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AN ASSESSMENT OF THE EFFECT OF FISCAL POLICY SHOCKS ON SELECTED MACROECONOMIC VARIABLES IN NIGERIA

Ado Bamanga
Department of Economics
Modibbo Adama University of Technology, Yola
adobamanga@gmail.com

Salihu Zumo Hayatuddeen
Department of Economics
Modibbo Adama University of Technology, Yola

Abstract
This paper examines the impact of fiscal policy shocks on GDP and aggregate investment in Nigeria. Structural vector autoregressive model (SVAR) was used with quarterly data from 1988-1 to 2018-4. The study measures the responses of Nigerian GDP and aggregate investment to shocks in government revenue from oil and taxes. The result of impulse response shows that fiscal policy shocks affect the selected macroeconomic variables, where the GDP and aggregate investment responded significantly to taxes and oil revenue shocks. However, aggregate investment responds negatively and insignificant to shock in tax revenue in long run. The positive reaction of these variables to shock in oil revenue shows evidence that the revenue base of Nigeria is poorly diversified and manage; and that the country is heavily dependent on oil revenue. The study however suggests that there is a need for the country to diversify its revenue base to attain output growth in all sectors of the economy and job creation through the use of revenues from the oil sector.

Keywords: Fiscal Policy, Shock, Macroeconomics and Fluctuations

Introduction

Shock is an amorphous phenomenon; it reflects uncertainty in the minds of households, managers, firms and policymakers about possible economic futures. It is also a wide concept, which includes uncertainty over the path of macro phenomena like gross domestic product growth, micro phenomena like the growth rate of firms, and noneconomic events like war and climate change (Bloom, 2014). Macroeconomic shocks refer to any imbalance in the economy to internal or external factors. These shocks are mostly unpredictable and emerges without any sign and affect almost all the macroeconomic variables of the economy. In some cases these shocks occur due to oil price volatility, sudden fall in demand for commodities, unpredicted fall in supply of commodities, imposition of strange tariff barriers in exporting countries, fall in domestic tariff, barriers of the domestic country, rise or fall in stock prices of large companies contributing a huge part to the domestic economies, national income and many more factors. For example total transactions at the Nigerian stock exchange market decreased by 41.72% from N189.72 billion recorded in January 2015 to N110.56 billion (about $0.56 billion) in December 2015 (NSE,2019) . This is tantamount to the investigation that news and increased uncertainty about higher future tariffs reduce investment and activity (Dario, Andrea, Matteo, Patrick & Andrea, 2019). Shocks to household income resulting from the economic crisis may arise through various channels and, depending on the household, may be viewed as temporary or permanent. The first impact is that labor receive may fall due to loss of employment or falling in real wages for those who remain in work. Secondly, declining remittance inflows are another means through which

household income may fall, this is in line with the investigation by Fiscsher, Huber and Pfarrhofer (2019) which reveals that the composition of income and labor market fundamentals determine the pattern of the dynamic responses of a shock. A new indexes of policy uncertainty using newspaper coverage, shows that uncertainty about fiscal policy and economic policy in general increased substantially over the post-Great Recession time using vector autoregressive (VAR) models, and further indicates that innovation to policy uncertainty is associated with a sizable decline in industrial production and employment (Baker, bloom & Davis, 2016). Most developing economies and the third world nations particularly African countries, volatility of prices of commodities is very common, leading to a lot of challenges in the pursuance of an effective economic policy such as sound fiscal policy. Nigeria, as one of the developing economies in Africa, has witnessed number of shocks and disturbances both externally and internally over decades. Among these external factors are technology transfer and changes, migration, foreign institutions influence, trade openness, insurgency, militancy, population growth and so forth, while the internal factors responsible for the shocks are improper implementation of government policies, lack of political stability, consumption patterns, unstable investment, changes in future expectation, among others. These uncertainties lead to decline in government revenue by 18.8% in 2016, consequently the capital expenditure that stimulates the performance of macroeconomic variables declined by 20.1% (CBN, 2019**).**

Many fiscal policies are redistributive in nature because they produce winners and losers in the sense that the policies make some agents strictly better off while some members are worst off, and that many sizable proportion of households do not own capital, (Hikarus 2018). Arguments have been presented for why both business investment and household consumption should be affected, and the empirical evidence for real effect of the shock is also painful, while most economists would agree with a general statement that shocks affects the real economy (Par & Par 2016). The financial crisis instigated a wave of research into the measurement of fiscal policy shocks and its effects on economic outcomes and financial market developments, where rise in the shocks is widely believed to have detrimental effects on macroeconomic variables and financial market outcomes and induce responses from monetary, fiscal, and regulatory policymakers (Fisher et al., 2019). Theoretical models maintained that increasing fiscal policy shocks could affect activity and decision-making through several economic channels. For example, firms may delay investment and hiring during periods of high uncertainty, and Households may cut consumption expenditure. These outcomes can lead to limited capital market participation which eventually results in sizable fall in output, investment, consumption which consequently, affect government revenue particularly from tax which has great impact on government expenditure as maintained by Matthew (2014) that tax revenue has a positive and significant impact on Nigerian Budget implementation; shock in oil revenue also contributes significantly to Nigerian annual budget (Omo & Bashir, 2015). This study aimed at examining the impact of shocks in government revenue (taxes and oil revenue) on the Nigerian GDP and aggregate investment.

Literature Review

Base on the assertion of Friedman (1978) as cited by Mohsen and Abbas (2014) the government revenues cause expenditure. Wagner (1883) also maintained that there is positive link between public expenditure and economic growth (GDP). In an empirical study Mohammad, Irfan and Khalil (2015) found positive relationship between government expenditure and aggregate investment.

This paper adopts Keynesian Business Cycle. This is because the Keynesian Business Cycle studies the periodic volatilities of income, employment and output. These three macroeconomics variables have link with government expenditure which is a direct function of government revenue and greatly influence aggregate investment and GDP.

This paper relates to two empirical studies. The paper is particularly related to an investigation by Usenobong and Johnson (2015) and Hikaru (2018). The first studied Macroeconomic Effects of Fiscal Policy Shock in Nigeria using the structural vector autoregressive model (SVAR), while the former studied the impact of uncertainty shocks using new Keynesian Business cycle model. Usenobong et al. (2015) using quarterly data from the period 1980:1-2010:4 found that a positive shock to oil revenue generates a positive and significant effect on real output through its effect on government spending while the response of real output to shocks in business taxes is negative, but insignificant; private investment decisions in the country (Nigeria) does not seem to rely on the taxes paid to the government, but on the interest rate and perhaps on other key variables such as the market demand and investment yield expectations. The direction of their study differ from those in this study because of the variables that are included in this study and the time frame which covers the period of 1988-1 to 2018-4.

This paper also relates to number of emerging literature on the effects of fiscal policy shocks. For instance, Pappa (2009) studied the transmission of fiscal shocks in the labor market by employing a structural VAR and base identification on the restrictions that shocks to government consumption, investment, and employment must raise output and deficits; these restrictions hold in both prototype Real Business Cycle (RBC) and New Keynesian models. Joseph (2017) examines the effect of income shocks on household real consumption expenditure, taking into account various informal coping strategies adopted by the households using Nigerian Household Panel Survey data for the year 2010/2011 and 2012/2013 respectively, and probit model estimation approach, the results suggest that idiosyncratic shocks have effect on household consumption expenditure and the informal insurance strategies play only limited roles in providing the needed insurance to households in the face of shocks. Akpan and Atan (2015) investigates the macroeconomic effects of fiscal policy shock in Nigeria using a Structural Vector Autoregressive (SVAR) framework on quarterly data for the period 1980:1-2010:4 found that the responses of real output and inflation may be asymmetrical depending on the component of government spending used as a fiscal stimulus to stabilized the economy. An obvious fact from the above literature is that there is no single conclusion on the impact of fiscal policy shocks on the macroeconomic variables. The results vary from one economy to another and from one period to another; and it involves the use of various methodological approaches and variables.

Methodology

The data used in this study is secondary obtained from the Central Bank of Nigeria and the website of National Bureau of statistics. Annual data were retrieved from these data which were interpolated using Eview to quarterly data due to lack quarterly data of some variables, this is in in line with the method of interpolation adopted by Usenobong et al. (2015). Some of the data (oil revenue, taxes and GDP) were transformed in to log form. The aggregate investment is percentage of GDP. The study adopted the SVAR model to examine the relationship between shocks in government revenue (taxes and oil revenue) and some macroeconomic variables. This is the model used by Bogren, (2017).

Model

The model takes each of the variable in the system and relate its variation to own past values of all other variables in the system. When describing the structural model, we need to indicate an identification problem, which represents the structure of a given economy

$$\Gamma Xt = B(L)\, x_{t-1} + u\, t, \qquad (1)$$

Where X is the (n×1) vector of the four endogenous variables,

Γ is the matrix of coefficients of the endogenous variables.

B(L) is an autoregressive polynomial in lag in the lag operator L.

u t, is a vector of reduced form of innovations which are assumed to be normally distributed with a constant variance-covariance matrix.

To transform equation (1) in to reduced VAR model we pre-multiply by Γ^{-1} to have:

$$X_t = \Gamma^{-1} B(L)\, x_{t-1} + e\, t, \qquad (2)$$

Or

$$X_t = B^*(L)\, x_{t-1} + e_t \qquad (3)$$

Where $B^* = \Gamma^{-1}B = \Gamma^{-1}$ u t.

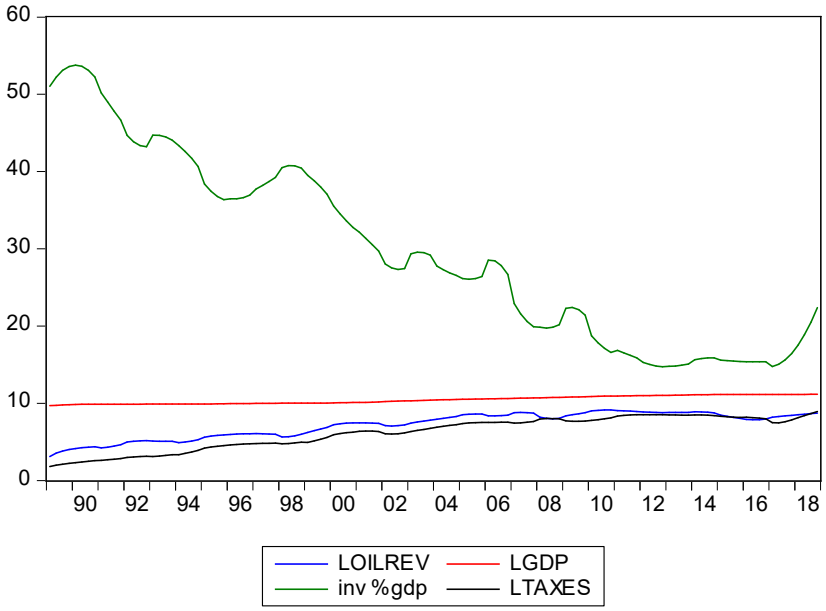
The variance-covariance matrix of reduced form model can be written as $\sum e = \Gamma^{-1} \sum u\, \Gamma^{-1}$. The reduced form model shown in equation (3) expresses each of the endogenous variable solely as a mathematical function of predetermined variables. This can be represented in matrix form as follows:

The element in the matrix shows that there exist no expected contemporaneous responses from specific shocks; while the nonzero elements are the coefficients of the responses to the shocks . Identifying the SVAR model is based on non-data information.

To identify the orthogonal (structural) components of the error terms requires the imposition of some restrictions on the impulse response functions. The recursive (Choleski decomposition) approach will be adopted for this study as used by Favaro (2002). The second assumption is that real output is ordered next as we assume it to be affected by its own shocks and contemporaneously by taxes and oil revenue shocks in line with the traditional Keynesian multiplier framework. The study specifically examined the responses of GDP and aggregate investment to shock in government revenue from oil and taxes.

Results

Figure 1: Series plots of the study variables



Source: Author's computation using Eview 9, 2021

Figure 1 above represents the slop of the variables captured in the study. The figure shows that the variables are not stationary at level.

Table 1unit Root Test

Variable	**LiolRev**	**Ltaxes**	**Lgdp**	**Inv%GDP**
Level	0.3248	0.5796	0.9638	0.1946
1st Difference	0.0000	0.0000	0.0406	0.2230
2nd Difference				0.0000

Source: Author's computation using Eview 9, 2021

Oil revenue, taxes and GDP are stationary at first difference, while investment is stationary at second difference.

Table 2 Descriptive Statistics

	LTAXES	LOILREV	LGDP	INV__GDP
Mean	6.191302	7.179893	10.44430	29.59467
Median	6.828979	7.840261	10.41584	27.79109
Maximum	8.930013	9.130903	11.16295	53.78375
Minimum	1.824045	3.092717	9.685167	14.72812
Std. Dev.	2.090493	1.634975	0.493774	12.04784
Skewness	-0.572021	-0.649747	0.158293	0.370579
Kurtosis	1.953051	2.120860	1.435276	1.927496
Jarque-Bera	12.02466	12.30785	12.74294	8.497898
Probability	0.002448	0.002125	0.001710	0.014279
Sum	742.9563	861.5872	1253.316	3551.360
Sum Sq. Dev.	520.0491	318.1039	29.01375	17272.89
Observations	120	120	120	120

Source: Author's computation using Eview 9, 2021

The maximum value of taxes is 8.930013 and a minimum value of 1.824045 with a mean value of 6.191302. The maximum value of oil revenue is 9.130903 and a minimum value of 3.092717 with a mean value of 7.179893. GDP has maximum value 11.16295 and a minimum value of 9.685167 with a mean value of 10.44430. The aggregate investment is a percentage of GDP with a maximum value of 53.78375% and minimum value of 14.72812% and an average of 29.50467. All the values of Kurtosis are less than 3 which imply that normal distribution is platykurtic. For the Jarque-Bera null hypotheses will be rejected with the probability values of all the variables less than 0.05. the variables are not normally distributed.

Table 3 Variance Decomposition

Variance Decomposition of LOILREV:

Period	S.E.	LOILREV	LTAXES	LGDP	INV__GDP
1	0.110054	100.0000	0.000000	0.000000	0.000000
2	0.198664	99.55056	0.445716	3.90E-05	0.003685
3	0.271999	97.96918	2.026205	0.001353	0.003264
4	0.331381	94.93353	5.007581	0.011812	0.047077
5	0.381055	90.62260	9.143172	0.040116	0.194116

Variance Decomposition of LTAXES:

Period	S.E.	LOILREV	LTAXES	LGDP	INV__GDP
1	0.088061	2.999941	97.00006	0.000000	0.000000
2	0.159814	6.868788	92.94592	0.076414	0.108881
3	0.222742	12.96160	86.65365	0.190045	0.194701
4	0.278244	20.63802	78.88457	0.283099	0.194307
5	0.328509	28.64981	70.86244	0.336656	0.151101

Variance Decomposition of LGDP:

Period	S.E.	LOILREV	LTAXES	LGDP	INV__GDP
1	0.005769	2.467338	2.470457	95.06221	0.000000
2	0.011377	3.659636	1.975448	94.33672	0.028200
3	0.016976	4.957809	1.454058	93.53662	0.051513
4	0.022328	6.362739	1.000064	92.58413	0.053067
5	0.027343	7.880586	0.676684	91.40216	0.040569

Variance Decomposition of INV__GDP:

Period	S.E.	LOILREV	LTAXES	LGDP	INV__GDP
1	0.671273	7.881393	1.259620	1.352722	89.50626
2	1.233382	7.599708	1.754919	0.995500	89.64987
3	1.699104	7.718786	1.888321	0.767456	89.62544
4	2.046700	8.227553	1.728353	0.619997	89.42410
5	2.284923	9.149733	1.448966	0.526326	88.87498

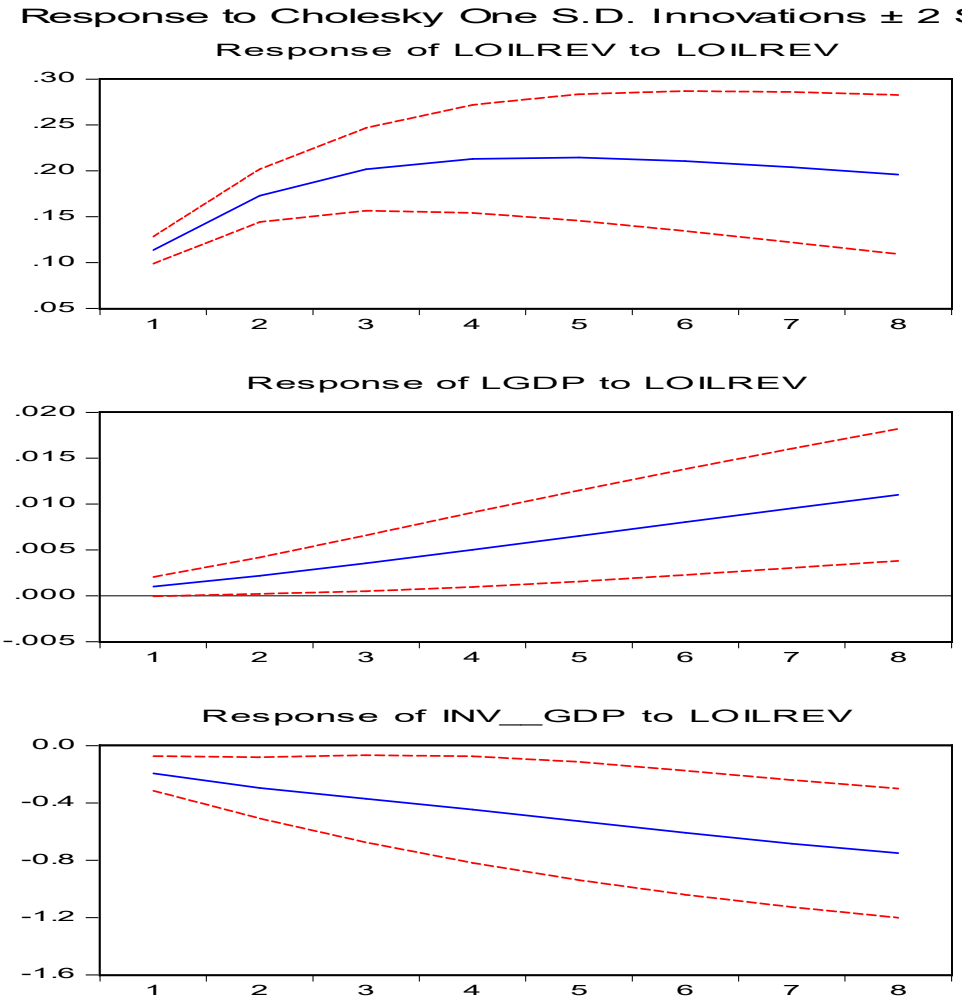
Cholesky Ordering: LOILREV LTAXES LGDP INV__GDP

Source: Author's computation using Eview 9, 2021

The above table shows the result variance decomposition where period 1 represents short run relationship and period 5 represents a long run relationship. The result shows that the variables are strong endogenous on themselves both in long run and short run. However, each of the variables shows strong exogenous on other variables both in the long run and short run with the values (%) increasing in long run.

Impulse Response Analysis

Figure 2: the result of impulse response on the responses of GDP and investment resulting from Oil Revenue shocks.



The blue lines in the impulse response result represents the impulse response of the variables to shocks in oil revenue. The red lined represent the 95% confidence limit. The impulse response function must lie between the two 95 % confidence limit functions. When the blue impulse response function lies below zero, it implies that the variable is insignificance to the shocks: and significance when it lies above zero.

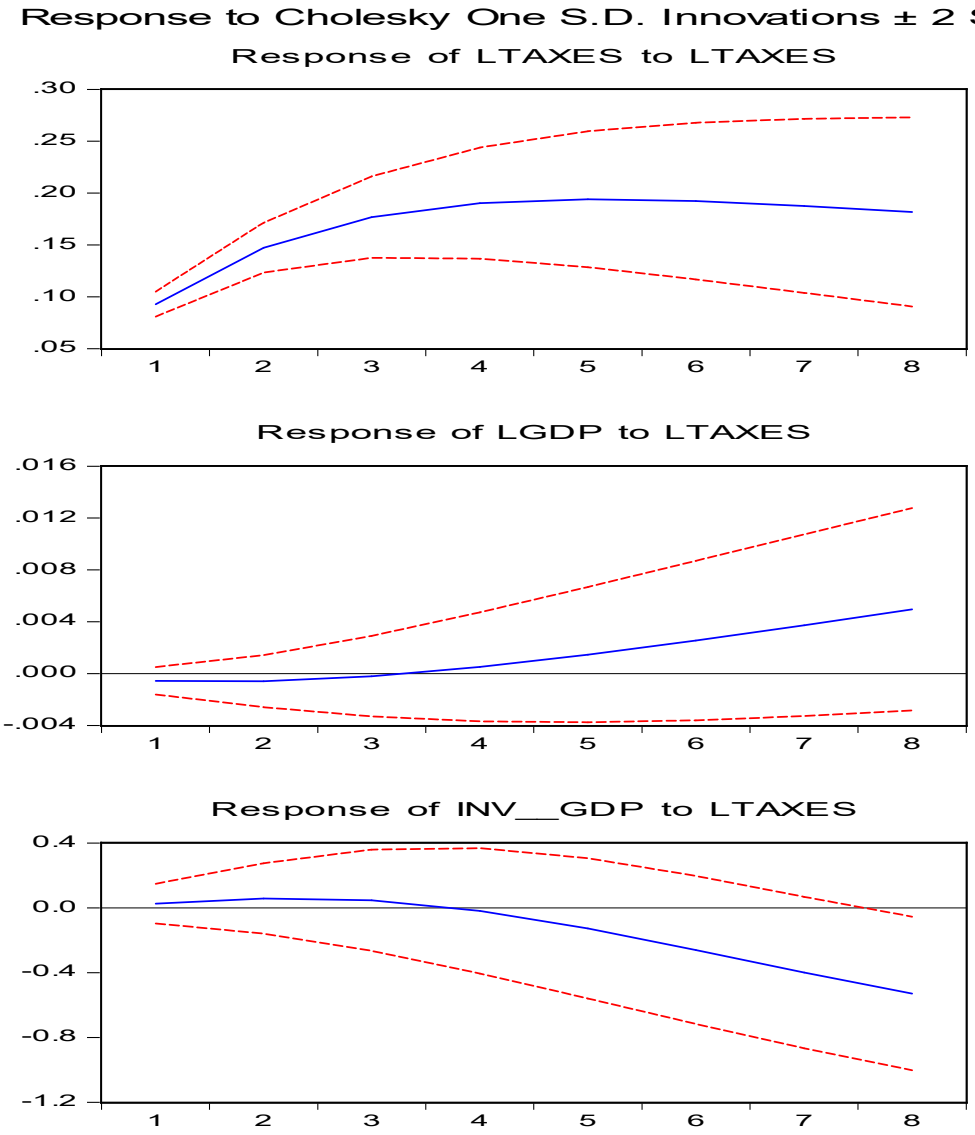
The first panel (response of LOILREV to LOILREV) exhibit the response of oil revenue to its own shocks which is significant and positive in sort run. In short run the response is also significant but negative.

The second panel (response of LGDP to LOILREV) shows the response of GDP to shocks in oil revenue. The gross domestic product indicate a significant and positive response to oil revenue shocks both in long run and short run. This may not be unconnected with the fact that Nigeria rely heavily on oil.

The third panel ((response of INV_GDP to LOILREV) represents the response of aggregate investment to shocks in oil revenue. The result shows that aggregate investment response negatively and insignificant to shocks in oil revenue. This may be connected with the fact that Nigerian oil revenue is not channeled to stimulate investment in the economy. This result is not contrary to an empirical investigation by Adebayo (2018) that “oil shocks highly affect policy variables in the short run and transfer the

effect to other macroeconomic variables in long run.

Figure 3: the impulse response result of the response of gross domestic product and aggregate investment to shocks in government revenue from taxes.



The first panel (response of LTAXES to TAXES) exhibit the response of tax revenue to its own shocks which is significant and positive in short run. In short run the response is also significant but stable.

The second panel (response of LGDP to LTAXES) shows the response of GDP to shocks in tax revenue. The gross domestic product indicate an insignificant and positive response to oil revenue shocks in short run but significantly positive in long run. This shows that Nigerian recent tax policies are sensitive to GDP.

The third panel (response of INV_GDP to LTAXES) represents the response of aggregate investment to shocks in tax revenue. The result shows that aggregate investment response negatively and significant to shocks in tax revenue in short run but insignificantly negative in long run. This shows that government tax policies are discouraging

investment in the economy.

Conclusion

Based on the results of this research work, it can be concluded that fiscal policy shock leads to macroeconomic fluctuations in Nigeria where the GDP responds significantly positive to taxes and oil revenue shocks. However, aggregate investment responds negatively and insignificant to shock in tax revenue. The positive reaction of the GDP to shocks in oil revenue showed empirical evidence which suggests the fact that, the revenue base of Nigeria is poorly diversified and managed; and heavily dependent on oil exports. The production growth in other sectors—particularly that of the manufacturing and agricultural sector in terms of exports has been very low in the country since the discovery of oil (Ismail, Adegbemi, & Misbaudeen, 2013). It has been concluded on the basis of the evidence available that the country's economy is vulnerable to recession due to lack of proper tax administration and too dependence on the oil revenue. Furthermore, judging from the findings of this study, Nigeria has not managed the taxes and oil revenue well to achieve economic growth through diversification. The country has failed to save in a fund to diversify investment in more productive portfolios due to the presence of weak political and democratic authority which have promotes the institutionalization of corruption, bad governance and outright disrespect for the process of the constituted authority to manage taxes and oil revenues to attain the desired economic prosperity. Finally, Nigeria requires a well-coordinated fiscal and monetary policies to stimulate rapid economic growth in all sectors and diversify the economy.

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