzodigwe A. A., (2015). Dynamic Impact of Money Supply on Inflation: Evidence from ECOWAS Member States. *Journal of Economics and Finance*, 6(3), 10 – 17.
13. Olayinka, M. S. (2021). Interest Rates and Inflation Rate Interplay: Impact on Policy Decision in Nigeria Since Year 2000. *International Journal of Economics, Management and Accounting*, *29*(1), 129–166.
14. Sola O. & Peter A. (2013). Money supply and inflation in Nigeria: Implications for national development. *Modern Economy*, 4(3), 161-170.
15. WDI, 2023. International Monetary Fund, International Financial Statistics and data files.
16. Williams B.C., Oladeji S. I. & Bank-Ola R. F. (2022). Money supply and inflation in Nigeria: An ARDL and ECM approach. *International Journal of Management, Social Sciences, Peace and Conflict Studies,* 5(1), 271- 282.

APPENDIX

Null Hypothesis: CPI has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.263059	0.9975
Test critical values:	1% level	-3.769597	
	5% level	-3.004861	
	10% level	-2.642242	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI)
Method: Least Squares
Date: 05/30/23 Time: 20:17
Sample (adjusted): 6 27
Included observations: 22 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI(-1)	0.081015	0.064142	1.263059	0.2247
D(CPI(-1))	0.719348	0.317826	2.263341	0.0379
D(CPI(-2))	-0.478709	0.346243	-1.382580	0.1858
D(CPI(-3))	-0.178345	0.348087	-0.512357	0.6154
D(CPI(-4))	0.578056	0.312701	1.848591	0.0831
C	-1.981596	1.470101	-1.347932	0.1965

R-squared	0.946299	Mean dependent var	16.17182
Adjusted R-squared	0.929517	S.D. dependent var	13.60489
S.E. of regression	3.611916	Akaike info criterion	5.633355
Sum squared resid	208.7350	Schwarz criterion	5.930912
Log likelihood	-55.96690	Hannan-Quinn criter.	5.703450
F-statistic	56.38871	Durbin-Watson stat	1.930366
Prob(F-statistic)	0.000000		

Null Hypothesis: EXCHANGE_RATE___N_US$1_00_ has a unit root
Exogenous: Constant
Lag Length: 2 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.305117	0.9999
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCHANGE_RATE___N_US$1_00_)
Method: Least Squares
Date: 05/30/23 Time: 20:20
Sample (adjusted): 4 27
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EXCHANGE_RATE___N_US$1_00_(-1)	0.131383	0.056996	2.305117	0.0320
D(EXCHANGE_RATE___N_US$1_00_(-1))	0.388836	0.215871	1.801241	0.0868
D(EXCHANGE_RATE___N_US$1_00_(-2))	-0.574840	0.226140	-2.541964	0.0194
C	-7.591296	8.442016	-0.899228	0.3792

R-squared	0.456905	Mean dependent var	13.34730
Adjusted R-squared	0.375441	S.D. dependent var	20.27899
S.E. of regression	16.02629	Akaike info criterion	8.537350
Sum squared resid	5136.841	Schwarz criterion	8.733692
Log likelihood	-98.44820	Hannan-Quinn criter.	8.589440
F-statistic	5.608662	Durbin-Watson stat	1.986551
Prob(F-statistic)	0.005872		

Null Hypothesis: M2 has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		6.178969	1.0000
Test critical values:	1% level	-3.711457	
	5% level	-2.981038	
	10% level	-2.629906	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2)
Method: Least Squares
Date: 05/30/23 Time: 20:23
Sample (adjusted): 2 27
Included observations: 26 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
M2(-1)	0.135516	0.021932	6.178969	0.0000
C	705.6884	1235.980	0.570955	0.5733

R-squared	0.614022	Mean dependent var	6163.545
Adjusted R-squared	0.597939	S.D. dependent var	6952.281
S.E. of regression	4408.320	Akaike info criterion	19.69418
Sum squared resid	4.66E+08	Schwarz criterion	19.79096
Log likelihood	-254.0243	Hannan-Quinn criter.	19.72205
F-statistic	38.17965	Durbin-Watson stat	1.601914
Prob(F-statistic)	0.000002		

Null Hypothesis: TFGE has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.662924	1.0000
Test critical values:	1% level	-3.788030	

	5% level	-3.012363
	10% level	-2.646119

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TFGE)
Method: Least Squares
Date: 05/30/23 Time: 20:25
Sample (adjusted): 7 27
Included observations: 21 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
TFGE(-1)	0.195405	0.053347	3.662924	0.0026
D(TFGE(-1))	-0.501538	0.223316	-2.245864	0.0414
D(TFGE(-2))	0.404616	0.188305	2.148725	0.0496
D(TFGE(-3))	0.306157	0.212431	1.441203	0.1715
D(TFGE(-4))	-0.996377	0.237950	-4.187330	0.0009
D(TFGE(-5))	-1.004776	0.285290	-3.521950	0.0034
C	232.1033	138.1648	1.679902	0.1151

R-squared	0.796532	Mean dependent var	545.8618
Adjusted R-squared	0.709332	S.D. dependent var	601.8688
S.E. of regression	324.4893	Akaike info criterion	14.66358
Sum squared resid	1474107.	Schwarz criterion	15.01176
Log likelihood	-146.9676	Hannan-Quinn criter.	14.73915
F-statistic	9.134505	Durbin-Watson stat	1.946731
Prob(F-statistic)	0.000351		

Null Hypothesis: D(CPI) has a unit root
Exogenous: Constant
Lag Length: 6 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		3.663390	1.0000
Test critical values:	1% level	-3.831511	
	5% level	-3.029970	
	10% level	-2.655194	

*MacKinnon (1996) one-sided p-values.
Warning: Probabilities and critical values calculated for 20 observations
and may not be accurate for a sample size of 19

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(CPI,2)
Method: Least Squares
Date: 05/30/23 Time: 20:19
Sample (adjusted): 9 27
Included observations: 19 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(CPI(-1))	1.042820	0.284660	3.663390	0.0037
D(CPI(-1),2)	-1.327836	0.484778	-2.739061	0.0193
D(CPI(-2),2)	-1.564539	0.438404	-3.568717	0.0044
D(CPI(-3),2)	-1.855026	0.494143	-3.754025	0.0032
D(CPI(-4),2)	-0.851048	0.458137	-1.857628	0.0902
D(CPI(-5),2)	-0.786764	0.407637	-1.930062	0.0798
D(CPI(-6),2)	-0.996405	0.436177	-2.284404	0.0432
C	-3.317180	1.789045	-1.854163	0.0907

R-squared	0.764318	Mean dependent var	2.685263
Adjusted R-squared	0.614338	S.D. dependent var	5.594664
S.E. of regression	3.474381	Akaike info criterion	5.624271
Sum squared resid	132.7846	Schwarz criterion	6.021930
Log likelihood	-45.43058	Hannan-Quinn criter.	5.691571
F-statistic	5.096142	Durbin-Watson stat	1.614896
Prob(F-statistic)	0.008556		

Null Hypothesis: D(EXCHANGE_RATE___N_US$1_00_) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.100961	0.0400
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(EXCHANGE_RATE___N_US$1_00_,2)
Method: Least Squares
Date: 05/30/23 Time: 20:22
Sample (adjusted): 4 27
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(EXCHANGE_RATE___N_US$1_00_(-1))	-0.742431	0.239420	-3.100961	0.0054
D(EXCHANGE_RATE___N_US$1_00_(-1),2)	0.374614	0.229236	1.634187	0.1171
C	9.567574	4.372000	2.188375	0.0401

R-squared	0.316537	Mean dependent var	1.803218
Adjusted R-squared	0.251445	S.D. dependent var	20.33707
S.E. of regression	17.59544	Akaike info criterion	8.689625
Sum squared resid	6501.587	Schwarz criterion	8.836882
Log likelihood	-101.2755	Hannan-Quinn criter.	8.728692
F-statistic	4.862942	Durbin-Watson stat	1.821747
Prob(F-statistic)	0.018387		

Null Hypothesis: D(M2) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.265740	0.9976
Test critical values:	1% level	-3.737853	
	5% level	-2.991878	
	10% level	-2.635542	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(M2,2)
Method: Least Squares
Date: 05/30/23 Time: 20:24
Sample (adjusted): 4 27
Included observations: 24 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(M2(-1))	0.320601	0.253292	1.265740	0.2195
D(M2(-1),2)	-0.784485	0.277581	-2.826149	0.0101
C	94.22578	1544.153	0.061021	0.9519

R-squared	0.317952	Mean dependent var	1031.223
Adjusted R-squared	0.252995	S.D. dependent var	5444.394
S.E. of regression	4705.561	Akaike info criterion	19.86735
Sum squared resid	4.65E+08	Schwarz criterion	20.01460
Log likelihood	-235.4082	Hannan-Quinn criter.	19.90641
F-statistic	4.894804	Durbin-Watson stat	1.801183
Prob(F-statistic)	0.017991		

Null Hypothesis: D(TFGE) has a unit root
Exogenous: Constant
Lag Length: 5 (Automatic - based on AIC, maxlag=6)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.534903	0.8645
Test critical values:	1% level	-3.808546	
	5% level	-3.020686	
	10% level	-2.650413	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(TFGE,2)
Method: Least Squares
Date: 05/30/23 Time: 20:28
Sample (adjusted): 8 27
Included observations: 20 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(TFGE(-1))	-0.336010	0.628170	-0.534903	0.6017
D(TFGE(-1),2)	-0.504775	0.526374	-0.958967	0.3551
D(TFGE(-2),2)	0.421525	0.556061	0.758056	0.4619
D(TFGE(-3),2)	0.708125	0.593390	1.193355	0.2541
D(TFGE(-4),2)	-0.303626	0.575189	-0.527872	0.6065
D(TFGE(-5),2)	-0.728518	0.351483	-2.072696	0.0586
C	220.0066	213.1798	1.032024	0.3209

R-squared	0.779000	Mean dependent var	80.77367
Adjusted R-squared	0.677001	S.D. dependent var	701.4610
S.E. of regression	398.6616	Akaike info criterion	15.08332
Sum squared resid	2066104.	Schwarz criterion	15.43183
Log likelihood	-143.8332	Hannan-Quinn criter.	15.15135
F-statistic	7.637274	Durbin-Watson stat	2.104319
Prob(F-statistic)	0.001142		

COINTEGRATION TEST

ARDL Long Run Form and Bounds Test
Dependent Variable: D(CPI)
Selected Model: ARDL(1, 1, 0, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/31/23 Time: 08:12
Sample: 1 27
Included observations: 26

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.44563	1.802828	-6.348707	0.0000
CPI(-1)*	-0.348241	0.088258	-3.945716	0.0008
EX_RATE(-1)	0.232673	0.038378	6.062651	0.0000
M2**	0.000459	0.000140	3.275506	0.0038
TFGE**	0.001056	0.001275	0.828467	0.4172
D(EX_RATE)	0.153096	0.033318	4.594926	0.0002

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
EX_RATE	0.668138	0.097980	6.819110	0.0000
M2	0.001317	0.000232	5.689169	0.0000
TFGE	0.003033	0.003704	0.819047	0.4224

EC = CPI - (0.6681*EX_RATE + 0.0013*M2 + 0.0030*TFGE)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	116.1458	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61
			Finite Sample: n=35	
Actual Sample Size	26	10%	2.958	4.1
		5%	3.615	4.913
		1%	5.198	6.845

	Finite Sample: n=30	
10%	3.008	4.15
5%	3.71	5.018
1%	5.333	7.063

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-3.945716	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.5%	-3.13	-4.05
		1%	-3.43	-4.37

ARDL Long Run Form and Bounds Test
Dependent Variable: D(EX_RATE)
Selected Model: ARDL(1, 1, 0, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/31/23 Time: 08:16
Sample: 1 27
Included observations: 26

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	40.56912	11.50805	3.525281	0.0021
EX_RATE(-1)*	-0.723996	0.255677	-2.831687	0.0103
CPI(-1)	1.106547	0.492243	2.247968	0.0360
M2**	-0.000777	0.000794	-0.978282	0.3396
TFGE**	-0.012196	0.005423	-2.249037	0.0359
D(CPI)	3.354375	0.730017	4.594926	0.0002

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	1.528388	0.327908	4.661031	0.0002
M2	-0.001073	0.000785	-1.365821	0.1872
TFGE	-0.016846	0.011025	-1.527982	0.1422

EC = EX_RATE - (1.5284*CPI -0.0011*M2 -0.0168*TFGE)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	7.044902	10%	2.72	3.77
k	3	5%	3.23	4.35
		2.5%	3.69	4.89

		1%	4.29	5.61
			Finite Sample: n=35	
Actual Sample Size	26			
		10%	2.958	4.1
		5%	3.615	4.913
		1%	5.198	6.845
			Finite Sample: n=30	
		10%	3.008	4.15
		5%	3.71	5.018
		1%	5.333	7.063

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-2.831687	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.5%	-3.13	-4.05
		1%	-3.43	-4.37

ARDL Long Run Form and Bounds Test
Dependent Variable: D(M2)
Selected Model: ARDL(1, 0, 1, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/31/23 Time: 08:21
Sample: 1 27
Included observations: 26

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6626.217	2490.905	2.660164	0.0150
M2(-1)*	-0.674230	0.120729	-5.584645	0.0000
CPI**	390.8829	97.66880	4.002127	0.0007
EX_RATE(-1)	-202.3336	47.31779	-4.276058	0.0004
TFGE**	2.572459	1.371725	1.875346	0.0754
D(EX_RATE)	-15.09198	41.46814	-0.363942	0.7197

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	579.7471	90.89964	6.377881	0.0000
EX_RATE	-300.0958	49.01483	-6.122551	0.0000
TFGE	3.815403	2.192544	1.740172	0.0972

EC = M2 - (579.7471*CPI -300.0958*EX_RATE + 3.8154*TFGE)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)

			Asymptotic: n=1000	
F-statistic	32.05206	10%	2.72	3.77
k	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61
			Finite Sample: n=35	
Actual Sample Size	26			
		10%	2.958	4.1
		5%	3.615	4.913
		1%	5.198	6.845
			Finite Sample: n=30	
		10%	3.008	4.15
		5%	3.71	5.018
		1%	5.333	7.063

t-Bounds Test Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-5.584645	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.5%	-3.13	-4.05
		1%	-3.43	-4.37

ARDL Long Run Form and Bounds Test
Dependent Variable: D(TFGE)
Selected Model: ARDL(1, 0, 1, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/31/23 Time: 08:26
Sample: 1 27
Included observations: 26

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-343.3510	425.2638	-0.807384	0.4289
TFGE(-1)*	-0.515663	0.199644	-2.582907	0.0178
CPI**	2.933633	17.96653	0.163283	0.8719
EX_RATE(-1)	7.499189	9.036021	0.829922	0.4164
M2**	0.023869	0.025882	0.922229	0.3674
D(EX_RATE)	-8.215514	5.482063	-1.498617	0.1496

* p-value incompatible with t-Bounds distribution.
** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPI	5.689049	34.43109	0.165230	0.8704
EX_RATE	14.54281	19.34225	0.751867	0.4609
M2	0.046288	0.048508	0.954234	0.3514

EC = TFGE - (5.6890*CPI + 14.5428*EX_RATE + 0.0463*M2)

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	11.08073	10%	2.72	3.77
k	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61
			Finite Sample: n=35	
Actual Sample Size	26	10%	2.958	4.1
		5%	3.615	4.913
		1%	5.198	6.845
			Finite Sample: n=30	
		10%	3.008	4.15
		5%	3.71	5.018
		1%	5.333	7.063

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-2.582907	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.5%	-3.13	-4.05
		1%	-3.43	-4.37

ARDL Error Correction Regression
Dependent Variable: D(CPI)
Selected Model: ARDL(1, 1, 0, 0)
Case 3: Unrestricted Constant and No Trend
Date: 05/31/23 Time: 20:50
Sample: 1 27
Included observations: 26

ECM Regression
Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-11.44563	0.997918	-11.46951	0.0000
D(EX_RATE)	0.153096	0.025017	6.119618	0.0000
CointEq(-1)*	-0.348241	0.015066	-23.11429	0.0000

R-squared	0.976853	Mean dependent var	14.13885
Adjusted R-squared	0.974841	S.D. dependent var	13.39529
S.E. of regression	2.124719	Akaike info criterion	4.453324
Sum squared resid	103.8320	Schwarz criterion	4.598489
Log likelihood	-54.89321	Hannan-Quinn criter.	4.495126
F-statistic	485.3340	Durbin-Watson stat	1.456874
Prob(F-statistic)	0.000000		

* p-value incompatible with t-Bounds distribution.

F-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	116.1458	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61

t-Bounds Test — Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
t-statistic	-23.11429	10%	-2.57	-3.46
		5%	-2.86	-3.78
		2.5%	-3.13	-4.05
		1%	-3.43	-4.37

Pairwise Granger Causality Tests
Date: 05/31/23 Time: 20:59
Sample: 1 27
Lags: 1

Null Hypothesis:	Obs	F-Statistic	Prob.
EX_RATE does not Granger Cause CPI	26	4.58690	0.0430
CPI does not Granger Cause EX_RATE		4.38093	0.0476
M2 does not Granger Cause CPI	26	0.04333	0.8369
CPI does not Granger Cause M2		9.37586	0.0055
TFGE does not Granger Cause CPI	26	1.16700	0.2912
CPI does not Granger Cause TFGE		12.6325	0.0017
M2 does not Granger Cause EX_RATE	26	5.54413	0.0275
EX_RATE does not Granger Cause M2		1.54445	0.2265
TFGE does not Granger Cause EX_RATE	26	1.80400	0.1923
EX_RATE does not Granger Cause TFGE		15.3806	0.0007
TFGE does not Granger Cause M2	26	18.2387	0.0003
M2 does not Granger Cause TFGE		1.38738	0.2509