Policy Mix and Non-Oil Output in Nigeria: The Case of Fiscal and Monetary Policies

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Authors’ contributions

This work was carried out in collaboration among all authors. Author OJB designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author AAVE managed the analyses of the study and author GACC managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

The shift from the non-oil sector to the oil sector affects the production base of the Nigerian economy and brings about Dutch Disease which rendered the economy susceptible to worries associated with the crude oil price in the international market and crude oil output. Consequently, the need for macroeconomic polies to redirect the economy from the oil to the non-oil based. Thus, the paper assessed policy mix and non-oil output in Nigeria for the period 1990–2019. The objectives of the study was to; examined the effect of fiscal policy in terms of government capital spending and value-added tax (VAT) on non-oil output in Nigeria; and examine the effect of monetary policy in terms of broad money supply and real exchange rate on non-oil output in Nigeria. The study made use of secondary data collected from the Central Bank of Nigeria statistical bulletin and applied the Vector Error Correction Method (VECM). Other tests carried out include: stationary and co-integration tests. The results of the ADF unit root and Johansen co-integration tests showed that all the variables were stationary at order one and were indeed co-integrated. The VECM result showed that the $R^2$ is 65%; this indicated that the model is a good fit.
The long-run VECM results showed that there is a long-run causality running from the independent variables to the dependent variable. The short-run VECM result showed that, there is a direct but insignificant relationship between government capital spending and non-oil GDP. Also, there is a direct but insignificant relationship between broad money supply and non-oil GDP. Meanwhile, there is a negative and insignificant relationship between VAT and non-oil output. But the real exchange rate exerts a negative and significant relationship with non-oil output. Owing to the findings, it was concluded that the combination of the policy mix in terms of fiscal and monetary policies are important drivers of the output of the non-oil sector. But constraint in the form of negative relationship between VAT and non-oil output is inimical to the growth of the non-oil sector. Based on these findings, the study recommended amongst others that macroeconomic policies in term of effective use of government revenue from VAT and strong value of the naira in-term of the U.S dollar should be well directed at increase the output of the non-oil sector.

Keywords: Policy; mix; non-oil; output; fiscal; monetary; VECM.

1. INTRODUCTION

Prior to the emergence of the crude oil in commercial quantities in Nigeria, the non-oil sector controlled by the agrarian sub-sector was the livewire of the economy in the 1960s. Meaning that the non-oil sector was then used to gauge the performance of the Nigerian economy particularly in term of economic growth, and employment generation. Thus, it can be inferred that the revenue from this sector serves as a gauge for government budget in every fiscal year. This is because the sector serves as the basic source of government revenue and foreign exchange earner. But the shift from the non-oil sector to the oil sector affects the production base of the Nigerian economy and brings about Dutch Disease which rendered the economy susceptible to worries associated with the crude oil price in the international market and crude oil output. Consequently, the economy has been plunged into grappling with incessant macroeconomic disorders [1, 2].

Meanwhile, as a matter of definition, the non-oil sector of the Nigerian economy comprises the collections of economic activities, excluding the petroleum and gas industry and those directly related to it [3]. The sector generally includes sub-sectors such as the; manufacturing, agriculture, transport, communication, finance, tourism, real estate, construction, education and health amongst others. Conversely, in-term of contribution to the output of the economy, the non-oil sector has continued to perform below its usual potentials as compared to the oil sector. But for the economy to be at equilibrium in terms of sectoral contributions, there is the urgent need for deliberate macroeconomic policy actions to launch the non-oil sector on the path of production-based and international competitiveness. Thus, the effective policies mix particularly, fiscal and monetary policies conduct over the years has therefore been to vigorously diversify and as well sustain the revenue base and foreign exchange earning capacity of the Nigeria’s economy via the non-oil sector [4].

Fiscal policy is the conscious management of revenue, expenditure, and debt by the government to influence the working of the economy towards the desired direction particularly in term of employment creation and output growth, while monetary policy entails the use of monetary instruments such as money supply, reserve requirement and interest rates to counteract the economy particularly in term of price stability, output growth and sustainable development [5, 6]. Given the statement above, there is the requirement for a very much organized financial and monetary approaches to diversify the Nigerian economy for sustained non-oil sector’s contribution to revenue generation and as well enhance productivity which in the long run will lead to the export of local products and create international competitiveness.

Despite the use of these policies for the past thirty years in Nigeria, empirical evidence shows that the non-oil sector output has not been impressive in terms of its percentage contribution to revenue generation and foreign exchange earnings for over four decades. For instance, the oil sector which accounted for over 90 per cent of export earnings and more than 80 per cent of government revenue by the end of 1970s still maintains the same trend to date. But non-oil sector recorded an average growth rate of 15.12 per cent as against 28.23% of the oil sector in the pre-Structural Adjustment Programme (SAP) era from 1971-1985 but after the oil glut of the
early 1980s, the non-oil sector reported an average growth rate of 3.28%. With the return to democracy from 1999-2015, the non-oil sector growth rate improved to 8.74% [1]. Also, the non-oil sector accounted for an average percentage contribution of 75.92% to GDP during period 1971-1985. The oil sector’s average share of GDP was 62.94 per cent and 79.70 per cent while the non-oil sector’s average percentage contributions were 37per cent and 20per cent during the SAP era and the era of sustained civil rule from 1999-2015 respectively [7]. Meaning that revenue generation and foreign exchange earnings of the Nigerian economy is excessively reliant on the oil sector.

In lieu of the above, the paper presents the relative effects of policy mix (fiscal and monetary policies) on the non-oil sector output in Nigeria. Thus, the objectives was to; examined the effect of fiscal policy in terms of government capital spending and value-added tax on non-oil output in Nigeria; and examine the effect of monetary policy in terms of broad money supply and real exchange rate on non-oil output in Nigeria.

2. REVIEW OF RELEVANT LITERATURE

2.1 Theoretical Review

Theoretically, the endogenous growth model postulates that domestic economic policies are critical determinants of the rate of technological progress which boosts the productivity of capital that sustain economic growth in the long-run. However, the monetarist theory believes that only monetary policy is significant for output growth whereas government intervention is ineffectual. This position is founded on the argument that money supply directly influences output growth in an economy while fiscal policy crowds-out private investment in the long-run. Conversely, the Keynesian theory believes in the instrumentality of interest rate, which results in a liquidity trap [8]. Nonetheless, the neoclassical economics synthesize that both monetary and fiscal policies are effective for output growth. Similarly, the supply-side economic theory argued in support of the Keynesian theory that supply-side fiscal and monetary policies will serve better to spur a country’s economic growth. The theory holds that lower tax rates and limited government create incentives to work, save and investment, which in the long-run will boost aggregate spending, economic growth and employment with lower inflation in an economy.

2.2 Empirical Review

Empirical studies revealed that several research explorations have examined the relative effects of monetary and fiscal policies on economic growth and other sectorial indicators like manufacturing output, agricultural output and non-oil exports over different data periods. For instance, [9] used an error correction method to examine the relative monetary and fiscal policies on economic activity in Nigeria. Their findings showed that monetary policy exerted positive stimulus on economic activity in Nigeria than the fiscal policy. Also, [10] used OLS to explore the impact of monetary and fiscal policies on non-oil exports in Nigeria from 1974 to 2003. Their findings showed the used policies variable (interest rate, budget deficit and exchange rates) impacted negatively on non-oil exports in Nigeria. [11] investigated the effect of monetary and fiscal policies on real output of Bangladesh from 1975 to 2003 with the use of unrestricted vector autoregressions (VAR) framework. He submitted that monetary policy alone significantly and positively influenced real output growth while the fiscal policy remains completely ineffectual.

[12] analyzed the relative relationship between fiscal-monetary policies and economic growth in Nigeria, applying annual time series data covering 1970 – 2007 to cointegration and error correction techniques. The result indicates that monetary policy in Nigeria is relatively more effective than fiscal policy. In other studies, [13] used correlation analysis to examine the impact of fiscal and monetary instruments on economic growth over the period of Nigeria democratic governance from 1999 to 2008. The study thus, presented that narrow money, broad money, government recurrent expenditure and capital expenditure are significant variables that stimulated the Nigerian economy during the study period.

[14] examined the relative effect of monetary and fiscal policies on economic growth in Nigeria from 1970-2010, and the Vector Error Correction (VEC) mechanism was employed for the empirical analysis. The findings revealed that the Nigerian economy is mostly driven by money supply and minimum rediscount rate in the long-run. Thus, monetary policy exerted a greater impact on economic growth in Nigeria than fiscal policy. [15] used ECM to examine the effects of
macroeconomic policies on economic growth in Nigeria, using annual time series data spanning 1981-2010. They found that fiscal policy instruments impacted inversely on GDP growth. Also, monetary policy instruments positively influence GDP growth. [16] used an error correction mechanism to examined the effect of monetary and fiscal policies on the Nigeria’s manufacturing sector performance from 1970 to 2009. The paper established that monetary tools in term of lending rate, exchange rate and broad money supply and fiscal tools via total tax revenue of the government, total government expenditures and deficit financing; greatly drives the manufacturing sector performance over the study period. [17] used ECM to examine fiscal -monetary policies and economic growth in Nigeria for the period 1970-2013. The result revealed a long-run relationship between fiscal and monetary policies variables and economic growth in the country.

In conclusion, the empirical review exposed that most of the studies of particular importance applied different estimation techniques in their analysis, such as Ordinary Least Squares, cointegration and error correction technique and ARDL. But then realizing that hardly is there any work on the relative effects of policy mix (monetary and fiscal policies) on non-oil sector output in Nigeria; this paper fills this research gap. This work also utilizes the vector error correction model (VECM) to analyze the relevant time series data extended from 1990 to 2019 in order to capture realities of new policy actions on non-oil sector output in the Nigerian economy.

3. METHODOLOGY

This section presented the method that was adopted in testing the economic theories as regards the subject matter. Despite the fact that there are several quantitative analyses that could be used for this study, the econometric technique of the Vector Error Correction Model (VECM) which help to measure both log-run and short-run relationship between the dependent and independent variables was used. The choice of the technique was premised on the stationarity of the series at the level and first difference and co-integration equations. Meanwhile, the descriptive statistics to establish the characteristics of the time series and the Augmented Dickey fuller unit root test of stationarity preceded the VECM [18]. The data employed in this study were mainly time series data for Nigeria sourced from the Central Bank of Nigeria statistical bulletin.

3.1 Model Specification

This study adopted the vector error correction model. The model was specified in line with Keynesian model. Thus, the non-oil output is a function of the policy mix. The functional model was formalized in a multiple regression model as follows:

\[
\text{NGDP} = f(GCE, VAT, MS_2, EXR)
\]  

\[
\Delta \ln \text{NGDP}_t = \alpha_0 + \alpha_1 \ln \text{NGDP}_{t-1} + \alpha_2 \ln GCE_t + \alpha_3 \ln VAT_t + \alpha_4 \ln MS_2_t + \alpha_5 \ln EXR_t + \sum_{i=1}^{n} \Delta \alpha_1 \ln NGDP_{t-i} - 1 + \sum_{i=1}^{n} \Delta \alpha_3 \ln VAT_{t-i} - 1 + \sum_{i=1}^{n} \Delta \alpha_4 \ln MS_2_{t-i} - 1 + \sum_{i=1}^{n} \Delta \alpha_5 \ln EXR_{t-i} + \Omega EM + \varepsilon_t
\]  

Table 1. Descriptive statistics for variables

|        | NGDP     | GCX      | VAT      | MS2      | EXR      |
|--------|----------|----------|----------|----------|----------|
| Mean   | 36245.32 | 618.6754 | 33680.2  | 76.66154 | 151.0081 |
| Std. Dev. | 19097.00 | 332.0189 | 29192.79 | 46.23281 | 105.8857 |
| Skewness | 0.225065 | -0.101256 | 0.209244 | -0.030574 | 1.002015 |
| Kurtosis | 1.464885 | 1.588214 | 1.248644 | 1.196306 | 3.346121 |
| Jarque-Bera | 2.772461 | 2.203663 | 3.512578 | 3.528470 | 4.480595 |
| Probability | 0.250016 | 0.332262 | 0.172685 | 0.171318 | 0.106427 |
| Sum     | 942378.4 | 16085.56 | 875690.9 | 1993.200 | 3926.210 |
| Sum Sq. Dev. | 3.12E+09 | 275591.4 | 2.13E+12 | 53436.82 | 280294.5 |
| Observations | 26        | 26        | 26        | 26        | 26        |

Note: NGDP = Non-oil Gross Domestic Product, GCE=Government Capital Expenditure, VAT= Value Added Tax, 
MS2 = Broad Money Supply and EXR= Exchange Rate

Source: Author’s Computation from E-view 10
Consequently, to put the variables on the same scale, the econometric form of the model was stated in log-linear formulations of the VECM as follows:

Where; NGDP is the non-oil gross domestic product (proxy for non-oil output), GCE is government capital expenditure, VAT is value added tax, MS₂ is broad money supply, EXR is the real exchange rate, αₖ is a constant term, α₁ – α₅ is short run dynamic coefficients of the regressors, Δ is first difference operator, n is maximum lag lengths, Σ is a summation, ECM is error correction term lagged for a period, Q is coefficient of error correction term, Ln is natural logarithm and εᵢ is the white noise.

4. RESULTS AND DISCUSSION

4.1 Pre-Estimation Test

This comprises the descriptive statistics to evaluate the trend and the nature of the variables. Also, the unit root test helps to ensure the stationary of the variables.

The descriptive statistics reported in Table 1 indicated that non-oil gross domestic product (NGDP) has an approximate mean of ₦362345billion with the corresponding standard deviation of ₦19097billion. Similarly, government capital expenditure (GCE) has an approximate mean of ₦619billion with the corresponding standard deviation of ₦332billion. Value-added tax (VAT) has an approximate mean of ₦336804billion with a corresponding standard deviation of ₦291928billion. Broad money supply (MS₂) has an approximate mean of ₦77billion with the corresponding standard deviation of ₦46billion. The exchange rate has an approximate mean of ₦151/dollar and a corresponding standard deviation of ₦106/dollar. The skewness test showed a combination of both negative and positive values; meaning that while some series were negatively sloped, some others were positively sloping. The probability of Jarque-Bera statistics showed that the null hypothesis of all the variables was accepted. Thus, the variables were normally distributed. More so, the kurtosis test showed that all the series have a large tail. In sum, the results of the descriptive statistics showed that the distributions are higher than normal as a result of the problem of trended data. This therefore necessitated the stationarity test to stabilize the series before further estimation.

The ADF unit root test of stationarity result presented above showed that both the dependent and independent variables were not stationary at order zero (at level). The non-stationary variables were differenced once and all became stationary at first difference prior to further estimation.

Table 2. Result of augmented dickey-fuller unit root test at level and first difference

| Variables | ADF @ Level | 5% Critical Value | Decision | ADF @ 1st Diff | 5% Critical Value | Decision |
|-----------|-------------|-------------------|----------|---------------|-------------------|----------|
| NGDP      | -1.4330     | -2.9762           | Not stationary | -3.9011       | -2.9718           | Stationary I(I) |
| GCE       | -1.2671     | -2.9677           | Not stationary | -7.0401       | -2.9718           | Stationary I(I) |
| VAT       | -0.6469     | -2.9862           | Not stationary | -6.4194       | -2.9918           | Stationary I(I) |
| MS₂       | -0.1563     | -2.9677           | Not stationary | -3.3012       | -2.9718           | Stationary I(I) |
| EXR       | -0.1145     | -2.9677           | Not stationary | -5.4132       | -2.9718           | Stationary I(I) |

Note: NGDP = Non-oil Gross Domestic Product, GCE=Government Capital Expenditure, VAT= Value Added Tax, MS₂ = Broad Money Supply and EXR = Exchange Rate

Source: Authors’ Computation from E-view 10

Table 3. Johansen test for co-integration

| Eigen value K=1, r=1 | Trace statistics | 5% critical value | Prob. ** | Hypothesis of CE(s) |
|----------------------|------------------|-------------------|---------|---------------------|
| 0.687934             | 71.95814         | 69.81889          | 0.0354  | None *              |
| 0.589919             | 44.00920         | 47.85613          | 0.1098  | At most 1           |
| 0.512825             | 22.61556         | 29.79707          | 0.2625  | At most 2           |
| 0.176616             | 5.356408         | 15.49471          | 0.7699  | At most 3           |
| 0.028439             | 0.692425         | 3.841466          | 0.4053  | At most 4           |

r=number of co-integrating vectors and k = number of lags in model. * rejection of the H0

Source: Authors’ Computation from E-view 10
The results of the Johansen test of co-integration via both the Trace statistics revealed the existence of one (1) co-integrating equation at a 5% level. Thus, the null hypothesis (H0) of no co-integration among the variables was rejected. Based on this result, the paper concludes that there is a long-run equilibrium relationship amongst the variables in the model.

### 4.2 Estimation Techniques

The long-run VECM showed that GCE and VAT were positively related to the non-oil output, while both MS$_2$ and EXR were negatively related to non-oil output. The results further showed that all the independent variables were statically significant with the dependent variable. Thus, there is a long-run causality running from the independent variables to the dependent variables.

The estimated short-run VECM result showed that the R$^2$ is 0.6534(65.34%); this showed that the model is a good fit. The f-statistic, showed that the overall explanatory variables are significant in explaining the non-oil output in Nigeria during the period of study. Also, the lag value of non-oil output is negatively and insignificantly linked with its’ current value. The short-run result showed that, there is a positive but insignificant relationship between government capital spending and the non-oil GDP. Meaning that a percentage increase in government expenditure causes a corresponding increase in output of the non-oil sector. The finding is in agreement with the empirical work of [1], who averred that fiscal policy in the form of government capital expenditure will spur the growth of the non-oil sector. Also, the empirical result showed that there is a positive but insignificant relationship between broad money supply and non-oil GDP. The finding corroborates [3].

Meanwhile, the estimated VECM result showed that there is a negative and insignificant relationship between VAT and non-oil output. What this potent is that the revenue from VAT has not been well utilized to significantly impact on the output growth of the Nigerian economy during the period of study. The finding supports the view of [2019] who averred that VAT in Nigeria has no significant impact on the growth of the economy. Also, the real exchange rate exerts a negative and significant relationship with non-oil GDP.

### Table 4. Long-run VECM result

| Variables | Coefficients | Standard Error | t-statistics | t-table |
|-----------|--------------|----------------|-------------|---------|
| GCE       | 37.24327     | 4.6461         | 8.0160.     | 2.0640  |
| VAT       | 0.048516     | 0.0070         | 6.9307      | 2.0640  |
| MS$_2$    | -362.684     | 60.348         | -6.0098     | 2.0640  |
| EXR       | -55.18945    | 5.9607         | -9.2588     | 2.0640  |

Note: NGDP = Non-oil Gross Domestic Product, GCE=Government Capital Expenditure, VAT= Value Added Tax, MS$_2$ = Broad Money Supply and EXR= Exchange Rate

Source: Author’s Computation from E-view 10

### Table 5. Short-run VECM result

| Variables | Coefficients | Standard Error | t-statistics | t-table |
|-----------|--------------|----------------|-------------|---------|
| D(NGDP(-1)) | -0.028278 | 0.03451 | -0.81931 | 2.0640 |
| D(GCE)     | 0.36658      | 0.29192       | 1.25576     | 2.0640  |
| D(VAT)     | -3.48603     | 16.5542       | -0.21058    | 2.0640  |
| D(MS$_2$)  | 0.000688     | 0.00156       | 1.12490     | 2.0640  |
| D(EXR)     | -0.000598    | 0.00028       | -2.07779    | 2.0640  |
| ECM        | -0.065170    | 0.02989       | -2.18020    | 2.0640  |
| R-Squared  | 0.653400     | F-statistics  | 18.800      |         |
| F-table    | 4.7200       |               |             |         |

Note: NGDP = Non-oil Gross Domestic Product, GCE=Government Capital Expenditure, VAT= Value Added Tax, MS$_2$ = Broad Money Supply and EXR= Exchange Rate

Source: Author’s Computation from E-view 10
Table 6. The post estimation test

| Test type           | Test statistics | P-value | Critical value |
|---------------------|-----------------|---------|----------------|
| Serial Correlation Test | Chi-square      | 0.0753  | 0.05           |
| Normality Test      | Chi-square      | 0.5313  | 0.05           |

Source: Authors’ Computation from E-view 10

oil output. This result suggests the weak value of the naira in relation to international currencies particularly the US dollar will not engender the growth of the non-oil sector output. But despite the weak relationship between the rate of the exchange and the non-oil output, exchange rate still exerts a significant impact on the non-oil output in Nigeria during the period of study. The finding supports the view of [17] as well as [3] who opined that the exchange rate exerts a significant impact on the non-oil output growth of the Nigerian economy.

4.3 Post Estimation Tests

Before drawing policy inferences from the VECM estimated regressions, it is imperative to conduct appropriate diagnostic tests to ascertain the linear relationship between the dependent variable and the independent variables assumption. The violation of this postulation may suggest that the model is wrongly specified. The following tests were conducted; normality test and serial correlation test.

The serial correlation test vis-à-vis the p-value of the chi-statistics (0.0753) which is greater than 0.05 critical p-value; showed that auto correlation problem does not affect the estimated model. The normality test presented above, showed that the error terms are normally distributed. This is because the probability values of the chi-square statistic which is 0.5313 is greater than 0.05 critical value. Thus, it was concluded that the sample data fit a standard normal distribution.

5. CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The paper examined policy mix and non-oil output in Nigeria between 1990 and 2019 and showed that prior to the emergence of the crude oil in commercial quantities in Nigeria, the non-oil sector controlled by the agrarian sub-sector was the livewire of the economy. But the shift from the non-oil sector to the oil sector affects the production base of the Nigerian economy and brings about Dutch Disease which rendered the economy susceptible to worries associated with the crude oil price in the international market and crude oil output. Consequently, the economy has been plunged into grappling with incessant macroeconomic disorders. Given the assertion above, there is the need for a well-coordinated monetary and fiscal policies to diversify the Nigerian economy for sustained non-oil sector’s contribution to enhance productivity.

The conclusion from the empirical findings using the VECM showed that the combination of macroeconomic policies in terms of the fiscal and monetary policy are important drivers of the output of the non-oil sector. But constraint in the form of a negative relationship between VAT and non-oil output is inimical to the growth of the non-oil sector.

5.2 Recommendations

Based on the findings, the study recommended that;

I. There should be an effective use of government revenue from VAT and other sources to engender output growth.

II. The apex bank and monetary authority should unify the exchange rate system and as well as minimize artificial scarcity in the market in order to guarantee the effective operation of foreign exchange activities.

III. The strong value of the naira in-term of the U.S dollar should be well articulated in order to increase the output of the non-oil sector.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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