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Monetary Policy Operation and Economic Growth in Nigeria: Evidence from 1990 – 2022

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ABSTRACT: *The study examined monetary policy operations and economic growth in Nigeria from 1990 to 2022. The primary purpose is to evaluate the impact of monetary policy operations on Nigeria's economic growth. The data for the study were obtained from National Bureau of statistics (NBS) databased and Central Bank of Nigeria CBN statistical bulletin. The econometric methods of OLS, Co-integration, Variance Error Correction Mechanism (VECM) and Vector Error Correction Model (VECM) were employed to examined the interplay among the critical variables. The natural log of real GDP was employed as the variable of interest while exchange rate and inflation rate as instrument of monetary policy operations. The result of the VECM shows that the overall model is satisfactory given the coefficient of determination of 34 percent and f-statistics of 3.37. The study discovered that the explanatory variables were not statistically significant at 5% level in stimulating economic growth in Nigeria. However, the long run dynamic result also shows that there exists a long-run relationship or equilibrium among the variables. The result of VARM revealed that exchange rate has positive coefficients, indicating a positive relationship with the lagged RGDP. The model has a moderately high R-squared value (0.9429), indicating a reasonably good fit. While inflationary rate indicates negative coefficients with the lagged exchange rate. The model has a lower R-squared value (0.2862), indicating a weaker fit to the data. These finding hold significant implications for the Nigerian economy, highlighting the effectiveness of monetary policy, the importance of exchange rate stability, and the imperative of inflation control in promoting sustained economic growth. Policymakers are urged to prioritise evidence-based decisions, long-term planning, and target interventions to harness the full potential of monetary policy in driving sustainable economic development in Nigeria.*

KEY WORD: Monetary Policy, Economic Growth, Exchange Rate (EXR), Inflation Rate (IFR), Real Gross Domestics Products (RGDP)

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INTRODUCTION

Nigerian economy has been highly unstable and volatile over the years. Monetary policy has a significant role to play in stabilizing the economy. It is an instrument of economic management that aimed to bring about sustainable economic growth and development. The goals of monetary policy have been to increase production and employment, as well as to encourage both domestic and international stability. The Nigerian economy growth has not been sustainable as reported by declining GDP resulting to increasing unemployment, high interest rates, persistent inflation, weakening currency, and severe poverty among the citizens. As recorded the National Bureau of Statistics (NBS), in the first quarter of 2023, the real terms Gross Domestic Product (GDP) of Nigeria experienced a growth of 2.31% (year-on-year). This rate of growth was lower in comparison to the 3.11% which was recorded in the corresponding quarter of the previous year (2022) and 3.52% in the fourth quarter of the same year (NBS, 2023). The decline in growth is attributed to the undesirable effects of the cash crunch experienced during the quarter. Moreover, this situation is likely caused by insufficient monetary and macroeconomic policies in past years. However, owing to the existing lack of consensus among economists on the operational validity of monetary policy on the economic growth and its ability to stimulates considerable macroeconomic stability in the short-run. This study investigates the effectiveness of monetary policy in stimulating the growth of the Nigerian economy. The main drive of this paper, therefore, is to empirically examine the impact of exchange rate as monetary variable and inflation rate as target variable on the economic growth in Nigeria. The long-run relationship of the variables is evaluated using Johansen Co-integration analysis. The rest of the study is organized as follows, the presentation of related literature reviews, the methodology for data analysis, interpretation and discussions of the results findings and the conclusions and recommendations.

Objectives of the study

The main objective of this study is to examine the impact of monetary policy operations on Nigeria's economic growth from 1990 -2022. The specific objectives of the study are to;

1. Examine the relationship between exchange rate and economic growth in Nigeria;
2. Examine the relationship between inflation rate and economic growth in Nigeria;

LITERATURE REVIEW

The impact of monetary policy on economic growth has generated large volume of empirical studies with mixed findings using cross sectional, time series and panel data. Some of these studies are country- specific while others are cross-country. Few of the studies are selected for review as follows:

Conceptual Framework

Monetary Policy

Monetary policy is the deliberate use of monetary instruments (direct and indirect) at the disposal of monetary authorities such as central bank in order to achieve macroeconomic stability. Monetary policy is essentially the tool for executing the mandate of monetary and price stability. It is essentially a programme of action undertaken by the monetary authorities, generally the central bank, to control and regulate the supply of money with the public and the flow of credit with a view to achieving predetermined macroeconomic goals (Olaruntuyi, 2020). Monetary policy is one of the tools of controlling money supply in an economy of a nation by the monetary authorities in order to achieve a desirable economic growth and infusing the economy. Governments try to control the money supply because most governments believe that its rate of growth has an effect on the rate of inflation. Hence, monetary policy comprises those government actions designed to influence the behaviour of the monetary sector. Monetary policies are effective only when economies are characterized by well-developed money and financial markets like developed economies of the world. This is where a deliberate change in monetary variables influences the movement of many other variables in the monetary sector. Monetary policy has thus been known to be a vital instrument that a country can deploy for the maintenance of domestic price and exchange rate stability as a critical condition for the achievement of a sustainable economic growth and external viability (Adegbite & Alabi, 2013: Shaibu & Enofe, 2021). Monetary policy may be inflationary or deflationary depending upon the economic condition of the country.

Monetary policy influence key macroeconomic indicators such as gross domestic product (GDP). exchange rates, and inflation rates (Hameed, 2011: Purwaningsih, 2019: Henry & Ajidani, 2020). In the context of Nigeria, a country with a history of economic challenges and aspirations for sustained growth, the effectiveness of monetary policy operations takes on paramount importance. This study delves into the intricate relationship between monetary policy and economic growth in Nigeria, spanning the extensive period from 1990 to 2022

Exchange Rate

The exchange rate, in essence, denotes the value of a particular currency relative to another. It is the proportion of the unit of one currency and the corresponding amount of another currency that can be exchanged during a specific point in time, as stated by Ngerebo-a and Ibe (2013). Mordi, posited that exchange rate represents the cost of one currency in relation to another and signifies the quantity of one currency required to purchase another currency, (Mordi, 2006). The exchange rate of currency serves as the bridge between domestic and foreign prices of goods and services. Furthermore, the exchange rate has the capacity to appreciate or depreciate. Appreciation of the exchange rate occurs when a lesser amount of domestic currency can be exchanged for a unit of foreign currency, whereas depreciation of the exchange rate occurs when a greater amount of domestic currency is required to acquire a unit of foreign currency.

Inflation Rate

Inflation pertains to the persistent escalation in the overall price level of goods and services within an economy, which is exhibited by a deterioration in the worth of currency. The adverse implications of elevated inflation are generally deemed detrimental to the economy. This is why ensuring price stability has always been deemed a fundamental objective of macroeconomic policy in both developed and underdeveloped nations, as posited by Ahiadorme, (2022). Inflation is a malady that must be eradicated if a country is to experience growth. It unpredictably reallocates income, obliterates savings, undermines the earnings of fixed income earners, engenders price distortions, and triggers the misallocation of societal economic resources.

Economic Growth

Kumaat et al. (2019) defines economic growth as an increase in a nation's capacity to produce goods and services. This implies a simple increase in the economic value of goods and services produced in a particular economy. Increases in various factors such as capital goods, labour force, technology, and human capital can all contribute to economic growth, which is measured by quantitative changes in the size of the economy's production. Economic growth involves improvements in qualities such as living standards, education, health, and poverty reduction. Economic growth can also be viewed as an increase in the production of economic goods and services, compared from one period of time to another. It can be measured in nominal or real (adjusted for inflation) terms (Investopedia, 2023). Aggregate economic growth is therefore traditionally measured in terms of gross national product (GNP) or gross domestic product (GDP) or gross domestic product per capita, although alternative metrics are sometimes used. Researches in these areas has consistently revealed volatility in inflation and exchange rates have adverse effect on economic growth. Various studies on the Nigerian economy have shown that both exchange rates and inflation rate exert a negative impact on its economic growth (Kumaat et al., 2019; Basiru, 2021; Cletus et al., 2023;). Test findings also show the detrimental impact of raising inflation and the negative effect of exchange rate fluctuation on stimulating growth. this research emphasis the need for further in-depth investigation and evidence-based policymaking to revive the economy. Therefore, it is imperative to implement appropriate monetary measures in order to foster economic development.

Theoretical Review

Keynesian Liquidity Preference

Keynes (1936) formulated the liquidity preference theory in his renowned publication, 'The General Theory of Employment, Interest, and Money.' He meticulously analyzed both transaction and asset theories of money demand. Keynes distinguished three motives for holding money - a 'transaction motive,' a 'precautionary motive,' and a 'speculative motive.' The speculative demand for money is Keynes's most significant innovation. As per this theory, the demand for money is inversely related to the interest rate. The theory's implication is that the demand for speculative money balances relies on both the observable market nominal interest rates and the people's

expectations regarding that rate in the future. Keynes expounded on a specific value that determines individuals' decision to hold either bonds or money. In the event that interest rates surpass the ordinary value, individuals will anticipate a decrease, resulting in an increase in bond prices and the realization of capital gains. Under such circumstances, individuals will hold their wealth in the form of bonds, and the demand for money will diminish. Conversely, if interest rates drop, bond prices will decline, leading to the realization of capital losses. In this case, individuals will demand to hold their wealth in the form of money, thereby causing a high demand for money. When interest rates are extremely low, the expectation is that they will rise, and as a result, the demand for money on the whole will become perfectly elastic in relation to interest rates, resulting in a liquidity trap. The combination of these three demands yields the Keynesian liquidity preference function, which characterises the total demand for money.

$Md/ P = \mu (R, Y)\ \mu_{10}$

μi denotes partial derivative of $\mu(.)$with respect to ith argument
In contrast to the quantity theory proposition, which posits that velocity remains constant, the Keynesian liquidity preference theory suggests that velocity is procyclical. This is due to the fact that procyclical movements in interest rates induce procyclical movements in velocity.

Structural Theory
This theory posits that the abatement of balance of payments disequilibrium is due to an intrinsically inefficient or imbalanced economy. The Nigerian economy is beset by two structural problems, namely the weakness in fiscal system and the high external debt burden. The former leads to budget deficits and increased expenditure on account of population growth and development, while the revenue system and tax rate of the Nigerian economy are inadequate for achieving the required growth in revenue. What is imperative is the restructuring and enhancement of the country's revenue system, along with an increase in taxes. The revenue system of the economy should be elastic with respect to economic growth, meaning that revenue must grow commensurately with high GNP. According to the IMF's analysis of Nigeria's external debt burden sustainability, the country's debt has been mounting since 1960, thereby stifling the economy. Determining the sustainability of the level of debt within a country is undoubtedly one of the most fundamental issues that must be addressed. Despite this, there exists no conclusive measure among economists to accurately determine when an external debt may be deemed sustainable over the long term. It is generally agreed upon, however, that a country's rate of economic growth must surpass the rate of interest on foreign loans (Yusuf et al., 2021; Tarawalie & Jalloh, 2021).

Monetarist View of Monetary Policy
Milton Friedman, a prominent economist, was the originator of the monetarist school of thought. This school of thought, which is considered a modern interpretation of classical macroeconomics, devised a more nuanced and applicable version of the quantity theory of money. In 1963, Friedman,

like any other school of thought, underscored the significance of the money supply as a crucial factor affecting the well-being of the economy and recognized the necessity for an effective monetary policy to stabilize an economy. Furthermore, he contends that, in order to promote consistent growth, the money supply should increase at a fixed rate rather than being regulated and altered by monetary authorities. Friedman also posited that, since money supply may be necessary for reasons beyond anticipated transactions, it can be held in various forms such as money, bonds, equities, physical goods, and human capital. Each form of wealth possesses distinct characteristics and yields. Milton Friedman, a distinguished economist, established the monetarist school of thought. This particular school of thought presents a contemporary analysis of classical macroeconomics. The effects of the monetarist approach are expected to enhance aggregate money demand and ultimately boost output. The Monetarists acknowledge the fact that the economy may not always operate at full employment in relation to real GDP. Therefore, monetarists contend that expansionary monetary policies can augment the level of real GDP in the short term by elevating aggregate demand. However, in the long run, when the economy reaches its full employment potential, the quantity theory remains a reliable approximation of the relationship between the money supply, the price level, and the real GDP. Additionally, over the long term, expansionary monetary policies only lead to inflation and have no bearing on the level of real GDP (Tomkiewicz, 2019).

Classical View of Monetary Policy

Milton Friedman, a renowned economist, is credited with the establishment of the monetarist school of thought. This school of thought is a contemporary interpretation of the quantity theory of money, which serves as the basis for the classical economists' viewpoint on monetary policy. The quantity theory of money is conventionally expounded in the context of the fisherman equation of exchange, which is represented by the expression MV = PY. In this equation, M represents the supply of money that falls under the purview of the Federal Government; V stands for the velocity of circulation, i.e., the average frequency of money changing hands. Milton Friedman, the esteemed economist, is credited with having founded the monetarist school of thought. This school of thought is a contemporary and influential approach that emphasizes the importance of monetary policy in economic analysis.

In the field of economics, the quantity theory of money serves as a fundamental basis for understanding the number of times a currency is expended on final goods and services in a given year. Here, P denotes the GDP price level, while PY represents current nominal GDP. It is worth noting that the equation of exchange is an identity that posits that the current market value of all final goods and services (nominal GDP) must equal the supply of money multiplied by the average number of times a currency is utilized in transactions over a specific period. Classical economists firmly believe that the economy operates at or near the natural level of real GDP. Consequently, they assume that the Y in the equation of exchange remains constant in the short run. when an entity pursues expansionary or contractionary monetary policy, it will lead to an augmentation or

reduction in the money supply denoted by M. The sole consequence of this action would be a corresponding increase or decrease in the price level P, which is directly proportional to the aforementioned alteration in money supply.

Keynesian View of Monetary Policy

The Keynesian theory disregards the notion that money and price are in a direct and proportional relationship. It is agreed that this relationship is done indirectly through interest rates. The theory also dismisses the idea that the economy is constantly at or near its natural level of real GDP, implying that the value of Y in the equation of exchange is fixed. Additionally, the Keynesian theory opposes the belief that the velocity of money circulation is constant. Keynesians hold the view that by increasing the supply of loanable funds available through the banking system, interest rates will decrease. This decrease in interest rates leads to a rise in aggregate expenditures on investment and interest-sensitive consumer goods, which ultimately results in a rise in real GDP. Therefore, monetary policy can have an indirect impact on real GDP according to the Keynesian theory.

Empirical Review

Undoubtedly, monetary policy plays a significant role in driving economies and sustainable development. It has a significant on both micro and macroeconomic variables, which in turns affect poverty level, social inequality, employment opportunities, and living standards. Mahmood, Waheed and Khalid posited that monetary policy can influence real economic variables in the short-term, regardless of whether it is a response to the state of the economy or exogenous shocks (Mahmood et al., 2017).

Ogu et al. (2020) investigates the impact of inflation on economic growth in Nigeria. The study adopts an Ordinary Least Square (OLS) of simple regression model in order to test the impact of inflation on economic growth of Nigeria between 1999 and 2017. The study found that inflation has positive but not significant impact on economic growth in Nigeria. The study also found that interest rate has negative and significant effect on economic growth in Nigeria. It is recommended amongst others that efficient tax policy be implemented and policy to invisible hands on the side of consumers and one-digit interest rate should be achieved.

Jude et al. (2019), the authors investigated monetary policy and macroeconomic variables in Nigeria from 1990-2018. The study applied Ordinary Least square (OLS) regression to analyze the times series data obtained from Central Bank of Nigeria. The findings revealed that monetary policy has a positive relationship with index of industrial production while it has a negative relationship with inflation rate, consumer price index and lending rates in the Nigerian economy. The Authors suggests that the Central Bank of Nigeria ought to consider lowering the monetary policy rate as it has been observed to result in an increase in both the demand and circulation of money within the economy. This, in turn, leads to an increase in investments and demands for

goods and services. It is recommended that monetary authorities frequently raise the requirement for the purpose of reducing the quantity of loanable funds that are available for loans. Such an action would have the effect of reducing the unit of money that is currently in circulation.

Ani and Oni, (2021) investigated the effect of monetary policy on economic growth during post structural adjustment program in Nigeria using the expo-facto design. The parameters of the model were numerically estimated through the application of Ordinary Least Squares (OLS) technique utilising linear regression. The study revealed that broad money supply had a positive effect on Nigeria's economic growth from 1986-2015. Interest rates had a negative impact during the same period, while inflation rates had a positive but insignificant effect. The study recommended that the Central Bank of Nigeria should promote market-based interest rates to attract domestic and foreign investments, create jobs, and revive industries. More the CBN should strengthen the financial sector, the Central Bank should introduce more flexible financial instruments.

Nwankwo and Agbo (2021) investigate the effect of monetary policy measures on Nigeria's economic growth. The study uses the Ordinary Least Squares technique and also conducted the unit root tests. The results of the study revealed that while Money supply (OMR) has significant positive effect on Nigeria's economic growth, however, the effect of interest rate and discount was positive but insignificant. The study recommends the that government should channel its attention on the control of money supply as a veritable monetary policy instrument for enhancing price stability and boosting Nigeria's economic growth.

Emeka, et al. (2020), the evaluate the extent to which monetary policy affects Real Gross Domestic Product and determine the relationship between monetary policy and inflation rate. Using selected some macroeconomic variables in Nigerian economy 1981-2019. Unit root test, Johansen Co-integration Technique, Vector Autoregressive as well as least regression analysis techniques were used for data analysis. The results shows that monetary policy have insignificant positive relationship with real gross domestic product but significant positive effect on inflation rate. Based on the findings of the study, the researcher recommends that there is the need for policy adjustment by modifying the core mandate of the Central Bank, which is price stability through inflation targeting to incorporate economic development through employment creation.

Henry, et al. (2020) examine the relationship between the exchange rate fluctuations and economic growth in Nigeria between 1997 and 2017. The study adopted the descriptive research design. The study used Secondary data on gross domestic product (GDP), exchange rate and inflation rate it obtained from the Central Bank of Nigeria (CBN) bulletins. Ordinary least square method and Pearson's product moment correlation were used to analyse the data collected. The study revealed decline in Nigeria economic growth since 2002 as shown by continuous drop in GDP. The findings of the study indicated a multiple regression coefficient (R = 0.042), which means that inflation rate was found to be positive and high but without significant relationship to economic growth.

Anifowose (2021) examines effect of exchange rate on economic growth in Nigeria with emphasis on asymmetric relationship among the variables (Gross Domestic Product, Exchange Rate and Inflation Rate) using data from 1981 to 2020. The study applied the Non-Linear Autoregressive Distributed Lag Model (NARDL) approach to examine asymmetric relationships among variables. The study found that, in the long-run, economic growth is positively affected by positive shocks to exchange rate. However, the result shows that both negative and positive shock to inflation rate was found to have adverse non contemporaneous effect on growth in the long run.

Elvis, and Lawal-Arogundade, (2023) examine the fluctuation of exchange rate and its impact on Nigeria's economic performance using annual time series spanning from 1986 to 2020. They used the Generalised Autoregressive Conditional Heteroscedasticity (GARC) model analytical technique. The study revealed that the devaluation of the exchange rate, inflation, and monetary policy rate significantly impact the Nigeria's economy performance. The Naira/USD exchange rate fluctuation negatively affects the Nigerian economy. The summary of the findings is that a continuous fluctuation in the exchange rate is detrimental to the economy stability and overall performance indices. It calls for intervention by monetary authority to reduce fluctuation and ensure stability in the exchange rate system of the country.

Popoola et al. (2022), examined the scenario of a fixed and floating exchange rate regime for the Nigerian economy through the mechanism of private investment spending. They discovered that the volatility of real exchange rate arising from the rapid and variable rates of depreciation has caused significant uncertainty in the system. It is also observed that the choice of exchange rate regime has significant impact on private investment and in turn, on the performance of Nigerian economy. This is so because the result showed that the economy performs better during the floating regime than that of fixed regime. They therefore, recommended that government provide an enabling environment by formulating and implementing an appropriate exchange rate policy, particularly by embarking on floating exchange rate regime

Idris, and Shuyur (2023), This study examines the impact of exchange rate fluctuations on economic growth in Nigeria using ordinary least square regression (OLS). The result revealed that exchange rate has positive effect but not significant, and further confirmed that developing countries are relatively better off in the choice of flexible exchange rate regimes (Popoola et al., 2022). The study recommended that Nigerian government should enhance the export sector, maintain a favourable balance of trade through export, secure and create trading atmosphere, implement efficient fiscal policies, and develop infrastructure facilities.

Andrew et al. (2022), The author examined the relationship between economic growth, exchange rate and foreign direct investment in Nigeria. They applied Autoregressive Distributed-lag Model (ARDL) to test for cointegration technique for the period spinning between 1981 to 2018. The study established a long-run relationship between economic growth, exchange and foreign direct

investment in Nigeria. Likewise established a convergence to the equilibrium at a speed of adjustment of 0.78 % in case of shocks and disequilibrium in the economy. The study therefore recommended that Nigerian government should create ease of doing business atmosphere for private businesses to thrive. The study also, recommended that government policies should be tilted towards attracting investors, and enable foreign companies to invest in the economy. Investment in education and healthcare infrastructure should be given more attention by the government and the private sectors.

Daniel, (2021) examines effect of exchange rate on economic growth in Nigeria with emphasis on asymmetric relationship among the variables (Gross Domestic Product, Exchange Rate and Inflation Rate) using data from 1981 to 2020. The study applied the Non-Linear Autoregressive Distributed-Lag Model (NARDL) approach to examine asymmetric relationships among variables. The study found that, in the long-run, economic growth is positively affected by positive shocks to exchange rate. However, the result shows that both negative and positive shock to inflation rate was found to have adverse non contemporaneous effect on growth in the long run.

METHODOLOGY

The research employed Cointegration Test, Vector Autoregressive Model (VAR) and Vector Error Correction Model (VECM) to measure the relationship between RGDP and Inflation rate (INFR) and Exchange Rate (EXR). Choosing lag criteria. The data were source from National Bureau of statistics and statistical Bulleting of The Central Bank of Nigeria. Based on the cointegration results, a Vector Error Correction Model (VECM) was estimated to capture the dynamic interactions among the variables. The VECM helps analyze both short-term and long-term relationships, as well as the speed of adjustment towards equilibrium following disturbances. For this research, a comprehensive dataset spanning the period from 1990 to 2022 was collected. The dataset includes key economic variables such as Real Gross Domestic Product (LRGDP), Exchange Rate (LEXR), and Inflation Rate (LIFR). These variables were selected to investigate the relationships between monetary policy, economic growth, exchange rates, and inflation.
The authors ensure the series were stationary, then tested for cointegration and determined the short and long run relationship of the model.

Mode Specification

VAR Equation Mode:

$$lrgdp = \alpha + \sum_{i=1}^{k} \beta_i \, lexr_{t-i} + \sum_{j=1}^{k} \emptyset_j \, linfr_{t-j} + \sum_{n=1}^{k} \varphi_n \, lrgdp_{t-n} + \mu_{1t}$$

$$linfr = \vartheta + \sum_{i=1}^{k} \beta_i \, lexr_{t-i} + \sum_{j=1}^{k} \emptyset_j \, linfr_{t-j} + \sum_{n=1}^{k} \varphi_n \, lrgdp_{t-n} + \mu_{2t}$$

$$lexr = \sigma + \sum_{i=1}^{k} \beta_i \, lexr_{t-i} + \sum_{j=1}^{k} \emptyset_j \, linfr_{t-j} + \sum_{n=1}^{k} \varphi_n \, lrgdp_{t-n} + \mu_{3t}$$

The dependent variable is a function of its lagged values and the lagged of another variable in the model.

Table 1: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-79.13569	NA	0.040176	5.299077	5.437850	5.344313
1	34.28850	197.5776	4.79e-05	-1.437968	-0.882876*	-1.257022
2	48.38848	21.83223*	3.51e-05*	-1.766999*	-0.795588	-1.450343*

* Indicates lag order selected by the criterion
LR: sequential modified LR test statistic (each test at 5% level)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion

Based on the result obtained in Table 1, lag 2 is best fitted to run the model. This is due to the simple reason that the AIC for lag 2, has the lowest values compared to FPE, SC, and LR.

Table 2: Stationarity Test

Variables	ADF Test	Critical values			Prob.	Order of Integration
		1 %	5%	10%		
RGDP	-2.890614	-3.661661	-2.960411	-2.619160	0.0579	I (1)
EXR	-5.247430	-3.661661	-2.960411	-2.619160	0.0002	I (1)
IFR	-3.560417	-2.660720	-1.955020	-1.609070	0.0010	I (1)

The Table 2 above present the result of a stationarity test for the three variables GDP, exchange rate and inflation rate. Using the Augmented Dicky-Fuller (ADF), and the critical values at 1%, 5% and 10% significant level are provided for each of the variables. The results shows that all the three variables are integrated at order 1 (I (1)), this suggest that they are non-stationary times series data. Additionally, the p-values associated with each test are also shown, with GDP having a p-value of 0.0579, EXR having a very low p-value of 0.0002, and IFR having a p-value of 0.0010. These low p-values provide evidence against the null hypothesis of non-stationarity, suggesting that all three variables are likely stationary after differencing.

Table 3: Cointegration Test Statistics

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.762239	57.18718	29.79707	0.0000
At most 1	0.239211	14.09249	15.49471	0.0804
At most 2 *	0.178276	5.890514	3.841466	0.0152

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.762239	43.09469	21.13162	0.0000
At most 1	0.239211	8.201974	14.26460	0.3585
At most 2 *	0.178276	5.890514	3.841466	0.0152

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

1 Cointegrating Equation(s):		Log likelihood	65.24858

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	LEXR	LIFR
1.000000	-0.295686	0.695647
	(0.05752)	(0.10279)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.043926
	(0.01258)
D(LEXR)	-0.178013
	(0.13998)
D(LIFR)	-0.050966
	(0.46296)

The study employed the Johansen cointegration test to assess the relationships among the key variables: LRGDP (Log Real Gross Domestic Product), LEXR (Log Exchange Rate), and LIFR (Log Inflation Rate). The findings from both the Unrestricted Cointegration Rank Test (Trace) and Unrestricted Cointegration Rank Test (Maximum Eigenvalue) reveal at most 1 evidence of cointegration among these variables at the 0.05 significance level. The Trace test underscores the

presence of one cointegrating equation, as indicated by the eigenvalue statistic (5.890514) surpassing the critical value (3.841466) at the 0.05 significance level, accompanied by a probability (Prob.) of 0.0152. Similarly, the Max-Eigenvalue test corroborates the existence of a single cointegrating equation, with the eigenvalue statistic (5.890514) exceeding the critical value (3.841466) at the 0.05 level, and a probability (Prob.**) of 0.0152.

Result from the normalized cointegrating coefficients, we observe that LEXR and LIFR possess coefficients of -0.295686 and 0.695647, respectively, indicative of their relationships within the cointegrating equation. The adjustment coefficients provide insights into how swiftly the variables return to equilibrium following a shock, with each variable having its distinct adjustment coefficient. Notably, the results reveal that exchange rates wield a positive and substantial influence on RGDP, while inflation rates exert a negative and noteworthy impact on GDP. Specifically, an appreciation in the exchange rate will boosts GDP, while an increase in inflation rates hampers GDP growth over the long run.

Table 4: Estimate of VectorAutoregressive model

	Coefficient	Std. Error	t-Statistic	Prob.
C (1)	1.253254	0.181384	6.909379	0.0000
C (2)	-0.329342	0.169841	-1.939120	0.0564
C (3)	-0.009211	0.028993	-0.317713	0.7516
C (4)	0.040971	0.029015	1.412075	0.1622
C (5)	-0.008585	0.007884	-1.088850	0.2799
C (6)	0.001093	0.005661	0.193039	0.8475
C (7)	0.712398	0.239256	2.977560	0.0040
C (8)	-0.387027	1.690806	-0.228901	0.8196
C (9)	0.695292	1.583201	0.439169	0.6619
C (10)	0.664158	0.270264	2.457444	0.0164
C (11)	0.091980	0.270466	0.340081	0.7348
C (12)	-0.060140	0.073493	-0.818314	0.4159
C (13)	-0.086508	0.052766	-1.639455	0.1055
C (14)	-1.616330	2.230263	-0.724726	0.4710
C (15)	2.222848	5.947203	0.373764	0.7097
C (16)	-2.069349	5.568717	-0.371602	0.7113
C (17)	2.414566	0.950620	2.539991	0.0132
C (18)	-2.351965	0.951330	-2.472292	0.0158
C (19)	0.688567	0.258501	2.663688	0.0095
C (20)	0.019203	0.185599	0.103467	0.9179
C (21)	-1.521635	7.844677	-0.193970	0.8467
Determinant residual covariance		8.85E-06		

Equation: GDP = C (1) *GDP (-1) + C (2) *GDP (-2) + C (3) *LEXAR (-1) +
C (4) *LEXAR (-2) + C (5) *LIFER (-1) + C (6) *LIFER (-2) + C (7)
Observations: 31

R-squared	0.997103	Mean dependent var	10.63020
Adjusted R-squared	0.996378	S.D. dependent var	0.467847
S.E. of regression	0.028155	Sum squared reside	0.019025
Durbin-Watson stat	2.188027		

Equation: LEXAR = C (8) *GDP (-1) + C (9) *LRGDP (-2) + C (10) *LEXR (-1) + C (11) *LEXR (-2) + C (12) *LIFR (-1) + C (13) *LIFR (-2) + C (14)
Observations: 31

R-squared	0.942936	Mean dependent var	4.686711
Adjusted R-squared	0.928671	S.D. dependent var	0.982692
S.E. of regression	0.262453	Sum squared resid	1.653162
Durbin-Watson stat	2.205405		

Equation: LIFR = C (15) *LRGDP (-1) + C (16) *LRGDP (-2) + C (17) *LEXR (-1) + C (18) *LEXR (-2) + C (19) *LIFR (-1) + C (20) *LIFR (-2) + C (21)
Observations: 31

R-squared	0.286229	Mean dependent var	2.585461
Adjusted R-squared	0.107786	S.D. dependent var	0.977320
S.E. of regression	0.923147	Sum squared resid	20.45283
Durbin-Watson stat	2.216407		

Model Equation from the System

$$LRGDP = C(1) * LRGDP(-1) + C(2) * LRGDP(-2) + C(3) * LEXR(-1) + C(4) * LEXR(-2) + C(5) * LIFR(-1) + C(6) * LIFR(-2) + C(7)$$

$$LEXR = C(8) * LRGDP(-1) + C(9) * LRGDP(-2) + C(10) * LEXR(-1) + C(11) * LEXR(-2) + C(12) * LIFR(-1) + C(13) * LIFR(-2) + C(14)$$

$$LIFR = C(15) * LRGDP(-1) + C(16) * LRGDP(-2) + C(17) * LEXR(-1) + C(18) * LEXR(-2) + C(19) * LIFR(-1) + C(20) * LIFR(-2) + C(21$$

Table 4 presents the results of an autoregressive model estimated for three variables: LRGDP (Log Real Gross Domestic Product), LEXR (Log Exchange Rate), and LIFR (Log Inflation Rate). Each equation in the model has lagged variables as predictors, denoted as C (1) through C (21). The coefficients for each lagged variable, along with their standard errors, t-statistics, and probabilities (Prob.), are provided. The LRGDP equation, C (1) has a positive coefficient, indicating a positive relationship with the lagged LRGDP variable. The model has a high R-squared value (0.9971), suggesting a good fit to the data. The LEXR equation, C (8) and C (9) have positive coefficients, indicating a positive relationship with the lagged LRGDP variables, while C (10) has a positive coefficient with the lagged LEXR variable. The model has a moderately high R-squared value (0.9429), indicating a reasonably good fit. The LIFR equation, C (17) and C (18) have negative coefficients with the lagged LEXR variables, while C (19) has a positive coefficient with the lagged LIFR variable. The model has a lower R-squared value (0.2862), indicating a weaker fit to the data. Overall, these equations describe the relationships between the variables and their lagged

values, providing insights into how these variables are influenced by their own past values and the past values of the other variables in the system.

Table 5: Vector Error Correction Model

Cointegrating Eq:	CointEq1		
LRGDP (-1)	1.000000		
LEXR (-1)	-0.682738 (0.10204) [-6.69067]		
LIFR (-1)	-0.691746 (0.16315) [-4.23996]		
C	-5.695703		
Error Correction:	**D(LRGDP)**	**D(LEXR)**	**D(LIFR)**
CointEq1	-0.006789 (0.01266) [-0.53629]	0.259482 (0.10398) [2.49543]	0.252619 (0.36887) [0.68485]
D (LRGDP (-1))	0.582171 (0.16378) [3.55454]	-1.336353 (1.34536) [-0.99330]	4.340109 (4.77249) [0.90940]
D (LEXR (-1))	0.008193 (0.02685) [0.30515]	-0.160062 (0.22055) [-0.72573]	2.560282 (0.78239) [3.27240]
D (LIFR (-1))	-0.002654 (0.00628) [-0.42267]	0.097425 (0.05157) [1.88905]	-0.061914 (0.18295) [-0.33842]
C	0.016288 (0.00990) [1.64610]	0.191557 (0.08128) [2.35671]	-0.475436 (0.28834) [-1.64889]
R-squared	0.341889	0.224938	0.480510
Adj. R-squared	0.240641	0.105698	0.400588
Sum sq. resids	0.026090	1.760445	22.15309
S.E. equation	0.031678	0.260210	0.923061
F-statistic	3.376751	1.886426	6.012262
Log likelihood	65.75569	0.473420	-38.77894
Akaike AIC	-3.919722	0.292037	2.824448
Schwarz SC	-3.688434	0.523326	3.055736

Mean dependent	0.040090	0.121318	0.015963
S.D. dependent	0.036352	0.275158	1.192251

Determinant resid covariance (dof adj.)	2.23E-05
Determinant resid covariance	1.32E-05
Log likelihood	42.24033
Akaike information criterion	-1.563892
Schwarz criterion	-0.731254
Number of coefficients	18

Table 5 presents the results of a Vector Error Correction Model (VECM) for the variables LRGDP (Log Real Gross Domestic Product), LEXR (Log Exchange Rate), and LIFR (Log Inflation Rate). The cointegrating equation indicates a long-term relationship among the variables. LRGDP (-1), LEXR (-1), and LIFR (-1) coefficients are provided. The coefficients suggest that GDP has a positive relationship with the lagged LRGDP variable, while both LEXR and LIFR have negative relationships with their respective lagged variables. These relationships are statistically significant based on the t-statistics.

The error correction coefficient gives the speed of adjustment which the model will restores its equilibrium following disturbances and shocks in the Nigerian economy. The coefficient of equilibrium ECT with RGDP as variable of interest is negative and statistically significant, which implies there is a convergence from short dynamics towards long-run equilibrium. The adjustment coefficient is 0.01 respectively toward the long-run equilibrium in the instances of shocks and Volatility. In the case of exchange rate and inflation rate, the coefficients are positive, 0.25 and 0.025 and insignificant. This has shown how the independent variables lack speed of adjustment toward the long-run equilibrium in the event of disturbances and volatility in the Nigerian
The VECM results indicate the presence of a long-term relationship (cointegration) among the variables. The error correction terms show how the variables adjust in response to deviations from this equilibrium. The goodness of fit measures suggest that the models may have room for improvement, and further analysis or model refinement may be needed to better explain the data.

Table 6: Long-run Coefficient

	Coefficient	Std. Error	t-Statistic	Prob.
C (1)	-0.006789	0.012659	-0.536290	0.5963
C (2)	0.582171	0.163782	3.554540	0.0015
C (3)	0.008193	0.026850	0.305153	0.7627
C (4)	-0.002654	0.006278	-0.422673	0.6760
C (5)	0.016288	0.009895	1.646103	0.1118

R-squared	0.341889	Mean dependent var	0.040090
Adjusted R-squared	0.240641	S.D. dependent var	0.036352
S.E. of regression	0.031678	Akaike info criterion	-3.919722
Sum squared reside	0.026090	Schwarz criterion	-3.688434
Log likelihood	65.75569	Hannan-Quinn critter.	-3.844328
F-statistic	3.376751	Durbin-Watson stat	2.106548
Prob(F-statistic)	0.023651		

D(GDP) = C (1) *(GDP (-1) - 0.682737624979*LEXAR (-1) -
0.691745999448*LIFER (-1) - 5.69570325872) + C (2) *D (LRGDP (-1)) +
C (3) *D (LEXAR (-1)) + C (4) *D (LIFER (-1)) + C (5)

Table 6 presents a comprehensive analysis of long-run coefficients and model fit statistics for a specific equation. Notably, these coefficients demonstrate varying degrees of significance. C (2), representing the impact of D (GDP (-1)), stands out as statistically significant, supported by a high t-statistic of 3.554540 and a notably low p-value of 0.0015. This finding implies that alterations in the preceding period's GDP substantially influence the current D(GDP) over the long term.

Conversely, other coefficients such as C (1), C (3), C (4), and C (5) exhibit limited statistical significance, evident from their t-statistics approaching zero and elevated p-values. Consequently, it is likely that these coefficients do not exert a significant long-term influence on D(GDP). Specifically, the negative and non-significant long-run coefficient C (1) suggests an absence of enduring causality between exchange rates and inflation rates on real gross domestic product (GDP) growth in the economy. Ideally, coefficients should possess a negative value to indicate their capacity to revert to equilibrium. The presence of a positive coefficient indicates a deviation from equilibrium.

Furthermore, examining short-term coefficients reveals insightful relationships. For instance, C (2) indicates that an increase in GDP in the current period results in a 0.58% increase in itself. Meanwhile, C (3) signifies that a percentage increase in exchange rates leads to a 0.01% increase in GDP. In contrast, C (4) suggests that an increase in the inflation rate corresponds to a 0.002% decline in GDP. Lastly, C (5) represents the constant intercept.

In conclusion, Table 6 highlights the significance of different coefficients in explaining the dynamics of D(GDP) over the long term. While some coefficients exhibit strong statistical significance, others do not. Understanding these coefficients is essential for comprehending the factors driving GDP growth in the economy, both in the short and long run.

DISCUSSION OF FINDINGS

Based on the cointegration results, a Vector Error Correction Model (VECM) was estimated to capture the dynamic interactions among the variables. The VECM helps analyze both short-term and long-term relationships, as well as the speed of adjustment towards equilibrium following disturbances. For this research, a comprehensive dataset spanning the period from 1990 to 2022 was collected. The dataset includes key macroeconomic variables such as Real Gross Domestic Product (RGDP), Exchange Rate (EXR), and Inflation Rate (IFR). These variables were selected to investigate the relationships between monetary policy, economic growth, exchange rates, inflation and GDP was employed as the variable of interest while exchange rate and inflation rate as instrument of monetary policy operations. The result of the VECM shows that the overall model is satisfactory given the coefficient of determination of 34 percent and f-statistics of 3.37. The study discovered that the explanatory variables were not statistically significant at 5% level in stimulating economic growth in Nigeria. However, the long run dynamic result also shows that there exists a long-run relationship or equilibrium among the variables. The result of VARM revealed from the EXR equation, C (8) and C (9) have positive coefficients, indicating a positive relationship with RGDP variable, while C (10) has a positive coefficient with the lagged EXR. The model has a high R-squared value (0.9429), indicating a good fit. While the IFR equation, C (17) and C (18) have negative coefficients with the lagged of EXR, while C (19) has a positive coefficient with the lagged Inflation rate. The model has a low R-squared value (0.2862), indicating a weak fit to the data. These findings hold significant implications for the Nigerian economy, highlighting the effectiveness of monetary policy, the importance of exchange rate stability, and the imperative of inflation control in promoting sustained economic growth. Policymakers are urged to prioritize evidence-based decision-making, long-term planning, and targeted interventions to harness the full potential of monetary policy in driving sustainable economic development

CONCLUSION AND RECOMMENDATION

This research revealed the multifaceted nature of economic growth in Nigeria and further emphasis evidenced-based approach to monetary policy. Indeed, inflation rate and exchange rate have significant implications for Nigeria's economic growth. Increasing inflation affects purchasing power and negatively impact on economic stability. More so, volatile exchange rate creates uncertainties for business and hinder investment and growth.

To promote economic growth, it is crucial to implement evidence-based policies and measures. This may involve adopting appropriate monetary policies to control inflation, implementing measures to stabilize exchange rates, and fostering an environment that encourages investment and entrepreneurship. It is recommended that the government and monetary authorities take proactive measures to control inflation and exchange rate fluctuations in order to promote economic growth. Additionally, maintaining an appropriate level of interest rate is crucial for sustaining economic growth. Therefore, in 2023, it is important for Nigeria to focus on managing rising inflation, exchange rate, and interest rate in order to support economic growth Policymakers should consider targeted interventions to address specific economic challenges. While the study found limited short-term effects, it is important to recognize the potential long-run benefits of maintaining exchange rate stability and controlling inflation.

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Appendices
Cointegration Test

Date: 09/03/23 Time: 11:04
Sample (adjusted): 1993 2022
Included observations: 30 after adjustments
Trend assumption: Linear deterministic trend
Series: LRGDP LEXR LIFR
Lags interval (in first differences): 1 to 2

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.762239	57.18718	29.79707	0.0000
At most 1	0.239211	14.09249	15.49471	0.0804
At most 2 *	0.178276	5.890514	3.841466	0.0152

Trace test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.762239	43.09469	21.13162	0.0000
At most 1	0.239211	8.201974	14.26460	0.3585
At most 2 *	0.178276	5.890514	3.841466	0.0152

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegrating Coefficients (normalized by b'*S11*b=I):

LRGDP	LEXR	LIFR
2.735606	-0.808881	1.903016
5.304692	-2.920100	-1.420275
1.796116	0.326475	0.195464

Unrestricted Adjustment Coefficients (alpha):

D(LRGDP)	-0.016057	-0.009448	-0.001442
D(LEXR)	-0.065073	0.087466	-0.065819
D(LIFR)	-0.018631	-0.082921	0.327390

1 Cointegrating Equation(s): Log likelihood 65.24858

Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	LEXR	LIFR
1.000000	-0.295686	0.695647
	(0.05752)	(0.10279)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.043926
	(0.01258)
D(LEXR)	-0.178013
	(0.13998)
D(LIFR)	-0.050966
	(0.46296)

2 Cointegrating Equation(s): Log likelihood 69.34957

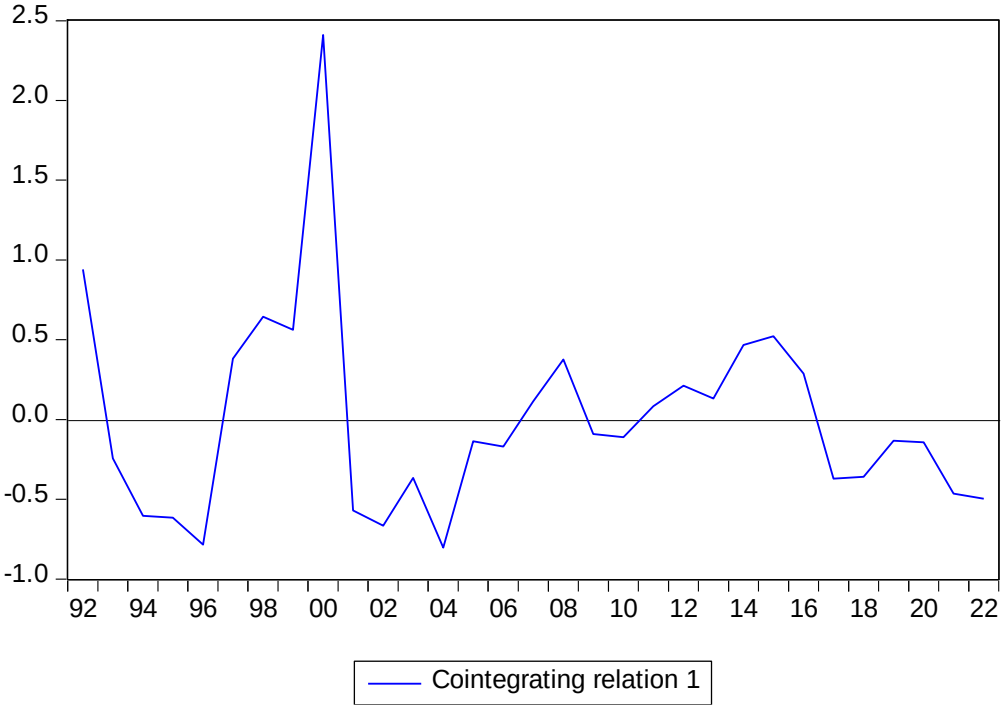
Normalized cointegrating coefficients (standard error in parentheses)

LRGDP	LEXR	LIFR
1.000000	0.000000	1.813672
		(0.24214)
0.000000	1.000000	3.781118
		(0.63475)

Adjustment coefficients (standard error in parentheses)

D(LRGDP)	-0.094043	0.040576
	(0.02467)	(0.01253)
D(LEXR)	0.285969	-0.202775
	(0.28440)	(0.14438)
D(LIFR)	-0.490839	0.257209
	(1.00455)	(0.50998)

VAR ESTIMATE



Vector Autoregression Estimates
Date: 09/02/23 Time: 10:57
Sample (adjusted): 1992 2022
Included observations: 31 after adjustments
Standard errors in () & t-statistics in []

	LRGDP	LEXR	LIFR
LRGDP (-1)	1.253254	-0.387027	2.222848
	(0.18138)	(1.69081)	(5.94720)
	[6.90938]	[-0.22890]	[0.37376]
LRGDP (-2)	-0.329342	0.695292	-2.069349
	(0.16984)	(1.58320)	(5.56872)
	[-1.93912]	[0.43917]	[-0.37160]
LEXR (-1)	-0.009211	0.664158	2.414566
	(0.02899)	(0.27026)	(0.95062)
	[-0.31771]	[2.45744]	[2.53999]
LEXR (-2)	0.040971	0.091980	-2.351965
	(0.02901)	(0.27047)	(0.95133)
	[1.41207]	[0.34008]	[-2.47229]
LIFR (-1)	-0.008585	-0.060140	0.688567
	(0.00788)	(0.07349)	(0.25850)
	[-1.08885]	[-0.81831]	[2.66369]
LIFR (-2)	0.001093	-0.086508	0.019203
	(0.00566)	(0.05277)	(0.18560)
	[0.19304]	[-1.63945]	[0.10347]
C	0.712398	-1.616330	-1.521635
	(0.23926)	(2.23026)	(7.84468)
	[2.97756]	[-0.72473]	[-0.19397]
R-squared	0.997103	0.942936	0.286229
Adj. R-squared	0.996378	0.928671	0.107786
Sum sq. resids	0.019025	1.653161	20.45283
S.E. equation	0.028155	0.262453	0.923147
F-statistic	1376.577	66.09725	1.604037
Log likelihood	70.65060	1.448020	-37.54117
Akaike AIC	-4.106491	0.358192	2.873624
Schwarz SC	-3.782687	0.681996	3.197428
Mean dependent	10.63020	4.686711	2.585461
S.D. dependent	0.467847	0.982692	0.977320
Determinant resid covariance (dof adj.)		1.91E-05	
Determinant resid covariance		8.85E-06	
Log likelihood		48.38848	

Akaike information criterion	-1.766999
Schwarz criterion	-0.795588
Number of coefficients	21

Wald Test for RGDP

Wald Test:
System: %system

Test Statistic	Value	df	Probability
Chi-square	1360.110	2	0.0000

Null Hypothesis: C (1) =C (2) =0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C (1)	1.253254	0.181384
C (2)	-0.329342	0.169841

Restrictions are linear in coefficients.

Wald Test: EXR
System: %system

Test Statistic	Value	df	Probability
Chi-square	46.19285	2	0.0000

Null Hypothesis: C (10) =C (11) =0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C (10)	0.664158	0.270264
C (11)	0.091980	0.270466

Restrictions are linear in coefficients.

Wald Test: INFER
System: %system

Test Statistic	Value	df	Probability
Chi-square	7.422495	2	0.0244

Null Hypothesis: C (19) =C (20) =0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C (19)	0.688567	0.258501
C (20)	0.019203	0.185599

Restrictions are linear in coefficients.

System Residual Portmanteau Tests for Autocorrelations
Null Hypothesis: no residual autocorrelations up to lag h
Date: 09/03/23 Time: 11:01
Sample: 1992 2022
Included observations: 31

Lags	Q-Stat	Prob.	Adj Q-Stat	Prob.	df
1	2.583453	0.9786	2.669568	0.9760	9
2	6.838804	0.9914	7.218391	0.9882	18
3	24.42837	0.6065	26.69255	0.4805	27
4	37.64175	0.3940	41.86347	0.2314	36
5	42.01746	0.5990	47.08067	0.3874	45
6	49.20201	0.6596	55.98951	0.4001	54
7	66.78584	0.3483	78.70195	0.0877	63
8	71.34674	0.4996	84.84925	0.1428	72
9	76.27716	0.6277	91.79666	0.1935	81
10	80.68847	0.7484	98.30860	0.2577	90
11	87.84805	0.7813	109.4059	0.2230	99
12	88.80538	0.9109	110.9679	0.4031	108

*The test is valid only for lags larger than the System lag order.
df is degrees of freedom for (approximate) chi-square distribution
*df and Prob. may not be valid for models with lagged endogenous variables

System Residual Normality Tests
Orthogonalization: Cholesky (Lutkepohl)
Null Hypothesis: residuals are multivariate normal
Date: 09/03/23 Time: 11:02
Sample: 1992 2022
Included observations: 31

Component	Skewness	Chi-sq	df	Prob.
1	0.458032	1.083931	1	0.2978
2	2.814879	40.93832	1	0.0000
3	0.778935	3.134821	1	0.0766
Joint		45.15707	3	0.0000

Component	Kurtosis	Chi-sq	df	Prob.
1	3.024739	0.000791	1	0.9776
2	13.97076	155.4618	1	0.0000
3	3.267855	0.092672	1	0.7608
Joint		155.5553	3	0.0000

Component	Jarque-Bera	df	Prob.
1	1.084721	2	0.5814
2	196.4002	2	0.0000
3	3.227493	2	0.1991
Joint	200.7124	6	0.0000