

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. The Structural Equation Model (SEM) was employed. The study finds that monetary and fiscal sectors have a positive influence on the real sector output, while the external sector has a negative influence on the real sector output in Nigeria. It was found that only the monetary sector influenced real sector output positively and significantly. This study recommends that monetary policy instruments particularly the money supply in collaboration with the fiscal instruments such as the external and domestic debt be used judiciously and more effectively to stimulate aggregate demand, boost economic activities, and spur economic growth in Nigeria.

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, unemployment rate, which affect the entire economy (Ames, Brown, Devarajan & Izquierdo, 2001 and Sargent & Sims, 2011). Inadequate knowledge on 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, exchange rate policies, Bodunrin (2016) noted that most developing economies have not been able to achieve sustainable price stability and economic growth in recent times. The Nigerian economy is no exception 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 are the transmission mechanisms within the macroeconomic framework in Nigeria? 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, no study examines 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, no single study employs Structural Equation Model (SEM) in its analysis, which the current study employs. 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 includes examining 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 these sectors, to explain how economic growth can be achieved. For example, the Neo-Classical Theory of Growth harmonises these sectors through labour, capital, and technology, as they are key determinants of economic growth. The interest rate is being 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. The International Business Circle Theory postulates that shocks to domestic economic activities are 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 rate through monetary policy.

Minsky's Financial Instability Hypothesis which was utilized to explain the Global Financial Crisis 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. The Keynesian Theory 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) represents the real sector; Government expenditure (G) represents the fiscal sector, in which major determinants are taxes. Investment (I) represents the monetary sector, as a major determinant of investment is the interest rate, which is a key variable in the sector. Consumption (C) covers the domestic and external sectors, as the exchange rate determines the dynamics of import and export in an economy. However, (X - M) represents the external sector of the economy. The Keynesian theory is the theoretical standpoint of this study, 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 an aim to proffering insight for policy decisions. Most literature on this subject considered the individual relationship between the sectors and economic growth, only a few dwell 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 link between monetary and the real sectors mostly dwell 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 & Chairsissawatsuk, 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 (real sector). 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 found a 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 without emphasising 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 the Structural Equation Model. This will go a long way to providing insight to policymakers in identifying the specific sector that propels economic growth for policy purposes.

3. Methodology

The study employs Structural Equation Models (SEM) a more robust econometrics model to examine the inter-relationship between the real, fiscal, monetary, and external sectors of the Nigerian economy. The advantage of the Structural Equation Model (SEM) over the other traditional models such as descriptive statistic, multiple regression analysis, VAR, ARDL, ECM, and Factor Analysis is that SEM combines factor analysis and multiple regression analysis; as well as 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, test model with multiple dependents (see Tabachnick & Fidell, 2014).

The choice of the model and the variables included in the analysis are guided by the Keynesian theory of aggregate demand represented in the national income identity. The SEM was constructed using 6 fiscal sectors observed 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

$$y = \Lambda_y \eta + \epsilon \text{ ----- (3.1)}$$

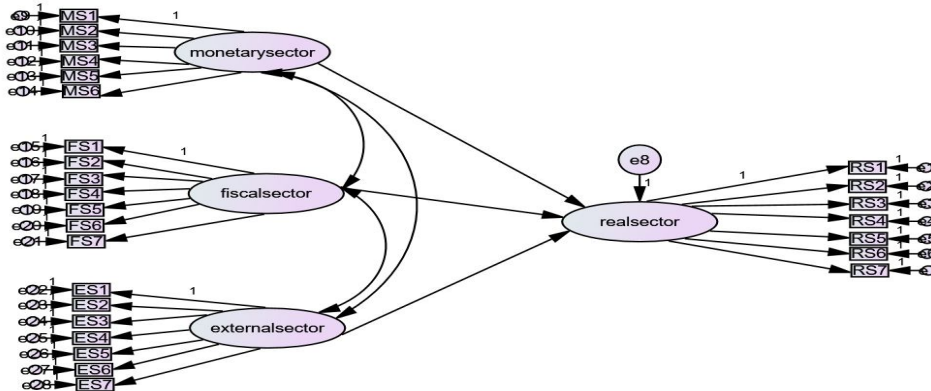
$$x = \Lambda_x \xi + \delta \text{ ----- (3.2)}$$

Structural equations among latent variables: dependent variables $\eta = (\eta_1 \dots \dots \dots \eta_k)'$ and independent variable $\xi = (\xi_1 \dots \dots \dots \xi_m)$ is thus

$$\eta = B\eta + \Gamma\xi + \zeta \text{-----}(3.3)$$

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 ζ 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).

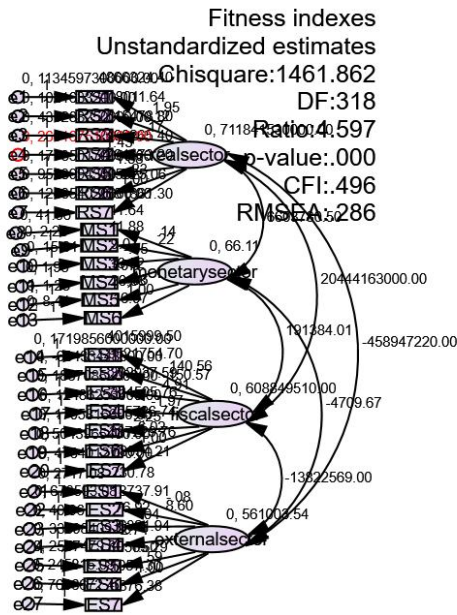
The fiscal sector was measured by external debt (FS1), domestic debt (FS2), debt service (FS3), net oil revenue (FS4), net non-oil revenue (FS5), recurrent expenditure (FS6), and capital expenditure (FS7). Finally, the external sector was measured by the exchange rate (ES1), export (ES2), oil price (ES3), 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 as 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 resrve 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 of 0.41 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 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 use to achieve the desire 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			

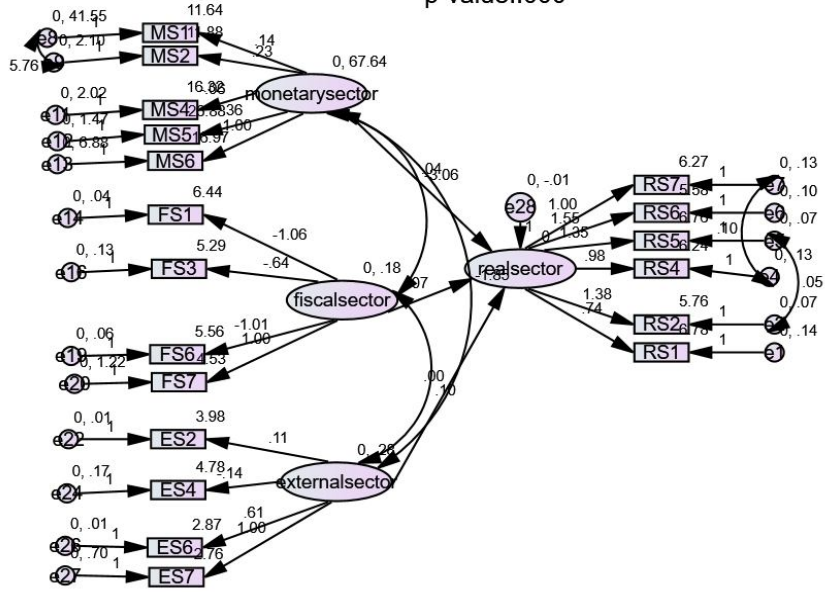
Source: SPSS Amos Version 21 output

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 indicating no observation was farthest from the centroid (i.e $p1 > 0.000$ and $p2 > 0.000$).

Figure 3: SEM Results

Fitness indexes
 Unstandardized estimates
 Chisquare:335.254
 DF:143
 Ratio:2.344
 p-value:.000



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 external and real sectors of the Nigerian economy. The external sector has a negative but statistically insignificant influence on the real sector.

This is consistent with the theoretical expectation of this study as an increase in the exchange rate, import, and deficit balance of payment will harm the real sector of the economy. On the issue of the link between external and real sectors, the current study found a negative and insignificant relationship between the two sectors. 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 consistent with the theoretical expectation of this study as the quantity theory of money stated that increase in money supply *ceteris paribus* may likely increase output and stimulate economic activities. In another development, 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 has 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. On the contrary,

The coefficients of MS and FS reveal that a one per cent 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 per cent increase in the external sector variables may likely translate into a 0.002 per cent decrease in the real sector output in Nigeria. This implies that the real sector responds positive to change in the monetary and fiscal sectors, while responds 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 monetary and fiscal sectors have a 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 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.

This study recommends that monetary policy instruments particularly the money supply in collaboration with the fiscal instruments such as external debt be used judiciously, patriotically, and more effectively to stimulate aggregate demand, boost economic activities and spur economic growth in Nigeria. Also, the study recommends that fiscal and foreign policies be used to support monetary policy. This was because monetary sector shows a positive and significant influence on the real sector output in Nigeria.

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