The Interplay between Fiscal and Monetary Policies in Nigeria: An Examination of Their Dynamic Relationship

Abstract

The study examined the nature of the interaction between fiscal and monetary policy in Nigeria and South Africa. It also investigated the channels through which impulses from fiscal and monetary policy interaction are transmitted to inflation, output and exchange rate. These were with the view to providing information into the nature of interaction between fiscal and monetary policies in Nigeria. Thequarterlysecondarydatacoveringthe periodbetween 1980Q1 and 2022Q1 wereused in thestudy. Data on real gross domestic product, consumer price index, lending rate, real exchange rate and total government expenditure were sourced from international financial statistical (2022Q4 Edition) and Central Bank of Nigeria (CBN) Statistical Bulletin (2009 and 2022Q4 Issues). Structural Vector Autoregression (SVAR) econometric model was employed for the analysis of data. The results showed that interaction between fiscal and monetary policy in Nigeria is characterised by the way shock occurred. This indicated that the interaction between both policies showed a substitutive nature when the shocks resulted from aggregate demand and supply shocks, whereas the policies complemented each other whenothermacroeconomic shocks occur due topolicy changes occurred. The study concluded that the nature of relationship between fiscal and monetary policy is dependent on shocks.

KEYWORDS: **Fiscal Policy, Monetary Policy, Nature, Interplay, Dynamic, Relationship, Interaction, SVAR**

1.0 Introduction

The 1936 Great Depression marked the birth of modern macroeconomics. In the midst of that catastrophic event, the Keynesian theorists argued that government of any country has a major task to play in stabilizing their economy, to prevent further calamities and to achieve sustainable development. The primary requirements for stability identified by these theorists are fiscal and monetary policies. Thesepolicies are the two important instruments for accomplishing any nation's macroeconomic goals. (Ezigbo, 2012; Anowor& Okorie, 2016). Government uses those policies to achieve goals such as price and production stability, economic expansion, high employment rates, general economic development, and a guarantee fair distribution of wealth and income(Afanasyeva, 2022; Onyeiwu, 2012; Seguino,2019). To accomplish these goals and protect their economies from unforeseen external shocks, Nigeria government in particular relies on those policies as two main stabilisation tools to encourage steady macroeconomic performance. (Anowor& Okorie, 2016; Ojeyinka& Yinusa, 2021).

Monetary policy employs instruments such as the money supply and interest rate to attain general equilibrium in any economy, and it is mostly tasked with maintaining price stability (Bank–Ola, *et al.*, 2020; Ioannidis *et al.*, 2021; Menna& Tobal, 2020;Moon, 2022). On the other hand, fiscal policy controls production stabilization and debt adjustment using various tools such as government expenditure and taxes to ensure sustainable economic growth, enhance the economy's aggregate demand, and achieve full employment (Abata *et al*., 2012). The coordination of fiscal and monetary strategies in Nigeria is by the government through the Federal Ministry of Finance and the Central Bank of Nigeria, respectively (Adewale, 2020).The relationship between monetary and fiscal policies remains a major point of contention in the literature as studies have revealed that fiscal and

monetary policies can interact as substantial complementarity between both policies, that is expansionary measures in one policy are reinforced by those in the other (Buyukbasaran*et al.*, 2020; Chibi *et al.*, 2019;Çevik*et al.*, 2014, Falade and Folorunso, 2015; Fragetta and Kirsanova, 2010; Ubid, 2022), other studies revealed that fiscal and monetary policies can also interact in a substitutive manner between both policies, that is expansionary measures in one policy are reinforced by contractionary measure in the other policy(Buti et al. 2001;Hayo and Niehof , 2014; Papagni, & Purificato, 2022; Tetik and Ceylan, 2016), although, the coordination between fiscal and monetary policies varies across countries and depends on their economic, political, and social situations (Svitlana, et al., 2022). However, the extent of their reliance, independence, and interdependencies determine whether the economy moves closer to or further away from predefined goals and targets (Adegboye, 2015; Aye, 2021; Chibi *et al.*, 2021; Chibi *et al.*, 2019; Chuku, 2010;Goshit&landi, 2014; Tairi, 2022).

Furthermore, evidence suggests that over the majority of the sample period in the literature, monetary and fiscal policies in Nigeria have exhibited various way of interaction, having on important macroeconomic variables such as aggregate demand, economic growth and inflation both in the short and long term (Onwudiegwu, *et al.*,2023)while Adegboye (2015) emphasize the interplaybetweentheboth systemshow complimentary in theshortterm,substitutivenessinthe medium term, and insignificant in the long term in Nigeria. Uncoordinated macroeconomic settings may have a negative impact on the likelihood that monetarypolicywill be successful, eroding confidencein its effectiveness and havingshort-term effects on aggregate demand, as well as altering the long-term conditions for economic growth and low inflation (Chibi *et al.*, 2021; Samson*et al.*, 2023). However, monetary policies can be accommodating or antagonisticto fiscal policies,dependingon the current policiesin aparticularcountry(Bank-ola *et al.*, 20; Goshit& Landi, 2014; Nwagu,*et al.*, 2022), it is expedient to ensure coordination and coherence between these policies to maximize their effectiveness and avoid negative impacts on the economy.Given Nigeria depends on natural resources, the interdependence of their fiscal and monetary policies are particularly crucial for macroeconomic control. It is necessary to implement sustainable fiscal policies that are easier with less flexible exchange rate measures (Tairi, 2022; Nwagu, 2022). Thus, in a flexible monetary and exchange rate regime, high-income volatility will be important to necessitate robust fiscal stabilization measures that support the selected monetary regime, as well as targeting an optimal inflation rate (Samson, *et al.*, 2023; Ogbole, 2010). Conversely, significant and persistent volatility that plagues countries Nigeria inclusive needs exchange rate flexibilityto lessen the burden of fiscal adjustment and foster the efficacy of fiscal policy (Darma,*et al.*, 2022;Elbadawi*et al.*, 2017;Maureen,*et al.*, 2022).

The purpose of this paper is to address some questions about the interplay interaction between fiscal and monetary policy and how it affects macroeconomic variables in Nigeria. The following is a list of these inquiries: How, for instance, do fiscal tools respond to a shock to interest rates? How, for instance, do fiscal tools respond to a shock to interest rates? How do fiscal shocks affect monetary policy? Do these two shocks complement one other (for example, contractionary fiscal policy and contractionary monetary policy) or act as replacements (for example,contractionary fiscal policy and expansionary monetary policy)?.The rest of the paper is couched as follows: macroeconomicoutcomesofNigeria: an overview**,** a review of empirical literature, followed by methodology, findings and conclusion.

2.0 MacroeconomicOutcomesofNigeria: An Overview

The Nigerian economy is a mixed in nature, with expanding communication, manufacturing, service, finance, entertainment, and technology sectors (Economic growth and trade 2017; Alao-Owunna and Adediwura, 2023;Alao-Owunna, et al., 2023; Olabisi,*et* al., 2020). It is said to be the 27th top economy globallybyGDP in nominal terms, and the 24th with full regards to her ability to

buy. Nigeria has the biggest economy in Africa; judging by her Real GDP that stands in 2021 at $442.98 (in billion U.S. dollars) as indicated in figure 1.. She creates enormous large products and labour for the West African region. In 2020, her debt to GDP ratio was 25.6% as indicated in figure 2, GDP at purchasing power parity has a substantialincrement of $170 billion in 2000 to $1,075.69 billion in 2019, the GDP per capita increased from$1400perindividualin2000to$2,800perindividualin2012.However,itdeclinedto $2097.092in2020,afteranall-timehighof$3098.986in2014asindicatedinfigure2.Population increased from 160 million in 2010 to approximately 210 million in 2020. (World Bank 2020; National Bureau of Statistics (NBS) 2021).

Two-thirdofstaterevenuescomethrough oilincomes, butoiljustcontributesabout7.24%tothe Nigeria GDP in 2021 according to NBS. Nigeria is a major oil producer and produces about 1.5 millionbarrelsofoilperday;however,sheonlydeliversjustabout2.7% asatDecember2021of the world's oil supply (BP Statistical Review of World Energy 2022). Nigeria oil is significant,as her incomes depend on this area (Financial Times 2017). Buiter (2011) indicated that between therangeof2010 and 2050, Nigeriawould havethemost significant nominal GDP improvement on the planet. However, the economy entered a recession in 2020 despite being one of two nations from Africa among11 Global Growth Generators, reversing three years of recovery. The account of falling global demand for oil and a much-needed lockdown that crippled economic activities as a containment measure to fight the spread of the deadly virus has hindered the growth rate.

These measures affected hospitality, restaurants, tourism, aviation, trade and manufacturing, which have led to a shutdown in information, communication and technology sectors. However, the measures put in place by Economic Sustainability Programme (ESP) prevented the decline fromworsening.Theinflationrate(CPI)andtheunemploymentratestoodat16.63%and33.3%, respectively, in 2021 (Bureau of Statistics 2021). The fiscal deficit is financed mainly by public debt, which increased from 4.3% to 5.2% in 2020, with spending pressures and revenueshortfalls due to pandemic-related issues, while the total public debt stood at 25% of GDP at an estimateof$85.9billionon30June2020;thisshowsanincreaseof2.4%inthepreviousyear.Half of the federallygenerated revenues in Nigeria are allocated to huge debt servicing, posing a significant financial risk to the country.

Figure.1TrendofInflation **Figure.2TrendofGDPPerCapita**

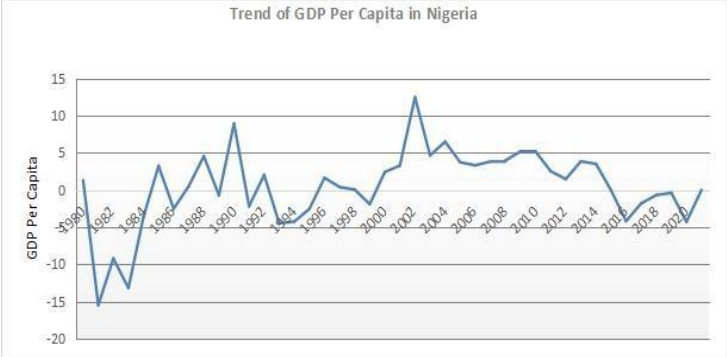


Figure3TrendofDebt

Figure4TrendofRealGDP

3.0 Review of Related Literature

Economists and decision-makers define fiscal policy as the government's use of revenue and spending to control the economy using either an expansionary or contractionary measure, while monetary policy is the system by which the monetary authority of an economy governs interest rates and money supply using either an expansionary or contractionary measure. The research, namely the IS-LM Model, suggests that the two policies interact through the macroeconomic variables of output and interest rate. But the most contentious finding has come from the empirical literature's findings on the relationship between monetary and fiscal policy.

Among the numerous attempts, that examined the topic in question; Dong et al., (2021) examined an extensive literature review on the complementary nature between fiscal policy and monetary policy. Unlike Afonso *et al.*, (2019), who examines the interaction between monetary policy and fiscal policy after the creation of the European Monetary Union (EMU), using the Ordinary Least Square -Fixed Effect and 2Stage Least Square estimator. It was discovered that a substitute connection exists between the two approaches. This particularly occurs when there is a significant level of debt and the presentation of a common medium of exchange, which is shared by 19 out of 28 EU nations primarily affected by the reaction and the association between the two policies. In a similar context, Lorenzo and Claudio (2000) use descriptive analysis to examine how the EMU's

implementation has affected the processes through which monetary and fiscal policy interact. They stress that under EMU, policies are coordinated between the fiscal and monetary authorities as well as within individual nations. While Marcelo and Marcelo (2005) use the Vector Autoregressive Model (MS-VAR) to examine fiscal and monetary policy interaction in Brazil, they show that coordination between Brazilian fiscal and monetary policies was bordering on the substitute type during the study period, with a predominantly monetary regime. In the same vein,

In their 2022 study, Karara, *et al.*, 2022 investigated the relationship between monetary and fiscal policy as well as the efficacy of these measures in establishing stable prices and a sustained GDP in Egypt. From quarter one (1) of 2005/2006 to quarter four (4) of 2021/2022, they employed the Bayesian Vector Autoregressve Model. They emphasise how these two policy initiatives in Egypt are complementary to one another. Nevertheless, monetary shocks like shifts in the central bank's stance, modifications to market expectations, or new economic data were responsible for this connection. Tairi (2022) also investigates the relationship between policy actions and their significance for the functioning of the economy after a catastrophe. Based on historical and theoretical examination, the paper determines that policy. Al-shawarby and El Mossallamy (2019) use the Bayesian estimation technique to analyse the collaboration between the policies and the ideal standards in Egypt from within 2004/2005Q1 and 2015/2016Q4. This research shows the two (2) successive uprisings in 2011 and 2013; they gathered that monetary-fiscal policy instruments add to the strength of the economy through their belongings, in accompanying macroeconomic outcomes output, inflation and debt stock. Likewise, Braude and Flug (2012) study the effect of two business cycles in Israel on policy interaction using the Descriptive analysis due to two recessions Israel experienced throughout thelast decade, with different circumstances. They found out that favourable introductory conditions and sound macroeconomic policy during typical occasions grew strategically, and were accessible to policymakers during need. Bashiri, *et al.*,(2016) explores the extent of coordination among fiscal-monetary authorities in Egypt. The results affirm that coordination between policies has been either missing or frail in Egypt over the period (1974-2015) using Game theory.

In the same vein, Adegboye (2015) examines the nature of fiscal- monetary interaction policy, but in the case of Nigeria and investigate the channel of the interaction using Classical and Bayesian econometrics techniques. The estimation was modeled by the dynamic stochastic general equilibrium between 1970 and 2012 in Nigeria. The study shows that the nature of the interaction was found to be complementary in the short run, substitute in the medium term, and insignificant nature was found in the long run. The nature of the interaction was also found to be shock dependent while terms of trade, taxation, government spending, and interest rate are vital channels that enhance fiscal and monetary interaction in Nigeria. Chibi *et al.* (2019) also examine the effective interaction between the two policies; however, they do it for Algeria using a Vector Auto-regression model using quarterly data from 1963 to 2017. The outcome shows that throughout the majority of the study period, monetary and fiscal policy acted in an opposite manner.

Similarly, Janku and Kappel (2014), by adopting Ordinary Least Square, multivariate regression analysis in their study, using the reaction function to access the nature of the relationship between fiscal and monetary policy in the countries of the VISEGRAD group in conflict or coordination between 2000Q1-2010Q4. They find that monetary policy appears to play a dominant role in the

Czech Republic, Poland and Slovakia, whereas fiscal policy plays a dominant role in Hungary. In a more closely related study, Cevik*et al*.(2014) explore the connection between fiscal and monetary authority for some developing European countries such as the Czech Republic, Estonia, Hungary, Slovenia, Poland and the Slovak Republic between 1995Q1-2010Q4 using the Game theory and correlated equilibrium. The study finds that the interaction between both policies points to a different picture in the sample countries but monetary authority was uninvolved in all countries examined and in the Czech Republic, Estonia, Hungary, and Slovenia fiscal policy appears to have shifted back and forth among dynamic and passive fiscal regimes. While in Poland and Slovak Republic fiscal policies can be described as a solitary fiscal system.

Cebi (2012) examines the fiscal and monetary policy interaction and their role in economic stabilization using the New Keynesian open economy DSGE model for turkey using the Bayesian estimation. The result shows that the monetary authority effectively responds to inflation but feebly reacts to the gap in the output. Gonzalez-Astudillo, (2013) examines the rules guiding monetary and fiscal policy interaction with time-changing and interdependent coefficients using the New Keynesian model and the Bayesian method of estimation. The result shows that there is a level of policy interdependence. This was driven by a positive connection coefficient between the inert components that drive the development of policy rule's coefficients.Fragetta and Kirsanova (2010) used Bayesian Estimation Methods to distinguish leadership regimes policy collaborations in the United Kingdom, United States, and Sweden. Their findings revealed that while the monetary and fiscal authorities in the United States are likely to perform poorly or operate according to a Nash regime, those in the United Kingdom and Sweden behave in an uncooperative manner under a regime of Fiscal Leadership.Similarly, Claey (2006) conducted an empirical analysis of the fiscal instrument rule for the G-3 nations, taking into consideration the interplay between monetary and fiscal policy. GMM was used by the United States, Japan, Germany, and the larger EMS nations, including France, Italy, the United Kingdom, Spain, the Netherlands, and Austria. The study found that public debt is typically resolved through fiscal policy, and there is significant coordination across policy arrangements through the debt channel.

It is clear from a thorough review of the literature that there is a sizable body of work on the topic of the interaction between fiscal and monetary policy. These policies are essential instruments for accomplishing desired macroeconomic results. While earlier research has looked at the relationship between these policies, the majorities of these studies have focused on the nature of their interactions and have not taken into account the shock and time dependency. Investigating the nature of how monetary and fiscal policy tools interact under different shock scenarios is therefore crucial. Macroeconomic shocks including aggregate supply and demand shocks as well as policy shocks like lending rate, government revenue, and spending shocks can be included in this category. By taking into account the effects of various shocks, we can gain a deeper understanding of how monetary and fiscal policies interact and respond in specific situations in Nigeria.

4.0 Data and Methodology

4.1 Data Sources and Description

The study is based on an empirical research method, and the variables' values are sought after to carry out the analysis. The researcher used a secondary source of data for this Study. The data are extracted from the Central Bank of Nigeria statistical bulletin, 2023 and the International Financial Statistics 2022 covering years (41) from 1980Q1 – 2022Q1.The theoretical model employed in this study is estimated using annual data of Nigeria over 1980Q1-2022Q1. All data are purely quarterly secondary time series data. The data on study variables such as real GDP, inflation, interest rate, Real exchange rate and government expenditure, is sourced from the International Financial Statistics and CBN Statistical Bulletin.

Table1:DataDescriptionand Sources

Variable	Abbreviation	Measurement	Sources
Interestrate	LRA	LendingRate:Interestrate,Discount Rate forNigeria	InternationalFinancial Statistics
Inflation	CPI	Consumer Price Index : Consumer Price Index, All items, Percentage change, Correspondingperiodpreviousyear,	InternationalFinancial Statistics
Exchangerate	REER	RealExchangeRate: Real Effective ExchangeRate,basedon ConsumerPrice	InternationalFinancial Statistics
Output	RGDP	Real Gross Domestic Product : Gross DomesticProductandExpenditureat2010 Constant Market Prices (₦'Million)	CBNStatisticalBulletin
Government expenditure	TEX	Gross National Expenditure: Total Expenditure (₦' Million)	CBNStatisticalBulletin/

Source: Author'scomputation(2024).

4.2 Methodology and Model Specification

This study is based on the new Keynesian theory, which serves as a theoretical foundation for analyzing policy interactions and their impacts on macroeconomic outcomes. This theory emerged as a response to the theoretical challenges facing Keynesian economics during the great inflation of 1970, and it incorporates several new assumptions such as heterogeneous labor, rational economic agents, asymmetric information among agents, and market imperfections. The philosophy of the new Keynesian economics involves quantitative analyses of economies with shocks and frictions. Nominal rigidities, often observed as price and wage stickiness, are described by new Keynesian adherents as the sluggish adjustment of prices to their equilibrium positions, deviating from the perfect flexibility assumption made in the real business cycle theory. The study shows that policy design should be based on relevant theories, and given the stylized facts in developing economies, the new Keynesian economic theory appears to be the most suitable for modeling an economic structure (Sims, *et al.,* 2023.). Hence, the study adopts the new Keynesian theory to examine the interactions between fiscal and monetary policies. Based on the theoretical foundation presented, the study treats the variables as endogenous, meaning that their values are derived within the VAR model being considered. The VAR model examines the interaction between all variables used in the study, including their lags (Dow,2023; Pressman , 2022; Sims , *et al.,* 2023;Taras and Tetyan;a, 2023). Therefore, all variables are considered as interdependent and mutually influential within the model. The variable can be represented as below

$$y_t=(y_{1t}, y_{2t}, \dots, y_{st}) \quad (1)$$

Where s = 1 ... ∞

The objectives of the research are to investigate the nature of the relationship between fiscal and monetary policy in Nigeria and analyze the channels through which impulses fiscal and monetary policy interaction are transmitted to inflation, output and exchange rate. The key analytical technique for this study is the Structural Vector Autoregression (SVAR) model, which enables the investigation of the response and inverse linkages between macroeconomic events. In order to study monetary policy and investigate the distributional pathways of real and nominal monetary shocks, Sims proposed SVAR models in 1980. Later, fiscal variables like taxes and public expenditure were included to the SVAR framework by Blanchard and Perotti, (2002); Ihebuluche, et al., 2023; Alymkulova andOhaegbu, 2023. However, Favero (2002) discovered that using separate estimates to assess the effects of fiscal and monetary policy might lead to biassed estimators.SVAR models use additional variables like trends or constants together with their own lags to represent observable variables. They have been used to study a variety of economic connections, including the one between labour hours and technological shocks, the effect of money on GDP, and the importance of supply and demand shocks on the economic cycle. Additionally, Cazacu (2015) examined the macroeconomic effects of fiscal and monetary policy using SVAR models. The impulse response function (IRF), forecast error variance decomposition (FEVD), and Granger causality are some of the helpful tools that the SVAR model offers for analysing the interplay between fiscal and monetary policy. These instruments make broad assumptions about the extent of the effects and pathways of macroeconomic and policy shocks. Additionally, the SVAR model separates each variable's response to structural shocks and emphasizes the transmission of these shocks through time.

Hung and Lin, (2013) pointed out that the structural shock that went unnoticed has a big impact on the economy. They also noted that there is no economic meaning for the vector autoregression (VAR) model in its simplified form. A contemporaneous (short-run) restriction is required to separate the structural shocks from the variance and covariance. Only for the current quarter (t) is the variable's response to a structural shock limited to zero by this restriction; the response for all previous quarters remains uncontrolled. The following structural vector autoregression, which removes the dummy variables for convenience of analysis, serves as an example.

$$Ay_t = \beta + \beta_1 y_{t-1} + \cdots + \beta_\rho y_{t-\rho} + \beta u_t \quad (2)$$

$y_t = n \times 1 \rightarrow$ Vector of macroeconomic variables at time t such as real domestic product, inflation, interest rate, real effective exchange rate, expenditure, revenue.

$\beta = n \times 1 \rightarrow$ Vector of constant

A & $\beta_i = n \times n \rightarrow$ Matrix of parameter for i= 1, ... ∞

$w_t = n \times 1 \rightarrow$ Vector of structured with $\mu_t \sim \mu(0, \beta E\ (\mu_t \mu_t^1)\beta^1)$

The baseline model consists of the following: Real GDP (denoted as GDP), inflation (π), the interest rate (t), real effective exchange rate (reer), general government expenditure (exp) and government revenue (rev).

The reduced form of equation (3) may be gotten by multiplying through by A^{-1}

$$A^{-1}Ay_t = A^{-1}\beta + A^{-1}\beta_1 y_{t-1} + \cdots, + A^{-1}\beta_\rho y_{t-\rho} + A^{-1}\beta u_t \quad (3)$$

$$y_t = A^{-1}\beta + A^{-1}\beta_1 y_{t-1} + \cdots, + A^{-1}\beta_\rho y_{t-\rho} + A^{-1}\beta u_t \quad (4)$$

Or equivalently:

$$y_t = \alpha + A_1 y_{t-1} + \cdots + A_\rho y_{t-\rho} + e_t \quad (5)$$

Where $A_i = A^{-1}\beta_i$

$e_t = A^{-1}\beta_\mu$ & $E(e_t e_t^1) = A^{-1}\beta E(\mu_t\ \mu_t^1)\beta^1 A^{i-1}$

In order to achieve structural identification of parameter: we improve the following contemporaries' value restriction for $Ae_t = \beta\mu_t$

Recall that: $y_t = \alpha + A_1 y_{t-1} + \cdots + A_\rho y_{t-\rho} + e_t$

$$\begin{bmatrix} a_{11} & 0 & 0 & 0 & a_{15} \\ a_{21} & a_{22} & 0 & 0 & a_{25} \\ a_{31} & a_{32} & a_{33} & 0 & a_{35} \\ a_{41} & a_{42} & a_{43} & a_{44} & a_{45} \\ a_{exp,gdp} & a_{exp,\pi} & a_{exp,i} & a_{exp,reer} & a_{55} \end{bmatrix} \begin{bmatrix} e_t^{gdp} \\ e_t^{\pi} \\ e_t^{i} \\ e_t^{reer} \\ e_t^{exp} \end{bmatrix} = \begin{bmatrix} b_{11} & 0 & 0 & 0 & 0 \\ 0 & b_{22} & 0 & 0 & 0 \\ 0 & 0 & b_{33} & 0 & 0 \\ 0 & 0 & 0 & b_{44} & 0 \\ 0 & 0 & 0 & 0 & b_{55} \end{bmatrix} \begin{bmatrix} \mu_t^{gdp} \\ \mu_t^{\pi} \\ \mu_t^{i} \\ \mu_t^{reer} \\ \mu_t^{exp} \end{bmatrix} (6)$$

in Eq (6) $\varepsilon_t^{gdp}, \varepsilon_t^{\pi}, \varepsilon_t^{i}, \varepsilon_t^{reer}, and\ \varepsilon_t^{exp}$ are the structural disturbances; that are Real GDP (denoted as GDP) shocks, inflation (π) shocks, the interest rate (t) shocks, real effective exchange rate (reer) shocks, general government expenditure (exp) shocks and government revenue (rev) shocks., respectively. Correspondingly, $\mu_t^{gdp}, \mu_t^{\pi}, \mu_t^{i}, \mu_t^{reer}\ and\ \mu_t^{exp}$. are the residuals in the reduced form equations, representing unexpected disturbances. Real GDP growth responds contemporaneously to variables shocks on the left side of Eq. (6), but there is no

contemporaneous link between real GDP growth and variables shocks on the right side of the equationThe literature on monetary SVAR, such as Angeloni *et al.*, (2003); Arora, (2018);Hang and Lin (2013); Şen and Kaya, (2015), examines the restriction of both the first row and column of matrices A and B to be zero inclusive. While the diagonal elements of matrix A are typically set to 1, we also follow this convention for a_exp□j and a_rev□j, which represent various government revenue and expenditure in elasticity form (Hang & Lin 2013).

5.0 Empirical Findings

To ensure the appropriate methodology and estimation approach, it is crucial to assess the stationary properties of the variables after examining their descriptive statistics. The Zivot-Andrews tests will be employed for this purpose. The findings of Table 2, the outcomes of the Zivot-Andrew unit root test conducted on Nigeria indicate the existence of a structural break in the variables. The test was carried out to minimize bias in the unit root test by detecting when the structural break occurred. The findings reveal that the real gross domestic product experienced a structural break in 2011Q1, the consumer price index in 1996Q3, the interest rate in 1987Q1, and the total expenditure in 2015Q4. The results of the test reject the null hypothesis that the series with an intercept has a unit root. All variables, except the Real Exchange Rate, were stationary at levels I(0), while the Real Exchange Rate was stationary at I(1) at a structural break location of intercepts.

Table2:ZivotandAndrewsunitroottest

Variables	T-Statistic	5% critical value	Probability Value	Structural break location	Structural break Year/Quarter	Orderof Integration
LNRGDP	-17.378	-4.930	0.000	Intercept	2011Q1	I(0)
CPI	-4.950	-4.930	0.000	Intercept	1996Q4	I(0)
LRA	-4.879	-4.930	0.006	Intercept	1987Q4	I(0)
REER	-7.686	-5.080	0.000	Both	1987Q1	I(1)
LNTEX	-2.563	-4.930	0.000	Intercept	2015Q4	I(0)

Source: Author's computation (2024). The sample period ranges from 1981Q1-2022Q1, LNRGDP- log of real gross domestic product, CPI - consumer price index, LRA is the lending rate, REER - real exchange rate, and LNTEX - log of total expenditure**.**

And the, we identified the order of VAR model using the Akaike Information Criterion (AIC), Schwarz Information Criteria (SC), and Hannan-Quinn Information Criteria (HQ).Akaike Information Criterion was used to determine the maximum number of lags, and the results are presented in Table 3. In Nigeria, two lag selection criteria yielded identical results, with both FPE and AIC indicating 3 as the optimal lag length. However, LR, SC, and HQ produced optimal lag lengths of 5, 0, and 1, respectively.

Table3: LagSelectionCriteriaforNigeria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-1418.700	NA	36.858	17.797	17.893*	17.836
1	-1366.900	99.706	26.372	17.462	18.038	17.696*
2	-1348	35.324	28.464	17.537	18.594	17.966
3	-1316.600	56.421	26.354*	17.458*	18.995	18.082
4	-1306.700	17.187	31.968	17.647	19.665	18.466
5	-1283.600	38.770*	32.944	17.670	20.168	18.684
6	-1269.600	22.472	38.221	17.808	20.787	19.018
7	-1253.300	25.360	43.195	17.916	21.376	19.321
8	-1238.600	21.850	50.092	18.045	21.985	19.645

Source: Author'scomputation(2024).*indicateslagorderselectedbythecriterion

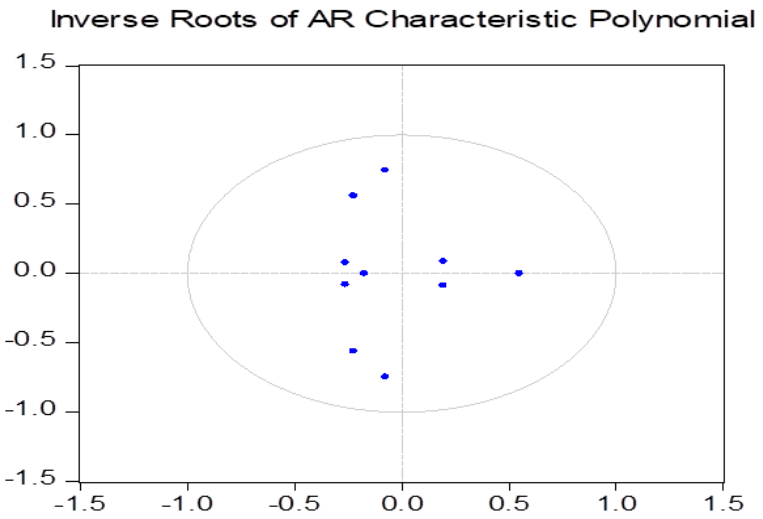


Figure 5: Inverse Roots the Characteristic Polynomial Reduced form VAR model, 1980:Q1-2022Q1

Figure 5 show that, Model's stability is verified when all inverse roots of the characteristic, polynomial of estimated VAR coefficients are inside the unit circle**.** The LM tests for serial correlation in Table 4 indicate that no serial correlation exists between the variables being analyzed in Nigeria and South Africa. The null hypothesis that there is no serial autocorrelation in the model was not rejected, as at least one probability value was found to be greater than the 5% significance level

Table 4: VAR Residual Serial Correlation LM Test for Nigeria

Lag	LRE* stat	Df	Prob.	Rao F-stat	df	Prob.
1	27.560	25	0.329	1.107	-25,543.90	0.329
2	28.881	25	0.269	1.161	-25,543.90	0.269
3	14.025	25	0.961	0.556	-25,543.90	0.961
4	23.026	25	0.576	0.921	-25,543.90	0.576

Source: Author's computation (2024). VAR Residual Serial Correlation LM Test

The normality tests for Nigeria and South Africa in Table 5 indicate that their residuals are multivariately normal. This is because the null hypothesis stating that the residuals are normally distributed was not rejected, with at least one probability value being greater than the 5% significant level.

Table 5: VAR Residual Normality Test for Nigeria

Component	Skewness	Chi-sq	Df	Prob.*

1	8.453	1976.705	1	0.000
2	0.025	0.018	1	0.895
3	-3.177	279.292	1	0.000
4	-4.779	631.797	1	0.000
5	1.046	30.274	1	0.000

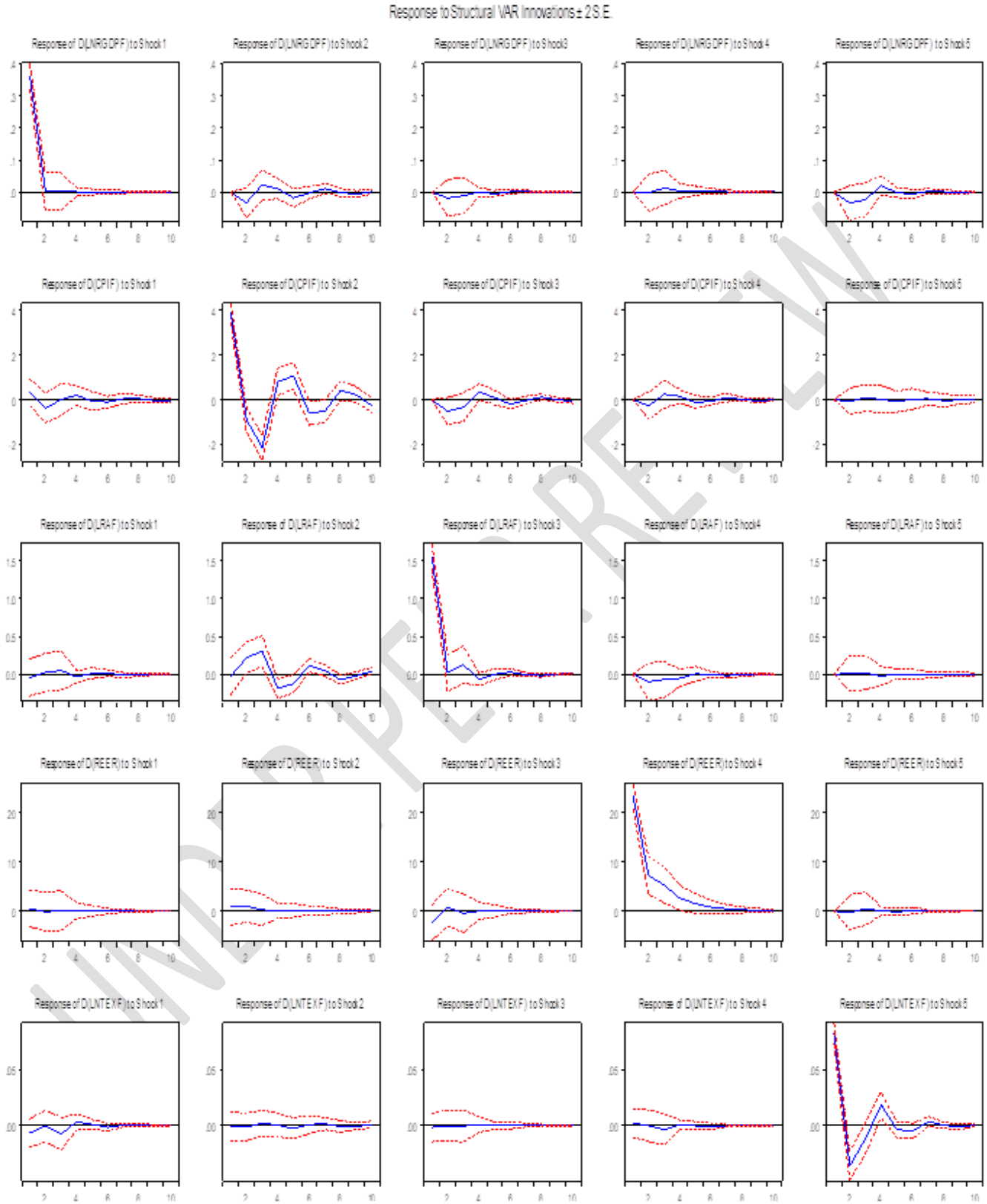
Source: Author's computation (2024). VAR Residual Normality Tests

The impulse-response functions analyses derived from the structural VAR model are presented in the paper's subsequent subsections. It is feasible to compute impulse-response functions, which display the impact of certain factors on growth, using the estimated SVAR model.

5.1 Impulses-Response Analysis

Interpreting SVAR model estimation results involves analyzing the graphical representation of the response function. This analysis was used to achieve research objectives of the study i.e. toexamine the nature of the interaction between fiscal and monetary policy in Nigeria and South Africa and investigate the channels through which impulses through which fiscal and monetary policy interaction are transmitted to macroeconomic variables. This shows how variables respond to shocks and how the reaction is influenced by other variables to a standard deviation. The vertical axis displays the response functions derived from the SVAR model estimation. It is important to consider the dashed lines representing the 95% confidence interval for the variable responses to determine the statistical significance of the results. (Kararaet*et.al,* (2022);Koop *et al.,* 1996; Lütkepohl, 2008; Pesaran& Shin, 1998 Tetik & Ceylan, 2016).

Figure. 6: SVAR Impulse Response



Source: Author's computation (2024)

5.2 Impulses-Response Analysis for Nigeria

When examining the impulse response functions in Figure 4.2a, it becomes clear that shocks have significant consequences on the system over time. These functions, based on the model, illustrate how shocks impact the system and their duration. Regardless of whether the shocks are statistically significant or not, their impacts on other variables last for three months or quarters. The first column focuses on a shock to aggregate demand (AD). A positive shock to output (lnrgdp) is observed, indicating an increase in economic activities. However, this also leads to a rise in the cost of goods (cpi), resulting in post-inflation. The response to the positive monetary shock policy rate in output is negative, indicating the application of expansionary policy to stimulate the economy. The initial response to the positive shock of total output expenditure (lntex) is negative, suggesting the application of a contractionary policy. In the same vein the second column examines the shock level of aggregate supply (AS). Inflation rises when the economy experiences a supply shock, and the central bank reduces interest rates in response. The inflation rate (cpi) falls to its lowest in the third month due to the expansionary monetary policy, in which the central bank lowers the interest rate. Supply-side shocks also caused total spending to respond adversely, and a contractionary budgetary policy was pursued.Therefore, It is believed that the outcome overlapped the conclusion that the nature of the interaction between both policies are substitute in nature this result can be seen in Buti *et al.*,(2001); Hayo and Niehof , (2014); Papagni, & Purificato, (2022); Tetik and Ceylan, (2016),which is thought to have shown with the result that a shock seen in the economy leads to a policy conflict.

In the third column, a shock in monetary policy is observed. Although a positive shock to monetary policy causes a negative response, it was perceived that there was a decrease in aggregate demand through the consumption and investments channel. A rise in interest rates did not significantly affect inflation but had a detrimental impact on overall spending, resulting in a contractionary monetary policy that was followed by a contractionary fiscal policy. Therefore, It is believed that the outcome overlapped the conclusion that the nature of the interaction between both policies are complementary in nature this result can be seenKarara*et al.*,(2022);Buyukbasaran*et al., (*2020); Chibi *et al.*,(2019);Çevik *et al.*,(2014), Falade and Folorunso, (2015); Fragetta and Kirsanova, (2010); Ubid, (2022).The fourth column shows a high positive shock in macroeconomic and exchange rate indicators. In response, the fiscal policy raises overall spending, indicating the pursuit of an expansionary strategy. The repercussions of the fiscal policy shock are visible in the last column, but no timely substantial response was discovered.

Table 6 Summary of Monetary- Fiscal Policy Interaction in Nigeria

Type of Shock	**Kind of Policy**	**Policy Instrument**	**Nature of interaction**
Aggregate Demand shock	Fiscal	Contractionary	Substitute
	Monetary	Expansionary	
Aggregate Supply shock	Fiscal	Contractionary	Substitute
	Monetary	Expansionary	
Other Macroeconomic Shocks (Policy Change)	Fiscal	Contractionary	Complementary
	Monetary	Contractionary	

6.0 Conclusion

Using an unrestricted Structural Vector Autoregressive (SVAR) model, the study investigates the relationship between fiscal and monetary policy in Nigeria between 1980Q1 and 2022Q1. The study's goal is to advance our understanding of the nature of the relationship between monetary and fiscal policy as well as the channel used for impulse transmission. The models illustrated how supply and demand structural shocks impacted Nigerian output, inflation, and exchange rates. The study's findings indicate that shock type impacts how the two policies interact. Both approaches fared well in reaction to shocks to output, the exchange rate, and inflation. They, however, function best in tandem when additional macroeconomic shocks arise due to policy Change (i.e., one authority is expanding while the other follows in the same direction). Conversely, during aggregate demand and supply shock, the interaction takes on a substitute nature (i.e., when one authority adopts an expansionary measure, the other implements the opposite measure). The study's findings have several policy implications, which are outlined below:

I. The study found that when it comes to aggregate demand and supply, cross-national policy interactions are complimentary, but when policy shocks strike, they are replaced. Because both policy blocks are useful in reacting to shocks but not equally effective in all cases, it is necessary to deploy a variety of policy instruments;
II. The monetary authority and the government play a strategic game where their objectives don't always coincide when it comes to the interplay between fiscal and monetary policy. Both authorities must make sure that none dominates the other in order to get the best medium-run results. This will increase sustainability and lend credibility;
III. The necessity of making investments in a thorough and reliable framework that would determine the efficacy of policies from both authorises over time. This could include channels interactions, time lag likewise the overall effect of policy measures on important macroeconomic variables.

Reference

Abata, M. A., Kehinde, J. S., & Bolarinwa, S. A. (2012). Fiscal and monetary policy and economic growth in Nigeria: A theoretical exploration. *International Journal of Academic Research in Economics and Management Sciences*, *1*(5), 75-88.

Adegboye, A.A. (2015): Effects of fiscal and monetary policy interactions on macroeconomic outcomes in Nigeria: An Unpublished PhD Thesis, Department of Economics, Obafemi Awolowo University, Ile-Ife, Nigeria.

Adewale, A. (2022). An Empirical Analysis of Macroeconomic Factors Influencing the Effectiveness of Monetary Policies in Developing Countries: The Case of Nigeria.

Afanasyeva, O. N. (2022). Monetary Policy Instruments and the Achievement of Three Macroeconomic Objectives in the United States and Japan. Finance and Management, (2), 1-14.

Afonso, A., Alves J., &Balhote R (2019): Interactions between monetary and fiscal policies, *Journal of Applied Economics*, *22*(1), 132-151, *DOI:* 10.1080/15140326.2019.1583309

Alao-Owunna, I., & Adediwura, O. M. (2023). Information Communication Technology and Its Impact on the Economic Growth of Nigeria. *Asian Journal of Economics, Business and Accounting*, *23*(8), 52-63.

Alao-Owunna, I., Adediwura, O. M., & Ayoade, O. S. (2023). Exploring the Nexus among Tourism, Information Communication Technology and Economic Growth: A Case Study of Nigeria. *Journal of Economics, Management and Trade*, *29*(11), 124-139

Al-shawarby, S., & El Mossallamy, M. (2019). Monetary-fiscal policies interactions and optimal rules in Egypt. *Review of Economics and Political Science*, *4*(2), 138-157.

Alymkulova, N., &Ohaegbu, N. E. (2023). Monetary policy shocks and output growth in Nigeria: which shocks are more important?.

Anowor, O. F., & Okorie, G. C. (2016). A reassessment of the impact of monetary policy on economic growth: Study of Nigeria. *International Journal of Developing and Emerging Economies*, *4*(1), 82-90.

Arora, S. (2018). Monetary versus fiscal policy in India: an SVAR analysis. *Macroeconomics and Finance in Emerging Market Economies*, *11*(3), 250-274.

Aye, G. C. (2021). Effects of fiscal and monetary policy uncertainty on economic activity in South Africa. Journal of Economic Studies, 48(6), 1356-1375. https://doi.org/10.1108/JES-05-2020-0205

Ayoade, O. S., Orisadare, M. A., Adediwura, M. O., &Ofino, E. E. (2023). Institutional Quality, Human Capital Development and Poverty Level in Nigeria (1981-2021). *International Journal of Research and Innovation in Social Science*, *7*(9), 2071-2085.

Bank-Ola, R. F., Akintaro, A. A., & Adediwura, M. O.(2020). Foreign direct investment and manufacturing output in Nigeria: An ARDL Approach.*International Journal of Management, Social Sciences, Peace and Conflict Studies*, *3*(4), 227-240

Bank–Ola, R. F., Jemiluyi, O. O., & Johnson, A. A. (2020). Monetary policy instrument and price stability in Nigeria: An ARDL bound testing approach. *Christian O. Ele.*

International Journal of Management, Social Sciences, Peace and Conflict Studies, *3*(3), 473-485.

Bashiri, S., Pahlavani, M., &Boostani, R. (2016). Optimal monetary policy and stock market fluctuations. *Applied Economics and Finance*, *3*(2), 157-178.

Bashiri, S., Pahlavani, M., &Boostani, R. (2016). Optimal monetary policy and stock market fluctuations. *Applied Economics and Finance*, *3*(2), 157-178.

Braude, K., & Flug, K. (2012). The interaction between monetary and fiscal policy: Insights from two business cycles in Israel. BIS Working Paper No. 67. Retrieved from https://ssrn.com/abstract=2205689

Buyukbasaran T., Cebi C., & Yilmaz E, (2020). Interaction of monetary and fiscal policies in Turkey, Central Bank Review. Research, and Monetary Policy Department, Central Bank of the Republic of Turkey, 20(4), 193-203

Çebi, C. (2012). The interaction between monetary and fiscal policies in turkey: an estimated new Keynesian DSGE model, Economic Modeling, *Elsevier*, *29*(4), 1258-126

Çevik E, Dibooglu S & Kutan A, (2014). Monetary and fiscal policy interactions: Evidence from emerging European economie.s, Journal of Comparative Economics, 42(4), 1079- 1091, https://doi.org/10.1016/j.jce.2014.05.001

Chibi, A., Chekouri, S. M., &Benbouziane, M. (2019). The dynamics of fiscal policy in Algeria: sustainability and structural change. Journal of Economic Structures, 8(1), 1-27.

Chibi, A., Chekouri, S. M., &Benbouziane, M. (2021). Interaction between monetary and fiscal policy in Algeria: An application of a model with Markovian regime switching. Les cahiers du cread, 37(1), 173-210.

Chuku, C. A. (2010). Monetary and fiscal policy interactions in Nigeria: An application of a state-space model with Markov-switching. CBN Journal of Applied statistics, 1(1), 39 51.

Claeys, P. (2006). Policy mix and debt sustainability: evidence from fiscal policy rules. *Empirica*, *33*, 89-112.

Darma, N. A., Magaji, S., &Amase, J. (2022). Macroeconomic impact of oil price Shocks on government expenditure and economic growth in Nigeria. *SDMIMD Journal of Management, 13*

Dong, W., Dunbar, G. R., Friedrich, C., Matveev, D., Priftis, R., & Shao, L. (2021). Complementarities between fiscal policy and monetary policy—Literature Review. *Discussion Papers 2021-4, Bank of Canada*.

Dow, S. (2023). Keynes on theorising for policy. In *Economic Policy and the History of Economic Thought* (pp. 173-188). Routledge.

Ezigbo, C. (2012). Justification and Implication of Macroeconomic Management for Sustainable Development. *Journal of Economics and Sustainable Development*

Falade, O. E., & Folorunso, B. A. (2015). Fiscal and monetary policy instruments and economic growth sustainability in Nigeria. American Journal of Economics, 5(6), 587-594..

Fragetta M., & Kirsanova T. (2010). Strategic monetary and fiscal policy interactions: An empirical investigation, *European Economic Review*, *54* (7), 855-879.

Gonzalez-Astudillo, M. (2013). Monetary-fiscal policy interactions: Interdependent policy rule coefficients.

Goshit, G. G., & Landi, J. H. (2014). Monetary and fiscal policy interactions and limitations: the need for policy coordination for macroeconomic outcomes in Nigeria. LWATI: A Journal of Contemporary Research, 11(3), 56-72.

Hayo, B., &Niehof, B. (2014). Monetary and fiscal policy in times of crises: a new Keynesian perspective in continuous time.

Hung, K,.& Lin, K (2013). Long-term business cycle forecasting through a potential intuitionistic fuzzy least-squares support vector regression approach. Information Sciences, *224*(4), *37–48*. doi:10.1016/j.ins.2012.10.033

Ihebuluche, F. C., Afolabi, J., Owuru, J., Oyolola, F., yyah Oladepo, S., & Adekunle, W. (2023). Modelling Policy and Macroeconomic Shocks Transmission over the Oil-Bust Cycle in Nigeria: Evidence from the last four decades.

Ioannidis, M., Hlásková, S. J., &Zilioli, C. (2021). The mandate of the ECB: Legal considerations in the ECB's monetary policy strategy review. *ECB Occasional Paper*, (2021276).

Karara, M., Fayed, M., El Mossallamy, M., & Aly, H. Interaction between Monetary and Fiscal Policies: Evidence from Egypt.

Lorenzo, F. D., & Claudio, M. (2000). The implementation of the EMU and its impact on the interaction between monetary and fiscal policy: An overview of recent developments. Banca d'Italia, Temi di discussione, (385).

Marcelo, D. P., & Marcelo, P. F. (2005). Coordination of macroeconomic policies in developing countries: The case of Brazil. Journal of Policy Modeling, 27(9), 1001-1015.

Maureen, O. C., Ulua, K. C., Nwagu, U. G., & Priscilla, I. C. (2022). Efficacy of monetary policy measures on price and exchange rate stabilty in Nigeria. *Asian Journal of Economics, Business and Accounting*, 162-174.

Menna, L., & Tobal, M. (2018). Financial and price stability in emerging markets: the role of the interest rate.

Moon,W.(2022).The goals of economic and monetary policy. 3-28.10.1017/9781009091527.002.

Nwagu, G. U., Orji, A., Jude, I. O., Ogbuabor, J. E., Anthony-Orji, O. I., &Nwufo, L. C. (2022). Fiscal Policy, Monetary Policy, and Trade Balance Nexus in Nigeria: A New Empirical Evidence. *Unisia*.

Ogbole, F. O. (2010). Fiscal policy and macroeconomic performance in Nigeria. *Journal of Economics and International Finance*, *3*(6), 407-417.

Ojeyinka, T. A., & Yinusa, D. O. (2021). External shocks and output composition: evidence from Nigeria. *Journal of Economic and Administrative Sciences*, *37*(4), 554-576.

Olabisi, A. S., Orisadare, M. A., & Olamide, A. M. The Nexus between Poverty, Inequality and Economic Growth in Nigeria,(1980-2018).

Onwudiegwu, M. N., Okoye, N. J., Ezeaku, H. C., & Okeke, N. L. (2023). Effect of monetary policy on selected macroeconomic variables in Nigeria. *International Journal of Advanced Economics*, *5*(3), 74-89.

Papagni, E., & Purificato, F. (2022). 16 Monetary policy and national fiscal policies in the euro area. *Classical Economics, Keynes and Money*, 250.

Pressman, S. (2022). The New Keynesian School. In *A Brief History of Economic Thought* (pp. 228-245). Edward Elgar Publishing.

Samson, B., Peter, F., & Cynthia, D. (2023). Fiscal Policy and Inflation in Nigeria. *Journal of Sustainable Business and Economics*, *6*(2), 1-11.

Seguino, S. (2019). Tools of macroeconomic policy: fiscal, monetary and macroprudential approaches. *Gender Equality and Inclusive Growth: Economic Policies to Achieve Sustainable Development*.

Şen, H., & Kaya, A. (2015). The relative effectiveness of Monetary and Fiscal Policies ongrowth: what does long-run SVAR model tell us?.

Sims, E., Wu, J. C., & Zhang, J. (2023). The four-equation new Keynesian model. *Review of Economics and Statistics*, *105*(4), 931-947.

Sukharev, O. S., & Afanasyeva, O. N. (2023). Distribution of the influence of monetary and fiscal policy instruments by technological modes and sectors of the economy. Finance: Theory and Practice, 27(3), 6-16.

Svitlana O., Kondratyuk. Y., Alla, B., & Olena, F (2022). Budgetary and monetary policy: theoretical principles and practice of complementarity. doi: 10.36962/msspa02022022-89

Tairi, I. (2022). Optimal coordination between fiscal and monetary policy. *Economic vision International Scientific Journal in Economics, Finance, Business, Marketing, Management and Tourism*, *9*(17-18), 81-89.

Tairi, I. (2022). Optimal coordination between fiscal and monetary policy. Economic vision *International Scientific Journal in Economics, Finance, Business, Marketing, Management and Tourism*, 9(17-18), 81-89.

Taras, I&Tetyana, P. (2023). Formation and main ideas of the new keynesian economics. Market Infrastructure. 10.32782/infrastruct71-1.

Ubid, B.K. (2022). Analysis of the Relationship between Fiscal Policy Shocks and Monetary Stability in Iraq's Economy for the Period 1990-2018. International academic journal of economics, doi: 10.9756/iaje/v9i1/iaje0902