THE SECTORAL NEXUS IN A SMALL OPEN ECONOMY: EVIDENCE FROM NIGERIA

Abstract

The interrelationship between the real, monetary, fiscal, and external sectors of the Nigerian economy is an issue of concern, as it will provide policymakers with insight on which of the sectors is potent in influencing output in the real sector, which little or no attention was given. This study, therefore, examines the interrelationships between these sectors in Nigeria between 2010Q1 and 2021Q1.Structural Equation Model (SEM) was employed. The study finds that monetaryand fiscal sectors havea positive influence on the real sector output, while the external sector has a negative influenceon the real sector output in Nigeria. It was found that only the monetary sector influenced real sector output significantly.This study recommends effective collaboration between the monetaryand fiscal authorities in stimulating aggregate demand, boosting economic activities, and spurring economic growth in Nigeriausing money supply, and external and domestic debt.

Keywords: output, fiscal sector, monetary sector, external sector, SEM

1. Introduction

The focus of Macroeconomics is the analysis of variables such as output, exchange rate, rate of inflation, the balance of payments, and unemployment rate, which affect the entire economy (Ames, Brown, Devarajan & Izquierdo, 2001;and Sargent & Sims, 2011). Inadequate knowledge of detailed quantitative relations among variables in the fiscal, real, monetary, and external sectors by policymakers has often been seen as the main reason for distortions in vital macroeconomic aggregates (Udah, 2009;and Gotz-kozeerkiewicz, 1991).

Despite the availability and use of various fiscal, monetary, structural, and exchange rate policies, Bodunrin (2016) noted that most developing economies have not been able to achieve price stability and sustainable economic growth in recent times. The Nigerian economy is not exceptional due to its volatility from global shocks (Bodunrin, 2016). This raises pertinent questions such as are fiscal, monetary, and foreign policies are still relevant in the context of the Nigerian economy? What policy mix will be necessary for achieving macroeconomic objectives in Nigeria?

In economics, productive activities start from the real sector and end with the real sector, hence the need to understudy the inter-connectivity between the monetary, fiscal, external, and real sectors to ascertain which of the sector contribute significantly to the growth of the

real sector. Several studies were conducted in the area of finding the relationship between either fiscal policy and reel sector, monetary policy and the real sector, external sector, and real sector, or a mixture of fiscal and monetary policy on the real sector of the Nigerian economy. To the best of our knowledge, little or no attention was given to the area of studying the inter-relationship between the real, fiscal, monetary, and external sectors of the Nigerian economy, which stands as a motivation for the current study. In addition, our study employs Structural Equation Model (SEM) in its analysis, which distinguishes it from previous studies reviewed. SEM was chosen because of its ability to model causal relationships, as well as the effectiveness of the various sectors of the Nigerian economy in stimulating activities in the real sector.

From the foregoing, the objective of the study is to examine the response of the real sector of the Nigerian economy to changes in monetary, fiscal, and external sectors of the economy. This is directed at articulating a policy mix that promotes economic growth and achieves the price stability of the Nigerian economy. The study is significant to policymakers because it provides useful insights into the interactions of policy variables and how it affects the Nigerian economy as a whole. This will further help the Central Bank of Nigeria in formulating and implementing useful policies due to the inter-connections within the economy.

The paper is structured into five sections. Following the introduction, section II contains the review of literature related to the study area, section III presents the methodology, section IV is the results and discussion, and section V is the conclusion and recommendations.

2. Literature review

The inter-relationship between real, fiscal, monetary, and external sectors of the Nigerian economy cannot be overemphasized. Monetary policy and fiscal policy link these sectors through the interest rate and exchange rate channels. The interest rate determines the level of investment in an economy, while the exchange rate influences global trade dynamics. Several growth theories attempt to explain the interaction among various sectors of the economy and how economic growth can be achieved. For example, the Neo-Classical theory of growth harmonizes these sectors through labour, capital, and technology, as they are key determinants of economic growth. The interest rate is a key variable in the monetary sector and a reward for capital, deliberate action by monetary authorities has an impact on the exchange rate, as the dynamics of investment and income change. The reward for labour being wages also changes the pattern of domestic and external consumption through the

income channel. Another theory that gives a broader perspective on this is the International Business Circle Theory, which postulates that shocks to domestic economic activities are both endogenous and exogenous. This implies that changes in the economic dynamics of foreign countries also have an impact on the domestic business circle, thus, the external sector is being incorporated. These external shocks can be in the form of changes in the interest rate of foreign countries, which affects domestic investments through capital flights, and can propel changes in domestic interest rates through monetary policy.

In the same vein, Minsky's Financial Instability Hypothesis was utilized to explain the Global Financial Crisis and also explains the transmission of external shocks through the financial sector channel. Its theoretical underpinning is based on the classification of the globe as a capitalist economy with huge capital assets, and a complex and fragile financial system (Minsky, 1992). The implication of this is that changes in foreign interest rate also affects the domestic economy, hence, the domestic interest rate can also be altered. This further affects the real sector as investment changes due to interest rate manipulation. To regulate the economy, in this context, the fiscal authorities also play a role through government expenditure as explained in the Keynesian Theory, which advocates that economic activity can be stimulated through the demand side by deliberate changes in aggregate demand. The conscious manipulation of taxes and government expenditure causes changes in aggregate demand. However, the trade-off to this can be a high inflationary trend and the crowding out of private investors in the financial market, which the monetary sector has to regulate by altering monetary policy instruments. The Keynesian model with the external sector can be presented using the equation below:

$$Y = C + I + G + (X - M) \text{ ---------- } (2.1)$$

Where:Y = Output,C = Consumption, I = Investment, and G = Government expenditure

The equation above represents the different sectors of the economy. Output (Y), which is used in this study to represent the real sector; Government expenditure (G) represents the fiscal sector, in which major determinants are taxes. Investment (I) is used as a proxy for the monetary sector, as a major determinant of investment is the interest rate, which is a key variable in the sector. However, (X – M) is used as a proxy for the external sector of the economy. The current study was underpinned by the Keynesian theory, as it brings all the sectors of the economy under one equation with the real sector depending on the fiscal, monetary, and external sectors.

2.1 Empirical Review

Studies abound on the relationship between macroeconomic variables and economic growth, cutting across major sectors of the economy. Propelled by the inter-relationship between most sectors of the economy, the link between these sectors has been investigated with the aim of proffering insight for policy decisions. Most literature on this subject considered the individual relationship between the sectors and economic growth, with few on the real sector of an economy. Consequently, to buttress the nature of the relationship between each sector with economic growth (real sector), the literature in this study is presented in three strands. The first strand of literature captures the monetary sector, the second strand covers the fiscal sector, and the third strand dwells on the external sector, to provide a link between these sectors and how it translates to economic growth.

The empirical literature on the relationship between monetary and the real sectors mostly dwells on the financial sector and monetary policy instruments, as they represent integral components of the monetary sector (see Portachi& Panis, 2013; Kyari, 2015; Anowor & Chisom, 2016; Khalil &Chaisrissawatsuk, 2018; Peace, Vincent & Okowa 2018; Etale & Owelibi, 2019;Chittedi & Raghutla, 2020; Folusu. 2020; and Mpuure& Abille, 2020).

The second strand of literature covers the relationship between the fiscal sector and economic growth. These studies mostly dwell on the nexus between fiscal policy and economic growth, as fiscal policy instruments are the key variables in the fiscal sector(see Chipaumire et al, 2014; Victor, 2017; Nwite et al, 2019; Stoilova & Patonov, 2020; and Kim et al, 2021).

Several studies have also examined the relationship between the external sector and the real sector within and outside Nigeria and founda strong relationship between the two sectors (see Berasaluce & Romero, 2017; Shah & Fazal, 2016; Victor, et al, 2018; and Onyekachi et al, 2019).

Although literature abounds on sectoral relationships and economic growth, most studies were carried out with little or no emphasis on the interrelationship between real, fiscal, monetary, and external sectors, particularly in Nigeria. This study seeks to add to existing knowledge or literature by studying the inter-relationship between these sectors concomitantly, by employing SEM. This will go a long way to providing insight to policymakers in identifying the sector that propels economic growth for policy purposes.

3. Methodology

The study employs Structural Equation Models (SEM) to examine the inter-relationship between the real, fiscal, monetary, and external sectors of the Nigerian economy. The advantage of the SEM over the other traditional models such as descriptive statistics, multiple regression analysis,VAR, ARDL, ECM,and Factor Analysis,is that SEM combines factor and multiple regression analysis, as well is used to test the proposed causal relationships between variables of a model. In addition, it allows a set of relationships between one or more independent variables (IVs), either continuous or discrete, and one or more dependent variables (DVs). It also uses confirmatory factor analysis to reduce measurement error by having multiple indicators per latent variable, test model overall rather than coefficients individually, and test model with multiple dependents (see Tabachnick & Fidell, 2014).

The choice of the model and the variables included in the analysis are theoretically guided. The SEM was constructed using 6fiscal sector'sobserved variables, 7 variables each from the real, monetary, and external sectors of the Nigerian economy. The method involves two steps, first step involves the construction of the measurement model and examining the factor loading to determine which variable to be included in the model, the next step is the construction of the SEM model to estimate the inter-relationship between the sectors of the Nigerian economy. This is because According to Hair et al (2012) in the latent structural equation models the measurement model must be specified and tested first, after which one can proceed to test the structural equation.

3.1 Model specification I

The SEM regression model is explicitly specified as:

The Measurement and Structural equation model

$$y = \Lambda_y \eta + \epsilon \quad (3.1)$$

$$x = \Lambda_x \xi + \delta \quad (3.2)$$

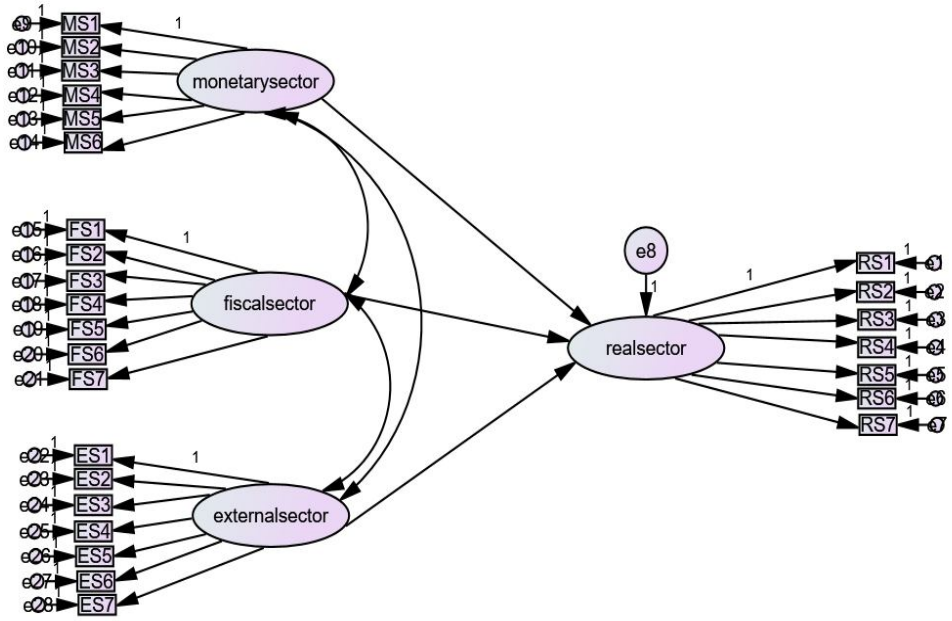
Structural equations among latent variables: dependent variables

$\eta = (\eta_1 \dots \dots \dots \dots \eta_k)$' and independent variable$\xi = (\xi_1 \dots \dots \dots . \xi_m)$ is thus

$$\eta = B\eta + \Gamma\xi + \varsigma \quad (3.3)$$

Where x and y are observed variables, through which ξ and η (respectively) are measured (or evaluated). The covariance matrix of η in the measurement model (3.1) is the same as the covariance matrix of ς *in structural equation model* (3.3).

Figure 1: SEM Graph for the interrelationship between sectors of the Nigerian economy



Source: SPSS Amos Version 21 output

3.2 Discussion of the SEM Graph

The graph showed that the real, monetary, fiscal, and external sectors are the latent unobserved variables measured by their respective subsectors' output and instruments. The real sector (RS) was measured by seven subsectors chosen according to their contribution. These subsectors were crop production (RS1), livestock (RS2), mining and quarrying (RS3), manufacturing (RS4), trade (RS5), information and communication (RS6), and transportation (RS7). The monetary sector was measured by inter-bank rate (MS1), monetary policy rate (MS2), treasury bill rate (MS3), prime lending rate (MS4), maximum lending rate (MS5), and cash reserve ratio (MS6).

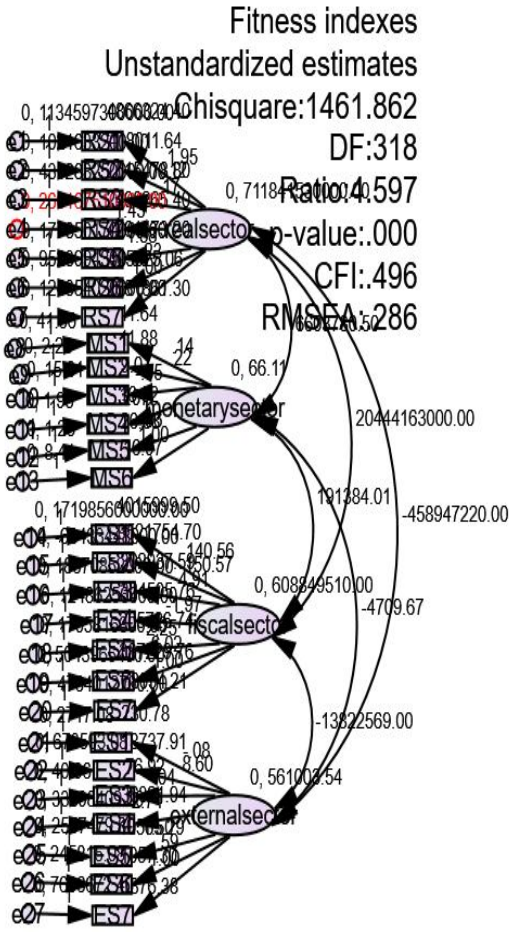
The fiscal sector was measured by external debt (FS1), domestic debt (FS2), debt service (FS3), net oil revenue (FS4), net non-oil revenue (FS5), recurrent expenditure (FS6), and capital expenditure (FS7). Finally, the external sector was measured by the exchange rate (ES1), export (ES2), oilprice (ES3), reserves (ES4), import (ES5), foreign direct investment (ES6), and portfolio investment (ES7). These subsectors are chosen best on their contribution

to the various sectors and the GDP. In addition, the Confirmatory Factor Analysis (CFA) was employed to determine and retain the subsectors that are significant and eliminate those that are not contributing significantly to the sectors.

4. Results and discussion

The result of the SEM showing the interconnectivity and interrelationships between the real sector, monetary sector, fiscal sector, and external sector in Nigeria was discussed here.

Figure 2 : Measurement path



Source: SPSS Amos Version 21 output

4.1 Assessing the Measurement Path

The Measurement path is considered part of data preparation because it is used to measure the construct validity by assessing the factor loading, and access normality of the measurement instruments. The Chi-Square (χ^2) = 1461.862, df = 318, p = .000, relative χ^2 (χ^2/df) = 4.597 indicates that the measurement model fits the data.

Table 1 : Factor Loadings (Confirmatory Factor Analysis CFA)

CONSTRUCTS	ITEMS	Factor Loadings >=0.50	Remark
Real sector variables (RS)			
Crop production	RS 1	0.52	**Valid**
Livestock Production	RS 2	0.79	**Valid**
Mining & Quarrying	RS 3	0.41	**Deleted**
Manufacturing	RS 4	0.56	**Valid**
Trade and Commerce	RS 5	0.77	**Valid**
Transportation	RS 6	0.83	**Valid**
Information & Comm.	RS 7	0.57	**Valid**
Monetary sector variables (MS)			
Interbank rate	MS 1	0.18	**Not Valid**
Monetary policy rate	MS 2	0.78	**Valid**
Treasury bill rate	MS 3	0.07	**Deleted**
Prime lending rate	MS 4	0.34	**Valid**
Maximum lending rate	MS 5	0.93	**Valid**
Cash reserve ratio	MS 6	0.95	**Valid**
Fiscal sector variables (FS)			
External debt	FS 1	0.92	**Valid**
Domestic debt	FS 2	0.33	**Deleted**
Debt service ratio	FS 3	0.61	**Valid**
Net oil revenue	FS 4	0.37	**Deleted**
Net non-oil revenue	FS 5	0.32	**Deleted**
Recurrent expenditure	FS 6	0.87	**Valid**
Capital expenditure	FS 7	0.36	**Not valid**
External sector variables (ES)			
Exchange rate	ES1	0.02	**Deleted**
Export	ES 2	0.64	**Valid**
Oilprice	ES 3	0.07	**Deleted**
Foreign reserves	ES 4	0.10	**Not valid**
Import	ES 5	0.20	**Deleted**
FDI	ES 6	0.83	**Valid**
Portfolio investment	ES 7	0.62	**Valid**

Source: Author's computation using SPSS Version 21

4.2 Discussion of Factor Loading results

In this study, the factor loading was applied to select the variables to be included in the Structural Equation Model and those variables not to be included in the model. The factor loading less than 0.50 is not significant and the measurement variable will be deleted and vice versa. Given the factor loadings for RS1, RS2, RS4, RS5,RS6,and RS7 of 0.52, 0.79, 0.56, 0.77, 0.83, and 0.57 signifies that the variables are relevant in the model, while the factor loadings of RS3 of0.41 show that RS3 is less relevant and was deleted from the model. The real sector has six relevant variables remaining, which are crop production, livestock production, manufacturing, trade and commerce, and information and communication. In the monetary sector, the factor loadings for all the variables are relevant except for MS3, which

is Treasury bill rates. This implies that the interbank rate, monetary policy rate, prime and maximum lending rate, as well as the cash reserve ratio are more relevant in the monetary sector, and were used in the SEM.

Also, in the fiscal sector, only FS1, FS3, FS6, and FS7 were found to be relevant, which implies that they are the more relevant variables in the sector, while the rest are less relevant. The study, therefore found that external debt,debt service ratio, recurrent, and capital expenditures are the more potent instruments of fiscal policy in Nigeria when compared with domestic debt, net oil, and net non-oil revenue. Finally, factor loading for the external sector shows that all the variables are relevant, except for ES3, but only ES2, ES4, ES6, and ES7 were used to achieve the desired fitness level. This implies that export, external reserves, foreign direct investment, and portfolio investment are the more potent instruments of external/foreign policy in Nigeria.

Table 2: Normality Test

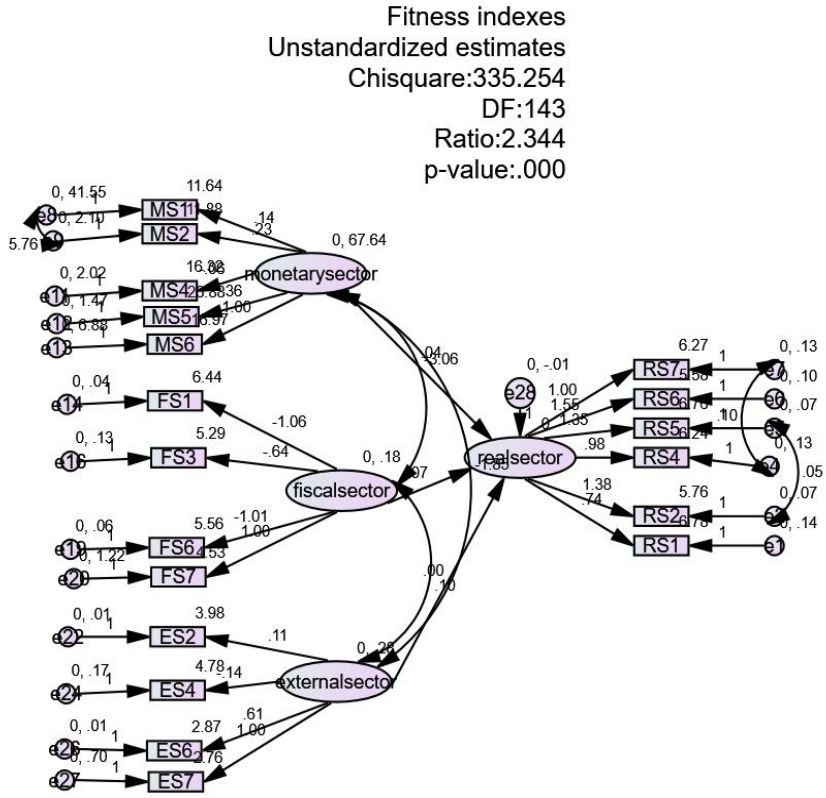
Variable	Min	max	skew	c.r.	kurtosis	c.r.
ES3	27.490	121.230	.188	.515	-1.344	-1.841
ES2	8271.410	30085.420	.184	.504	-1.280	-1.753
ES6	58.720	3084.900	.858	2.351	.449	.615
ES5	7055.360	15971.380	.336	.919	-.200	-.274
ES7	-6105.130	9111.150	-.184	-.504	.998	1.367
ES4	23806.510	47884.120	.077	.211	-.906	-1.240
ES1	149.940	381.000	.423	1.158	-1.436	-1.966
FS5	95630.330	384173.670	.625	1.713	-.331	-.453
FS3	57836.600	787425.150	1.016	2.783	-.176	-.240
FS2	3466360.000	16513929.180	.194	.530	-1.185	-1.622
FS6	172547.970	769780.330	.918	2.514	-.275	-.377
FS4	125643.670	707169.270	.674	1.847	1.046	1.432
FS7	.000	358440.330	1.890	5.176	4.049	5.544
FS1	640392.450	12705618.480	.998	2.734	-.288	-.394
MS5	21.850	31.450	-.003	-.007	-1.357	-1.858
MS4	11.200	18.860	-1.982	-5.427	4.425	6.060
MS2	6.000	14.000	-1.476	-4.043	1.127	1.543
MS3	.310	14.700	-.686	-1.880	-.518	-.709
MS6	1.000	29.000	-.570	-1.562	-.931	-1.275
MS1	.420	33.110	.658	1.801	1.057	1.448
RS7	1432940.410	4839196.730	.532	1.458	-.384	-.526
RS6	115847.320	953991.120	.903	2.472	-.112	-.153
RS5	2191342.830	6197977.300	-.250	-.684	-1.302	-1.782
RS4	875408.170	6110645.250	1.018	2.788	.349	.478
RS3	894875.820	3937558.750	-.303	-.830	.101	.138
RS2	216103.700	613715.300	-.114	-.311	-1.050	-1.437
RS1	2262178.080	10192217.020	.889	2.435	.086	.118
Multivariate					4.053	.344
Mahalanobis	**36.58 p1= 0.103**	**P2=0.954**				

Source: SPSS Amos Version 21 output

4.1 Discussion of Normality Test Results

Kurtosis for all items ranges from a maximum of 4.425 to a minimum of –1.436 which all falls within the values of less than 5. And also, the overall multivariate Kurtosis = 4.053 implies that the sample is normally distributed because the multivariate Kurtosis is less than 5. Certainly, if the data is normally distributed then, it is a clear indication that there are no outliers in the data set. This is further confirmed with the Mahalanobis d-squared indicatingno observation was farthest from the centroid (i.e p1 > 0.000 and p2 > 0.000).

Figure 3: SEM Results



Source: SPSS Amos Version 21 output

Table 3: Regression weight in the hypothesized path model

Hypothesized relationships			**B**	**S.E**	***CR***	***P***
RS	<---	MS	0.06	0.008	4.378	0.000*
RS	<---	FS	0.072	0.091	0.784	0.433
RS	<---	ES	–0.002	0.029	–0.063	0.950

***Chi-square* = 335.254 DF = 143 Prob. = 0.000 CMIN/DF = 2.344 (<5) The model is fit**

Source: SPSS Amos Version 21 output

Note: RS:- Real sector; MS:- Monetary sector; FS:- Fiscal sector; ES:- External sector; B:- Unstandardized Regression Coefficient S.E.:- Standard Error; CR:- Critical Ratio. * is 1% significance level

4.2 Discussion of coefficients of Structural Equation

Table 3 contains the coefficients of structural equation results for the interrelationship between real, monetary, fiscal, and external sectors of the Nigerian economy. The real sector is the construct dependent variable, while the monetary, fiscal, and external sectors were the construct independent variables.

The coefficient of MS and FS shows that monetary and fiscal sectors have a positive impact on the real sector, while the coefficients of the external sector show a contrary behavior, indicating a negative relationship between the external and real sectors of the Nigerian economy. The current study found that the external sector has a negative but statistically insignificant influence on the real sector. This finding corroborated Victor et al, (2018) who in their study revealed that imports, foreign direct investment, and exchange rate have a negative impact on economic growth in Nigeria. Also, the negative nexus found between external and real sectors is not surprising as Nigeria is an import-dependent country. This would likely result in a decrease in net foreign earning (Export minus import) and negative current account balance (CAB), which would in turn adversely affect the real sector of the economy.

On the other hand, the monetary sector has a positive and statistically significant influence on the real sector of the Nigerian economy. This is indicated by the probability value of MS0.000. This is consistence with the theoretical expectation of this study as the quantity theory of money stated that an increase in money supply ceteris paribus may likely increase output and stimulate economic activities. In another development, the fiscal sector had a positive but insignificant impact on the real sector of the Nigerian economy. Theoretically, an increase in government spending, revenue, and debt have the potential of increasing output in the real sector if they are channeled toward productive sectors of the economy. The finding of the current study is theoretically consistent and corroborated by Nwite et al, (2019) and Onyekachi et al, (2019) who in their separate studies found a positive relationship between fiscal sector variables and output in Nigeria.

The coefficients of MS and FS reveal that a one percent increase in monetary and fiscal sector variables will lead to a 0.06 and 0.07 percentage point increase in the real sector output in Nigeria, while a one percent increase in the external sector variables may likely translate into a 0.002 percentdecrease in the real sector output in Nigeria. This implies that the real sector responds positively to change in the monetary and fiscal sectorswhile responding negatively to change in the external sector.

The chi-square value of 335.254, DF of 143, and the corresponding probability value of 0.000, as well as the CMIN/DF value of 2.344, which is less than 5, implies that the model of the study fits the data and is fit for policy.

In summary, therefore, the study finds that monetary sector variables significantly influenced the real sector output, but the fiscal and external sectors do not significantly influence the real sector in Nigeria.

5. Conclusion and recommendations

This study examines the interrelationships between real, monetary, fiscal, and external sectors of the Nigerian economy between 2010Q1 and 2021Q1. The study employs the Structural Equation Model (SEM) and found that monetaryand fiscal sectors havea positive influence on the real sector of the Nigerian economy, while the external sector has a negative influence on the real sector of the economy. It was also found that the monetary sector influenced real sector output positively and statistically significant, the fiscal influenced real sector output positively but statistically insignificant, while the external sectors influenced the real sector negatively and statistically insignificant. The study concludes that monetary, fiscal, and external sectors are still relevant and there is an interconnection between the sectors of the Nigerian economy. In addition, it was concluded that the connection between the monetary and real sectors of the economy is more significant than the interconnection between fiscal,external, and real sectors of the economy.

This study,therefore, recommends effective collaboration between the monetary and fiscal authorities in stimulating aggregate demand, boosting economic activities, and spurring economic growth in Nigeria using money supply, and external and domestic debt. Also, the study recommends that fiscal and foreign policies be used to support monetary policy.This was because the monetary sector shows a positive and significant influence on the real sector output in Nigeria. We suggest that future studies could look at other jurisdictions apart from Nigeria and apply a different technique such as the Bayesian Dynamic Stochastic General Equilibrium (DSGE) analysis to examine the interconnectivity between the various sectors of the economy.

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