

An Estimation of Causal Interaction between Monetary and Fiscal Stabilization Policies on Economic Growth in Nigeria

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Abstract

This study was structured to examine the causal relationship between monetary and fiscal stabilization policies on economic growth in Nigeria. Data employed for econometric analysis were obtained from the Central Bank of Nigeria statistical bulletin published in 2022. The analytical methodology adopted was the Granger Causal technique. Augmented Dickey-Fuller test was employed to examine the stationary properties of the time series at a 5 per cent level. None of the series was stationary at a level, which validated the hypothesis of non-stationarity. Stationarity was attained after the first and second differencing respectively at a 0.05 level of significance. A cointegration test was also performed to confirm the existence or otherwise of a long-run equilibrium relationship at 0.05 level. The results indicate long-run equilibrium relationships among the variables. The results of Granger Causality signify that both monetary and fiscal policies are potent stabilization instruments in gauging the health of the Nigerian economy to guarantee that the economy is prodded onto a steady long-run growth path. Therefore, it is recommended that growth in the money supply should be consciously backed up with gold and other foreign hard currencies to guarantee price stability, and that, the Federal Government should establish a coordinating agency to synchronize conflicting monetary and fiscal policies and implementation that are inimical to the attainment of the macroeconomic goal of economic stabilization and growth.

Keywords: Monetary Policy, Fiscal Policy, Government Expenditure, Budget Deficit, Money Supply, Granger Causality.

JEL Classification: C4, C5, E4, E5, H3, H6.

Introduction

Economies of the world, especially of developing nations, are typically cyclical and volatile. Developing economies are characteristically exposed to both external and internal constraints that potentially inhibit growth and rather promote instability. However, the orchestrated agenda of most governments of developing nations has always been the attainment of economic greatness and stability through structural transformation.

In Nigeria, various stabilization policies have been pursued to preserve the economy on a sustainable steady growth path, capable of absorbing shock from both internal and external environments. The most important and potent policy options employed for macroeconomic stabilization are monetary and fiscal policies. Each of these policies is complementary to each other for the successful attainment of stabilization objectives to boost growth.

Therefore, monetary policy is the actions undertaken by the monetary authorities to promote macroeconomic policy objectives of maintaining price stability, full employment, balance of payment equilibrium and stable economic growth. On the other hand, fiscal policy denotes sustainable tax and revenue policies of the federal government. Thus, there is no unanimity of opinions among scholars and policymakers concerning the role of both monetary policy and fiscal policy in the economic stabilization and growth process. The attainment of the goal of economic growth via stabilization policies largely hinges on the performance of microeconomic and macroeconomic environments, the internal and external environmental dynamics and the institutional framework. The monetarists opine that monetary policy exerts significant influence on aggregate economic activity, such as the national income.

On the contrary, the Keynesians postulate that fiscal policy contributes momentarily to aggregate economic activity. However, the conjecture of the monetarists implies that money supply affects aggregate demand or economic activity. This further infers that this connection enhances stable and sustainable growth and development in the long run. According to them, only money matters in the economic stabilization and growth process. Therefore, an increase in money supply linearly relates to growth in economic activity, hence an increase in output and national income. Keynesians further hypothesize that with the complexity of the global economy, and though money exercises a huge influence on growth, money is not the sole factor in determining economic growth.

The Nigerian economy is a mono-cultural economy vastly dependent on revenue from oil and gas exports and so the economy is susceptible to the vagaries of external shock. Thus, the economy is considered to be volatile with attendant unvarying high inflationary spiral, low output, plummeting external reserves and a high rate of unparalleled unemployment. To address this economic malaise and to attain sustainable growth, policymakers preferably engage monetary policy and fiscal policy instruments. Nonetheless, there appears to be a lack of clarity between monetary policy and fiscal policy as well as with price stability.

Over the years, especially since 2016, the central monetary authority and the fiscal authority have frequently intervened in the economic stabilization and restructuring process through the manipulation of money supply, interest rate and demand and varying monetary policy rates in addition to deficit financing respectively. Despite these interventions, the Nigerian economy remains abysmally poor with stunted and sporadically declining growth rates while the national economy straddled through various phases of unwarranted recessions. The application of short-term monetary and fiscal policy framework as a remedy for long-run stabilization distortions and policy inconsistency has been identified as a bane and a major challenge the Nigerian economy faces. Arising from the above narration, this study is designed to examine the causal interaction between monetary and fiscal policies in the

process of attaining sustained economic growth and to proffer recommendations necessary to catapult the comatose economy from doldrums to steady growth path by the employment of Granger causality econometric technique.

Review of Related Literature

Theoretical Background

Macroeconomic instability is a chronic economic phenomenon, especially, in developing and underdeveloped economies. Every economy experiences a business cycle. The business cycle usually is bifurcated into four distinct periods, such as recession, trough, expansion, and peak. Nevertheless, the business cycle passes through two severe locations, which are boom and depression.

After the 1929 great depression, economists began to give credence to the business cycle which led to the emergence of the Keynesian and the monetarist economists with the two opposing and conflicting theoretical propositions which garnered extensive attention from scholars, investors and policymakers. The controversy between the Keynesians and the monetarists' viewpoints rests on the causes and the strategies needed to propel the economy from recession/depression to a growth path. The Keynesian postulation centred on the demand volatility during cyclical downturns and therefore, suggests government intervention by increasing spending and tax cuts to engender economic stability and growth. However, monetarists consider the stock of money in the economic system as the source of economic volatility. From the above narration, the basic Keynesian equation is given as:

$$Y = C + I + G = (X - M)$$

Where Y symbolizes real output, C represents household consumption, I denotes gross investment, G signifies government expenditure and (X-M) is equal to net exports. Therefore, G should be increased to offset the decline in average propensity to consume (APC). Accordingly, Keynesians postulate that government spending and hence fiscal policy are crucial to determining output growth and employment as well as enhancing economic stabilization and growth.

The monetarist economists, on the other hand, lend attention to the importance of adjusting money stock. The basic equation of the monetarists is the equation of exchange given below:

$$MV = PQ$$

Where M represents money supply, V denotes velocity of money, P symbolizes price level and Q is the physical volume of goods produced in a given period. According to the monetarist, money and thus monetary policy are the key determinants or/strategies for the stabilization of the economy. The monetarists opine that an increase in money supply leads to a decline in interest rate which will support increased investment. Therefore, an increase in investment will enhance increased output through the multiplier effect. Consequently, from the above theoretical review, this study is established on the Keynesian and monetary theories of economic stabilization and growth.

Empirical Literature

The extant literature provides evidence of several studies that have placed prominence on the contributions of the central government to the promotion of macroeconomic growth through the manipulation of the money supply by monetary authority and tax administration by fiscal authority. Nevertheless, contradictory research postulations variously have generated new thoughts that government involvement retards growth. Conversely, there is a growing body of empirical literature supporting judicious and objective coordination of both monetary and fiscal policies to attain long-run sustainable economic growth.

For instance, Umar & Murtala (2020) examined the impact of fiscal policy on economic growth in Nigeria, using data from 1981 to 2017. Using the Autoregressive Distributed Lag (ARDL) approach, the study indicated that government spending and taxation have significant impacts on economic growth in Nigeria, both in the short run and in the long run. The study also shows that government spending has a stronger positive impact on economic growth than taxation. It was recommended that the Nigerian government should focus on using fiscal policy to stimulate economic growth, especially through increased government spending on sectors that have a higher multiplier effect on economic growth, such as infrastructural development.

Oseni & Oyelade (2023) investigated the effects of monetary and fiscal policies on economic growth in Nigeria using various economic variables. The findings showed that gross capital formation, total number of employees, broad money supply, and lending interest rate are significant factors in determining economic growth in Nigeria. The study found that gross capital formation, the total number of employees, and broad money supply have a positive and significant effect on the gross domestic product (GDP) while lending interest rate has a negative and significant effect on GDP. The study recommended that the government should encourage more private investment in Nigeria by lowering the lending interest rate, which would lead to more borrowing by private investors and boost investment in the country.

Balogun (2021) investigated the effects of the Cash Reserved Ratio (CRR) and Monetary Policy Rate (MPR) on the economy of Nigeria from 1999–2020. The Real Gross Domestic Products (RGDP) was the dependent variable while CRR and MPR were the explanatory variables. The prime lending rate (PLR) of the deposit money banks was included as a control variable. The study employed Auto Regressive Distributed Lag (ARDL) bound test for cointegration to determine the long-run relationships between the variables, while the unit root was tested with Augmented Dickey-Fuller (ADF) to determine the variations in the variables. Durbin Watson's technique was employed to detect serial correlation in the variables. The results of the study revealed the long-run dynamics of the relationship between RGDP and the explanatory variables CRR, MPR and PLR. There exists a negative and significant relationship between RGDP and CRR, which indicates that a long-run relationship exists between RGDP and CRR. The study concluded that CBN should take the monetary policy holistically to achieve the goal of stimulating banks' credit to the desired economic agents, which will spur economic growth.

Ezeaku et al., (2020) investigated the relationship between fiscal policy and the unemployment rate in Nigeria, using an Autoregressive Distributed Lag (ARDL) Bounds Testing approach. Findings showed that government spending had a significant negative impact on the unemployment rate in Nigeria in both the short and long run, while taxation had a significant positive impact on the unemployment rate in the short run only. The study also indicated that fiscal policy influences the unemployment rate differently in different sectors, with government spending having a stronger negative impact on the unemployment rate in the industrial and service sectors compared to the agricultural sector.

A study by Alabi & Olarinde (2020) on the relationship between fiscal policy and economic growth in Nigeria also found that government spending and taxation had a significant impact on economic growth in Nigeria, with government spending having a positive impact and taxation having a negative impact. The study also confirmed that the impact of fiscal policy on economic growth varied by sector, with government spending having a stronger positive impact on the service sector compared to other sectors.

In a similar view, Ayodeji & Oluwole (2018) investigated the impact of monetary policy on economic growth in Nigeria. The study used money supply and exchange rate as independent variables and economic growth as dependent variables. The findings of the study showed that both money supply and exchange rate have an insignificant positive impact on economic growth. This implies that the effectiveness of monetary policy in Nigeria may be limited in promoting economic growth, and suggests that additional policies may be necessary to support sustained economic growth in the country.

Edeme *et al.* (2018) also investigated the influence of fiscal and monetary policies on the growth of small and medium enterprises (SMEs) in Nigeria, using data from 1986 to 2015. The study submitted that fiscal policy had a more significant impact on stimulating the growth performance of Nigerian SMEs compared to monetary policy. This implies that the Nigerian government may need to focus more on fiscal policy measures, such as tax incentives or government spending, to support the growth of SMEs in the country. The study also suggested that monetary policy may not be as effective in promoting SME growth in Nigeria.

Nwaogwugwu (2018) also carried out a study to examine the impact of macroeconomic policy on stock market behaviour in Nigeria. The study found that both monetary and fiscal policies had statistically significant effects on the stock market in both the short and long run. Specifically, the study found that money supply and interest rates had significant effects on the stock market, as did government spending and taxation. This implies that macroeconomic policy in Nigeria can significantly impact the performance of the stock market, and suggests that investors in the Nigerian stock market may need to pay close attention to changes in macroeconomic policy to make informed investment decisions.

Ogundipe & Akinbobola (2020) also carried out a study on the relationship between monetary policy variables (money supply, interest rate, and exchange rate) and economic growth, using an Autoregressive Distributed Lag (ARDL) Bounds Testing approach. The results suggested that there was a significant positive relationship between money supply and economic growth in the short run, while, in the long run, both money supply and exchange rate have significant positive impacts on economic growth. Conversely, the study found that interest rate hurts economic growth both in the short and long run. The study concluded that the monetary policy variables considered in the analysis can be used to promote economic growth in Nigeria if appropriately implemented by policymakers.

Mogaji *et al.* (2020) examined the impact of fiscal policy on economic growth in Nigeria. The study used a Vector Auto-regression (VAR) model to investigate the relationship between government spending, taxation, and economic growth. The results of the study showed that there was a positive relationship between government spending and economic growth, but this relationship was not statistically significant. On the other hand, the study found that there was a negative relationship between taxation and economic growth, and this relationship was statistically significant. The study concluded that fiscal policy can have an impact on economic growth in Nigeria, but policymakers need to carefully consider the appropriate balance between government spending and taxation to achieve this goal.

Idris & Bakar (2017) looked at the influence of fiscal operations on macroeconomic growth in Nigeria. The findings of the study revealed that fiscal operations were ineffective in providing the necessary macroeconomic environment for sustainable growth in Nigeria. The study concluded that the government's fiscal policy had failed to stimulate economic growth due to a lack of fiscal discipline and a failure to properly manage government revenues. The study recommended more effective fiscal policy measures to promote sustainable economic growth in Nigeria.

Abata *et al.* (2012) analyzed the impact of fiscal and monetary policies on economic growth and development in Nigeria and identified fiscal indiscipline as one of the major factors affecting sustainable economic growth in Nigeria. They concluded that the growth of Nigeria's economy can only be achieved through proper coordination and implementation of fiscal and monetary policies, as well as the need for strong political will to address the issue of fiscal indiscipline in Nigeria.

Okorie *et al.* (2017) also studied the relationship between monetary and fiscal policies and economic growth in Nigeria. The study made use of a quarterly time series from 1981-2012. The findings of the study showed that both monetary and fiscal policies are positively and significantly related to income.

Ogar *et al.* (2014) examined the relationship between fiscal and monetary policies and economic growth in Nigeria from 1986 to 2010. The study concluded that both government revenue and money supply had a positive and statistically significant impact on gross domestic product.

Nwoko *et al.* (2016) studied the effectiveness of monetary policies in promoting economic growth and development in Nigeria. Applying data from 1990 to 2011, the study showed that average

price and the labour force had a significant influence on economic growth. The study also revealed that inflation and employment are important factors in determining the economic growth of a nation. Nevertheless, the study failed to establish that money supply had a significant impact on economic growth in Nigeria. This may imply that the effectiveness of monetary policy in Nigeria may depend on factors other than the amount of money in circulation and suggests that the apex bank may need to consider alternative strategies to promote economic growth.

Noman & Khudri (2015) studied the impact of fiscal and monetary policies on the economic growth of Bangladesh, between 1979 and 2013. The study found a positive correlation between narrow money, broad money, exchange rate, government revenue, and expenditure with real gross domestic product. This can be explained to mean that an increase in these variables will result in a corresponding increase in the real gross domestic product.

Agu et al., (2015) examined the relationship between components of fiscal policy and economic growth in Nigeria. Analysis of data from the study revealed a positive correlation between government expenditure on economic services and economic growth. Nevertheless, evidence from the study was not strong enough to show the impact of other components of fiscal policy, such as government expenditure on social services or transfer payments, on economic growth in Nigeria. The study suggested that further studies be carried out to explore the effectiveness of different fiscal policy components in driving sustainable economic growth in the country.

Ogunbiyi & Okoye (2016) studied the relationship between fiscal policy and economic growth in Nigeria between 1970 and 2014. The study showed that government expenditure on economic service and fiscal deficit positively but insignificantly related to economic growth, while government expenditure on social and community service and tax revenue positively and significantly related to economic growth. Alternatively, government expenditure on administration and transfer is negatively and insignificantly related to economic growth.

A study by Adigwe et al. (2015) also investigated the influence of monetary policy on economic growth in Nigeria. With data from 1980 and 2010, the study revealed that monetary policy, proxied by money supply, demonstrated a positive influence on GDP. At the same time, monetary policy demonstrated a negative impact on the inflation rate, implying that the effectiveness of monetary policy in Nigeria is dependent on the specific macroeconomic variables being targeted. Specifically, increasing money supply can stimulate economic growth but may also lead to inflationary pressures.

Ajayi & Aluko (2016), using a modified St. Louis equation, carried out a study to evaluate the relative impact of monetary and fiscal policy in Nigeria from 1986 to 2014. The study showed that growth in money supply positively and significantly influences economic growth, while increases in government expenditure negatively and insignificantly influence economic growth. The study suggested increased money supply and controlling inflation as ways of enhancing economic growth rather than a fiscal policy that places a high emphasis on government expenditure.

Bodunrin (2016) investigated the relationship between fiscal and monetary policy and economic growth and development in Nigeria. Data for the study was obtained from statistical bulletins from 1981 and 2015. Using the VAR model, the study found a short-term impact between fiscal policy and real GDP growth. The study also revealed that monetary policy is insignificantly related to the growth of real GDP in Nigeria.

Among the studies that examined the effectiveness of monetary and fiscal policies are Adegioriola (2018), Bobreta & Bananaya (2016) and Bianchi & Ilut (2017). Adegioriola (2018) investigated the importance of monetary and fiscal policies in the stabilization of the Nigerian economy for the period between 1981 and 2015. The econometric approaches adopted were the Jesulius Johansen co-integration technique and the error correction mechanism. A positive relationship between money supply, government expenditure and revenue was established. Nevertheless, budget deficit and interest rate were found to be negatively related. It was concluded that both policies were found to be potent instruments in the economic stabilization process.

Bobreka & Benanaya (2016) examined the role of monetary and fiscal policies on the macroeconomic stabilization and growth of Algeria using an econometric modelling methodology of co-integration and error correction mechanism to analyze the data from 1970 to 2021. The result of the analysis indicated that government expenditure positively and significantly influenced national economic growth. It was also established in the study that taxation exerted a nominal influence on growth, while the exchange rate was significant to growth. It was concluded that fiscal policy generated capital growth.

Bianchi & Ilut (2017) studied the monetary-fiscal policy combination for the economy of the United States of America. Monetary policy subjugated fiscal policy from the 1960s to the 1970s. The policy mix further spawned higher inflation.

In 2009, Benos investigated the connection between fiscal policy and economic growth involving fourteen European countries for thirty years. He adopted the panel data analytical technique. The study revealed that government capital expenditure positively and significantly affected economic growth rates.

Ali et al. (2008) adopted the autoregressive distributed lag (ARDL) model and error correction mechanism (ECM) to ascertain the relative effectiveness of monetary policy and fiscal policy on economic growth in South Asian Countries. They employed annual data spanning between 1990 and 2007 and considered gross domestic product, broad money supply and fiscal balance. The result signified that monetary policy engendered immense influence on growth in the South Asian region.

Data and Econometric Methodology

The data set employed in this study for the estimation of the causal linkage between money policy, fiscal policy and economic growth in Nigeria were annual data obtained from the 2022 statistical bulletin published by the Central Bank of Nigeria for the period 1981 to 2021. The data streams include government total expenditure (GXP) which is a proxy of fiscal policy. Economic growth is measured by real gross domestic product (GDP). To estimate economic instability in the economic system which could be stimulated by unchecked excessive money supply (MS), a monetary policy indicator is captured in the Granger Causality model. The consumer price index (CPI) is incorporated in the model as a major proxy for the inflationary spiral and measures economic volatility. The CBN introduces price stability as a means of controlling the level of money supply (MS). However, the use of money supply in this study is predicated on the fact that money supply plays a crucial role in determining economic stabilization through price stability.

Nevertheless, monetary authority frequently modifies monetary policy rates (MPR), either by increasing or reducing interest rates, for example, lowering the cost of borrowing to boost economic investment potential and increase household demand, and vice-versa. Thus, data on MPR is also used as a monetary policy pointer, and apriori, is expected to be either positively and/or negatively related with GDP. Data on deficit financing (BSD) is representative of fiscal policy instruments. However, the annual budgets of the country most frequently result in deficits. It should be noted that the following variables: GDP, GXP and MS were transformed to natural logarithms to help in the reduction of errors due to un-scaled magnitude.

Analytical Techniques

Pairwise Granger causality technique is employed to investigate the causal interaction between monetary policy, fiscal policy and stable economic growth in Nigeria between 1981 and 2021.

Examining the Stationarity Property

Before the estimation of the causal nexus between monetary policy, fiscal policy and economic growth, it became logical and econometrically wise, to examine the stationary property of the time series to ensure that the series are free of unit root problems and to bypass nonsensical estimation. The implication is that time series do not exhibit either characteristic of positive or negative autocorrelation or non-existence of stochastic non-stationarity at a 5% level or to ensure data admissibility. Therefore, the preferred approach adopted in the study is this Augmented Dickey-Fuller (ADF) procedure specified below:

$$\Delta Y_t = \delta_0 + \delta_1 t + \beta y_{t-1} + \sum_{j=1}^K \alpha_j \Delta Y_{t-j} + \varepsilon_t \quad 1$$

Where Y_t symbolizes applicable time series, Δ represents the first difference operator, t signifies a linear trend and ε_t stands for stochastic white noise. It is hypothesized in the null (H_0) that there is no existence of stationarity in the series. The series will be differenced if the null is not rejected until stationarity is attained and the null is rejected. Akaike Information Criterion (AIC) is used in determining the lag length and the lag length selected was one.

Cointegration Test

To ascertain the existence of long run and equilibrium relationship having differenced the series to certify data admissibility, cointegration regression was conducted with the application of Jesulius & Johansen's (1990) cointegration technique. The confirmation of the existence of long-run and equilibrium relationship between the variables guarantees that the variables are cointegrated and do not drift apart from each other and reassures that short-run disturbances from long-run trends are corrected. The Johansen & Jesulius (1990) maximum likelihood test that specifies econometric procedure is here under-expressed as:

$$\Delta Y_t = \Pi y_{t-1} + \sum_{i=1}^{k-1} \Gamma_i \Delta Y_{t-i} + \beta x_t + \varepsilon_t \quad 2$$

$$\Pi = \sum_{i=1}^{k-1} A_i, \Gamma = -\sum_{i=1}^k A_j \quad 3$$

Where Y_t signifies the k -vector of the $I(1)$ variables, x_t is a vector of deterministic variables, Γ represents the number of cointegrating relations, and ε_t signifies an identically and independently identically stochastic term. To validate the existence of the hypothesized Γ cointegrating vectors, the trace test module and the maximum eigenvalue statistical procedure are applied. While applying the trace test module to examine the long-run equilibrium relation, adequate consideration was given to the number of diverse or distinct cointegrating vectors that are lower than or equal to the general alternative. However, the maximum eigenvalue test statistic which is the likelihood ratio measure statistic for the null hypothesis of Γ cointegrating vectors against the alternative $\Gamma+1$ cointegrating vector.

Granger Causality Test

Data significant for the estimation of the causal nexus among the variables defined above were captured in the econometric relationship specified below:

$$\ln GDP_t = \delta_1 + \sum_{i=1}^p \alpha_i \ln GDP_{t-i} + \sum_{j=1}^q \beta_j \ln GXP_{t-j} + \sum_{k=1}^r \nu_k \ln MS_{t-k} + \sum_{l=1}^s \pi_l MPR_{t-l} + \sum_{m=1}^t \phi_m BDS_{t-m} + \sum_{n=1}^u \theta_n CPI_{t-n} + \varepsilon_t \tag{4}$$

$$\sum_{i=1}^p \beta_i \ln GXP_{t-i} = \delta_2 + \sum_{j=1}^p \beta_j \ln GXP_{t-j} + \sum_{j=1}^q \beta_j \ln GDP_{t-i} + \sum_{k=1}^r \nu_k \ln MS_{t-k} + \sum_{l=1}^s \pi_l MPR_{t-l} + \sum_{m=1}^t \phi_m BDS_{t-m} + \sum_{n=1}^u \theta_n CPI_{t-n} + \varepsilon_t \tag{5}$$

$$\sum_{i=1}^p \nu_i \ln MS_t = \delta_3 + \sum_{j=1}^q \nu_j \ln MS_{t-k} + \sum_{j=1}^r \beta_j \ln GDP_{t-i} + \sum_{k=1}^s \beta_k \ln GXP_{t-j} + \sum_{l=1}^t \pi_l MPR_{t-l} + \sum_{m=1}^t \phi_m BDS_{t-m} + \sum_{n=1}^u \theta_n CPI_{t-n} + \varepsilon_t \tag{6}$$

$$\sum_{i=1}^s \pi_i MPR_t = \delta_4 + \sum_{i=1}^p \pi_i MPR_{t-i} + \sum_{j=1}^q \nu_j \ln MS_{t-k} + \sum_{k=1}^r \beta_k \ln GDP_{t-i} + \sum_{l=1}^s \beta_l \ln GXP_{t-j} + \sum_{m=1}^t \phi_m BDS_{t-m} + \sum_{n=1}^u \theta_n CPI_{t-n} + \varepsilon_t \tag{7}$$

$$\sum_{i=1}^t \phi_i BDS_t = \delta_5 + \sum_{i=1}^p \phi_i BDS_{t-m} + \sum_{j=1}^q \beta_j \ln GDP_{t-i} + \sum_{k=1}^r \pi_k MPR_{t-l} + \sum_{l=1}^s \nu_l \ln MS_{t-k} + \sum_{m=1}^t \beta_m \ln GXP_{t-j} + \sum_{n=1}^u \theta_n CPI_{t-n} + \varepsilon_t \tag{8}$$

$$\sum_{i=1}^u \theta_i CPI_t = \delta_5 + \sum_{j=1}^p \theta_j CPI_{t-n} + \sum_{k=1}^q \phi_k BDS_{t-m} + \sum_{l=1}^r \beta_l \ln GDP_{t-i} + \sum_{m=1}^s \pi_m MPR_{t-l} + \sum_{i=1}^t \nu_i \ln MS_{t-k} + \sum_{n=1}^u \beta_n \ln GXP_{t-j} + \varepsilon_t \tag{9}$$

Based on the system of the equation specified above, to ascertain the nature of causality existing among the variables of the study, a pair-wise Granger causality test was performed. Similarly, an appropriate lag length of two based on the Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) was preferred to determine possible feedback in the system of equations.

Empirical Results

The analysis of the results of the various econometric data validation tests conducted in this section is presented here under in table three.

Unit Root Test Results

All the variables were tested to make certain of their stationary property based on the Augmented Dickey-Fuller procedure. The result is displayed in table one below. The null hypothesis of non-stationary of the variables cannot be rejected at a 5% level for all the variables at the level. Thus, CPI, log(GDP) and MPR were stationary after the first difference. Furthermore, log(GXP), log(MS) and BSD became stationary after second difference.

Table 1: Results of unit root test at 5 percent level of significance

Variables	Levels		First difference		Second difference		Order of integration	Lag length
	ADF statistic	Critical values	ADF statistic	Critical values	ADF statistic	Critical values		
Log(GDP)	2.617510	-1.949609	-	-	-	-	I(1)	1
			2.271569	1.949856				
Log(GXP)	3.504177	-1.949609	-	-	-9.770667	-	I(2)	1
			1.918827	1.949856		1.950117		
LOG(MS)	2.064159	-1.949609	-	-	-6.099867	-	I(2)	1
			1.270603	1.949856		1.950117		
MPR	-	-1.949609	-	-	-	-	I(1)	1
	0.357456		6.018484	1.605856				
BSD	5.373052	-1.441609	-	-	-7.197793	-1.950117	I(2)	1
			0.397979	1.949856				
CPI	-	-1.950394	-5031137	-	-	-	I(1)	1
	1.745304			1.951000				

Source: Authors' Computation

The result of cointegration performed based on Jeselius and Johansen's procedure and hypothesized conjecture of no long-run equilibrium relationship among the variables or deterministic trend is presented in panels one and two of Table 2. The results in Table 2 suggest that trace statistic and eigenvalue statistic show forth evidence of two cointegrating equations respectively at 5 per cent among the variables. Thus, the null hypothesis of no cointegration is hereby rejected. This entails there is the existence of unique long-run equilibrium relationships among the variables. This result, therefore, restores the confidence to proceed to vector auto-regression (VAR) estimation.

Results of Granger Causality Test

Granger causality test results are presented in Table 3 below. The null hypothesis of non-causality among the variables was tested and the results are intriguing. It is fascinating to note that there is a strong and positively significant influence of government expenditure on the economic growth process.

Table 2: Cointegration Test Results

Date: 07/08/23 Time: 12:16

Sample (adjusted): 1983 2021

Included observations: 36 after adjustments

Trend assumption: Linear deterministic trend (restricted)

Series: LOG(GDP) LOG(GXP) LOG(MS) BSD MPR

CPI

Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.777995	151.4896	117.7082	0.0001
At most 1 *	0.697328	97.30766	88.80380	0.0106
At most 2	0.456507	54.28388	63.87610	0.2453
At most 3	0.363442	32.33330	42.91525	0.3707
At most 4	0.206987	16.07283	25.87211	0.4867
At most 5	0.193097	7.723887	12.51798	0.2750

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.777995	54.18199	44.49720	0.0033
At most 1 *	0.697328	43.02378	38.33101	0.0134
At most 2	0.456507	21.95058	32.11832	0.4972
At most 3	0.363442	16.26047	25.82321	0.5216
At most 4	0.206987	8.348948	19.38704	0.7892
At most 5	0.193097	7.723887	12.51798	0.2750

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Source: Authors' computation

Keynesians are of the view that growth in government spending is a potent fiscal instrument capable of promoting economic stabilization and increased economic activity. Additionally, there is response feedback that runs from aggregate economic activity (GDP) to government expenditure (GXP).

Thus, the causal interaction between $\log(\text{GXP})$ and $\log(\text{GDP})$ is captivating. With the F-statistic of 2.23584 for $\log(\text{GXP})$, there is an indication that government expenditure significantly drives the Nigerian economy within the period under review. This result also authenticates the relevance of increased government expenditure in the transmission of fiscal impulses to increased economic tempo. Significant causality is also observed from the gross domestic product $\log(\text{GDP})$ to the government expenditure $\log(\text{GXP})$ since the F-statistic is 2.20320 and consistent with the supposition of the Classical economists. This is an indication of bi-causality with feedback.

Nevertheless, a strong and significant uni-directional causality with no feedback is observed from money supply to aggregate economic output at a 5% level. With the calculated F-statistic of 4.25492, the hypothesis of the monetary economists that money matters is validated. However, the calculated F-statistic of 1.43054 concerning the direction of causality from the output growth $\log(\text{GDP})$ to the money supply $\log(\text{MS})$, does not confirm any evidence of causality in that direction. Nevertheless, it could be noted that while growth in the money supply denotes a significant causal effect on economic activity in Nigeria, the economy has over time been spirally sliding downhill because growth in the money supply has not been effectively channeled to productive investments.

Furthermore, uni-directional and significant causation is observed to run from economic activity $\log(\text{GDP})$ to deficit financing (BSD). This is corroborated by the F-statistic of 7.05718 at 5% level. The non-causal relationship running from deficit financing to economic growth may be attributed to poor deficit financing in the country. Conversely, there is no evidence of causation from BSD to $\log(\text{GDP})$. Similarly, there is no noticeable statistically significant relationship between $\text{MPR} \rightarrow \log(\text{GDP})$, $\log(\text{GDP}) \rightarrow \text{MPR}$, $\text{CPI} \rightarrow \log(\text{GDP})$ and $\log(\text{GDP}) \rightarrow \text{CPI}$. The F-statistics associated with the above dismal relationships are grossly low and below two.

Table 3: Granger Causality Test Result

Pairwise Granger Causality Tests

Date: 07/08/23 Time: 12:20

Sample: 1981 2021

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
LOG(GXP) does not Granger Cause LOG(GDP)	39	2.23584	0.1224
LOG(GDP) does not Granger Cause LOG(GXP)		2.20320	0.1260
LOG(MS) does not Granger Cause LOG(GDP)	39	4.25492	0.0224
LOG(GDP) does not Granger Cause LOG(MS)		1.43054	0.2532
BSD does not Granger Cause LOG(GDP)	39	0.74324	0.4831
LOG(GDP) does not Granger Cause BSD		7.05718	0.0027
MPR does not Granger Cause LOG(GDP)	39	0.31057	0.7351
LOG(GDP) does not Granger Cause MPR		0.86368	0.4307
CPI does not Granger Cause LOG(GDP)	36	0.10218	0.9032
LOG(GDP) does not Granger Cause CPI		1.04826	0.3626

LOG(MS) does not Granger Cause LOG(GXP)	39	0.75890	0.4759
LOG(GXP) does not Granger Cause LOG(MS)		6.05078	0.0056
BSD does not Granger Cause LOG(GXP)	39	0.71341	0.4972
LOG(GXP) does not Granger Cause BSD		2.84983	0.0717
MPR does not Granger Cause LOG(GXP)	39	2.66537	0.0841
LOG(GXP) does not Granger Cause MPR		1.79014	0.1823
CPI does not Granger Cause LOG(GXP)	36	0.26820	0.7665
LOG(GXP) does not Granger Cause CPI		0.80124	0.4578
BSD does not Granger Cause LOG(MS)	39	3.36788	0.0463
LOG(MS) does not Granger Cause BSD		3.60480	0.0380
MPR does not Granger Cause LOG(MS)	39	1.41308	0.2573
LOG(MS) does not Granger Cause MPR		0.75868	0.4760
CPI does not Granger Cause LOG(MS)	36	0.33908	0.7150
LOG(MS) does not Granger Cause CPI		2.78654	0.0771
MPR does not Granger Cause BSD	39	0.84840	0.4370
BSD does not Granger Cause MPR		0.95372	0.3954
CPI does not Granger Cause BSD	36	0.46934	0.6298
BSD does not Granger Cause CPI		0.48511	0.6202
CPI does not Granger Cause MPR	36	0.97728	0.3876
MPR does not Granger Cause CPI		1.75964	0.1889

Source: Authors' computation.

Interestingly, a bi-directional causality runs significantly between budget surplus and deficit (BSD) and money supply. This is evidenced by the F-statistic of 3.36 and 3.60 respectively nonetheless, without corresponding improvement in investment and growth. This further denotes an unsustainable fiscal deficit that potentially distorts growth in the money supply which further results in hyperinflation.

Similarly, the F-probabilities associated with these variables are all above 0.05 critical values symptomatic of insignificant interactions. It is enthralling to observe a uni-directional causal relationship between government expenditure to money supply. This relationship authenticates Keynesian economists' postulation that government intervention serves as a fiscal stimulus for the stabilization process and growth. Hence, government expenditure stimulates aggregate demand which further kindles investment and propels the economy onto a growth path. Conversely, money supply was inept in eliciting significant response from government expenditure or granger caused government expenditure to support aggregate demand.

Fiscal deficit and/or surplus budget have been observed to have no significant effect on government expenditure. The Nigerian Federal Government has over the years been financing budget

deficit while the country steadily slumps into infrastructural insufficiency and decay, unemployment, poverty and high incidence of corruption. This scenario is an indication of incredulous government spending on infrastructural improvement and investment in human development. It is rather irritating to note that government expenditure granger caused an overwhelming budget deficit in Nigeria without a significant corresponding improvement in the relevant sectors even with an F-statistic of 2.84983 revealing a significant response.

Based on the F-statistic of 2.66537, it can be established that the manipulation of the monetary policy rate (MPR) by the Central Bank of Nigeria is significant in reducing government expenditure. Nonetheless, there is no significant feedback from the $\log(\text{GXP})$. It is intriguing to note that a bi-directional relationship did not exist between MPR and $\log(\text{GDP})$. The frequent upward review of monetary policy rates raised lending rates and placed a greater burden of debt servicing on investors, and consequently impaired investors' proclivity for investible funds. This further exacerbated the declining national economic performance. Nonetheless, the seeming lack of significant response from economic growth to monetary policy rate may be because changes in economic performance arising from changes in MPR depended on the elasticity of investment demand.

There appears to be inertia in the demand for investment in the Nigerian economic system due to policy inconsistency; especially frequent changes in MPR culminating in a liquidity trap. It could be conjectured that the Nigerian economy has slipped into a liquidity trap whereby people's preference to hold cash appears to be higher than the people's penchant to invest in financial instruments to boost financial markets' capability to support long-term investments in real assets. This further entails that the monetary authority (CBN) may have lost effective control over the determination of effectual interest rates through the manipulation of MPR to influence the money base and to determine the optimum level of money supply and aggregate demand. This perceptible loss of control exceedingly manifested during the last quarter of 2022 and the first quarter of the 2023 cash crunch crisis in the country.

Interestingly, according to apriori conjecture, the money supply granger caused an inflationary spiral in the economy. This is symbolized by a significant F-statistic of 2.78654 at 5% level. The high inflationary trend is overwhelming, because, most probably the monetary authority does not correspondingly and adequately back up money supply growth with gold and/or other international hard currencies. Arising from Keynesian theoretical perspective, growth in government expenditure is expected to elicit growth in money supply in the economic system and thus promote aggregate demand, investment, business expansion and economic growth. The implication is that monetary policy is a potent tool in economic stabilization and growth process. However, growth in money supply in Nigeria has correspondingly not produced the expected growth in business and economy. The appalling level of investment and abysmal economic outlook could be attributed to the fact that large volumes of money supplied are not being channeled through the banking system for productive investments but stored outside the banking system to fund public officers' ostentatious and extravagant living, thus stifling investments and economic growth.

Conclusion and Recommendations

This paper was structured to estimate causal relations between monetary and fiscal stabilization policies on economic growth in Nigeria with the application of the Granger causality econometric approach to ascertain whether monetary policy or fiscal policy and/or both are effective in the economic stabilization and growth process in Nigeria. We verified the stationary property of the time series using the Augmented Dickey-Fuller approach. Furthermore, we examined the existence or otherwise of

equilibrium long-run relationships among the variables using the Johansen and Jeselius cointegration technique. Cointegration results authenticated the existence of long-run equilibrium relationships among the variables. Finally, we engaged a vector-regressive Granger causality procedure to examine the causal nexus between the monetary policy and the fiscal policy variables in the growth process of the Nigerian economy spanning between 1981 and 2021. The unit root results indicate that $\log(\text{GXP})$, $\log(\text{MS})$ and BSD were stationary after the second difference, while $\log(\text{GDP})$, CPI and MPR attained stationarity at the first difference.

Considering the analysis of Granger causality output above, it can be established that both monetary and fiscal policies are potent stabilization instruments in gauging the health of the economy to guarantee that the economy is prodded onto a steady long-run growth path. Granger causality results denote that capital expenditure is a potent fiscal policy instrument that significantly and positively influenced the economic growth process during the period under review. It is also observed that over the years, the government has paid more credence to fiscal policy, especially deficit budget financing.

Therefore, it is suggested that the fiscal authority should make certain that the country achieves or maintains a balanced budget annually and inculcate fiscal discipline in its budgetary policy and implementation to free the economy from the vicious cycle of fiscal imbalance.

It is confirmed from the study that fiscal deficit promoted growth in the money supply. Thus, it is suggested that fiscal authorities need to lower the financing of fiscal deficit and ensure that deficit financing does not exceed optimal or satisfactory precipice.

The Monetary authorities, as a matter of urgency, need to institute effective mechanisms to regulate the money supply and to objectively allocate credit and resources to sectors with high multiplier effects for the growth of the economy. Furthermore, the Central Bank of Nigeria needs to intensify a day-by-day level monetary policy and long-run dependable liquidity forecast so that the government cash balance is given prime attention to strengthen the determination of the optimum level of money supply and to place a limit of credit from the Central Bank of Nigeria to the government to forestall consistent price instability in the economy.

Furthermore, monetary authorities should reconsider monetary policy decisions aimed at reducing monetary policy rates to galvanize lower costs of borrowing for investment and economic growth. This policy may engender increased consumer spending and output growth with the potential for increased investment and growth. Furthermore, growth in the money supply should be consciously backed up with gold and other foreign hard currencies to guarantee price stability.

Additionally, The Federal Government of Nigeria need to set up an effective coordinating body/agency to foster the synchronization of contradictory or divergent monetary and fiscal policy frameworks and implementation which are inimical to attaining economic stabilization and growth.

References

- Abata, M. A., Kehinde, J. S. & Bolarinwa, S. A. (2012). Fiscal/monetary policy and economic growth in Nigeria: A theoretical exploration. *International Journal of Academic Research in Economics and Management Sciences*, 1(5), 75-88.
- Adegioriola, A.E; (2018). An Empirical Analysis of Effectiveness of Monetary and Fiscal Policy Instrument in Stabilizing Economy: Evidence from Nigeria. *Journal of Social Sciences*. 7 (3). 133-140
- Adigwe, P. K., Echekeba, F. N. & Onyeagba, B. C. (2015). Monetary policy and economic growth in Nigeria: A Critical Evaluation. *IOSR Journal of Business and Management (IOSR-JBM)*, 17(1), 110-119.
- Agu, S. U., Okwo, I. M., Ugwunta, O. D. & Idike, A. (2015). Fiscal policy and economic growth in Nigeria: Emphasis on various components of public expenditure. *SAGE Open*, 5(4), 37-54.
- Ajayi, M. A. & Aluko, O. A. (2016). Evaluating the relative impact of monetary and fiscal policy in Nigeria using the St. Louis Equation. *ActaUniversitatisDanubius. OEconomica*, 13(1), 40-50.
- Alabi, J. O. & Olarinde, M. O. (2020). Fiscal policy and economic growth in Nigeria: an empirical investigation. *Journal of Economics and Management*, 38, 10-26.
- Ali, S; Irum, S. & Ali, A; (2008). Whether fiscal stance or monetary policy is effective for economic growth in case of South Ass
- Ayodeji, A. & Oluwole, A. (2018). Impact of monetary policy on economic growth in Nigeria. *Open Access Library Journal*, 5(02), 1-12.
- Balogun, A. A. (2021). Does monetary policy affect economic growth in Nigeria? *Fuoye Journal of Finance and Contemporary Issue*, 1 (1): 92-102.
- Batten, D.S. & Hafer, R.W. (1983). The relative impact of monetary and fiscal actions on economic activity: A cross- country comparison, review, from EU countries, university of Loannina
- Benos, N. (2009). fiscal policy and economic growth: Empirical evidence from EU countries, University of Loannina
- Bianchi, F. & Ilut C. (2017). Monetary/ fiscal policy mix and agents belief. *Review of Economics Dynamics*, 26, 113-139
- bobreta, k. & bananaya, d. (2016) fiscal – monetary policy and economic growth in Algeria: VECM approach. *International Journal of Economics and Management Engineering* 10 (9), 3084-3088.
- Bodunrin, O. S. (2016). The impact of fiscal and monetary policy on Nigerian economic growth. *Munich Personal RePEc Archive*, 3(1), 1-21
- Edeme, R. K., Ehikioya, I. L. & Uduh, D. M. (2018). Relative impact of fiscal and monetary policy on the growth of small and medium scale enterprises in Nigeria. *Quantitative Economics Research*, 1(1), 1-12.
- Ezeaku, H. C., Nwanna, G. O. & Okafor, R. E. (2020). Fiscal policy and unemployment rate in Nigeria: An autoregressive distributed lag (ARDL) bounds testing approach. *American Journal of Economics*, 10(2), 98-108.
- Idris, M. & Bakar, R. (2017). Fiscal operations and macroeconomic growth: The Nigerian experience. *International Journal of Business, Management and Social Research*, 3(1), 162-178.
- Mogaji, P. B., Adetula, D. T. & Olaoye, O. A. (2020). Examining the impact of fiscal policy on economic growth in Nigeria. *Ovidius University Annals, Economic Sciences Series*, 20(2), 407-416.
- Noman, S. M. S. & Khudri, M. M. (2015). The effects of monetary and fiscal policies on economic growth in Bangladesh. *ELK Asia Pacific J Finance and Risk Management*, 6(3), 21-34.

- Nwaogwugwu, I. C. (2018). The effects of monetary and fiscal policy on the stock market in Nigeria. *Journal of Economics*, 6(1), 79-85.
- Nwoko, N. M., Ihemeje, J. C. & Anumadu, E. (2016). The impact of monetary policy on the economic growth of Nigeria. *African Research Review*, 10(3), 192-206.
- Ogar, A., Nkamare, S. E. & Emori, E. G. (2014). Fiscal and monetary policy and its effect on growth of Nigeria economy. *European Journal of Business Management*, 6(29), 220-230.
- Ogundipe, A. A. & Akinbobola, T. O. (2020). An appraisal of monetary policy on economic growth in Nigeria. *Asian Economic and Financial Review*, 10(7), 765-774.
- Okorie, D., Sylvester, M. A. & Simon-Peter, D. A. C. (2017). Relative effectiveness of fiscal and monetary policies in Nigeria. *Asian Journal of Social Science Studies*, 2(1), 117-129.
- Ogunbiyi, S. S. & Okoye, N. F. (2016). Fiscal policy and economic growth: The Nigerian experience (1970-2014). *Journal of Accounting and Financial Management*, 2(6), 50-60.
- Oseni, I. O. & Oyelade, A. O. (2023). The effects of monetary policies on economic growth in Nigeria, *African Journal of Economic Review*, 11 (3): 13 – 28.
- Umar, H. & Murtala, K. B. (2020). Fiscal policy and economic growth in Nigeria: An ARDL approach. *Global Business Review*, 21(4), 981-994

Appendix

YEAR	LOG(GDP)	LOG(GXP)	BSD	LOG(MS)	MPR	LR	CPI
1981	9.890834	2.433613	14.47	2.672078	6	38.5	20.9
1982	9.820375	2.476538	15.79	2.759377	8	40.5	7.7
1983	9.704694	2.261763	17.69	2.873000	8	54.7	23
1984	9.693476	2.292535	20.11	3.001217	10	65.1	2
1985	9.750924	2.564949	22.3	3.104587	10	65	39.6
1986	9.751533	2.785011	23.81	3.170106	10	36.4	5.5
1987	9.783033	3.091042	27.57	3.316728	12.75	46.5	5.4
1988	9.853808	3.321432	38.36	3.647015	12.75	45	10.2
1989	9.872820	3.713572	45.9	3.826465	18.5	40.3	38.3
1990	9.984155	4.099332	47.42	3.859044	18.5	44.3	40.9
1991	9.987732	4.198705	75.4	4.322807	15.5	38.6	7.5
1992	10.03300	4.530447	111.11	4.710521	17.5	29.1	13
1993	10.01244	5.253320	165.34	5.108004	26	42.2	44.5
1994	9.994126	5.080783	230.29	5.439339	13.5	48.5	57
1995	9.993400	5.516649	289.09	5.666738	13.5	33.1	72.8
1996	10.03450	5.820676	345.85	5.846005	13.5	43.1	29.3
1997	10.06345	6.059590	413.28	6.024125	13.5	40.2	8.5
1998	10.08894	6.188469	488.15	6.190623	13.5	46.8	10
1999	10.09476	6.854038	628.95	6.444052	18	61	6.6
2000	10.14370	6.552651	878.46	6.778170	14	64.1	6.9
2001	10.20119	6.925595	1269.32	7.146237	20.5	52.9	18.9
2002	10.34381	6.925792	1505.96	7.317186	16.5	52.5	12.9
2003	10.41471	7.111512	1952.92	7.577081	15	50.9	14
2004	10.50319	7.316016	2131.82	7.664731	15	50.5	15
2005	10.56558	7.559924	2637.91	7.877742	13	50.2	17.9
2006	10.62441	7.619724	3797.91	8.242206	10	81.42	8.2
2007	10.68824	7.804211	5127.4	8.542354	9.5	41.56	5.4
2008	10.75370	8.083575	8643.43	9.064555	9.75	37.72	11.6
2009	10.83100	8.146999	9687.51	9.178593	6	26.39	12.54
2010	10.92359	8.341553	11101.46	9.314832	6.25	27.39	13.7
2011	10.97130	8.457889	12628.32	9.443697	12	42.02	NA
2012	11.01321	8.434963	15503.41	9.648815	12	49.72	12.2
2013	11.06574	8.553583	18743.07	9.838579	12	46.23	8.5
2014	11.12693	8.431069	20415.61	9.924055	13	38.27	8.05
2015	11.15311	8.514971	20885.52	9.946811	11	42.35	9.01
2016	11.13681	8.675666	24259	10.09654	14	45.95	15.7
2017	11.14484	8.772874	28604.47	10.26132	14	54.79	16.5
2018	11.16388	8.963634	29774.43	10.30141	14	65.04	12.1
2019	11.18573	9.181385	34257.9	10.44167	13.5	104.2	11.4
2020	11.16762	9.233246	36038.01	10.49233	11.5	67.6	13.25
2021	11.20344	9.406244	40318.29	10.60456	11.5	5.88	16.95

Source: Central Bank of Nigeria Statistical Bulletin 2022