

Impact of Fiscal Policy Variables and Oil Price Shocks on Sectoral Output Growth in Nigeria: Evidence from Vector Error Correction Model

Arulogun, O. O*¹, Aruwaji, A. M*², Adekeye E.S*³ and Peters F.F*⁴

¹Department of Economics, ^{2,4}Department of Accounting,

Ladoke Akintola University of Technology, Ogbomosho Oyo State, Nigeria.

³Department of Economics, Thomas Adewumi University, Oko Kwara State, Nigeria.

*Corresponding Author E-mail: ooarulogun@lautech.edu.ng

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Abstract

Nigeria reliance on oil production as a source of income has enormous economic ramifications. Agriculture was abandoned in lieu of oil, which became Nigeria's principal source of revenue and was expected to bring great economic growth and wealth. However, there have been sequences of oil price changes over the last four decades, which has impeded Nigeria's macroeconomic objectives. This study looked at the impact of fiscal policy variables and oil price shocks on sectoral output growth in Nigeria: Evidence from Vector Error Correction Model. This study relied on secondary data. The data were sourced from Central Bank of Nigeria (CBN) Statistical Bulletin, National Bureau of Statistics (NBS), World Economic and Financial Surveys for the period of 1981 and 2018 and econometric statistics such as multiple regression and Johansen Co-integration test were used to analyze the data collected. The results showed that government revenue reduces agricultural output out by (6.768981) 6.8 % in the long run, this shows that there was negative relationship between government revenue and agricultural output. Also, one percent increase in government expenditure, reduces agricultural output out (.5488866) by 0.55 % in the long run, this shows that there was a negative relationship between the variables in the long run. Government revenue increases industrial output by 1.2 % in the long run, this shows that there was positive relationship between Government revenue and industrial output. Also, one percent increase in Government expenditure, increases industrial output by 2.45 % in the long run, this shows that there was a positive relationship between the variables in the long run. Government expenditure, increases trade and service output by 0.83 % in the long run, this shows that there was a positive relationship between the variables in the long run. One percent increase in external reserve, decreases trade and service output by 0.52% in the long run, this shows that there was negative significant relationship between external reserve and trade and service output in the long run. The study recommends that Government should implement structural reform that will be targeted at eliminating structural inflexibility, enhance production, and promote global competitiveness of our products and services. Such reforms should aim at fashioning institutions to prevent politicians from violating inter-temporal budget constraints, and more generally, from engaging in short-sighted, time inconsistent policies that in the end impasse economic growth.

Keywords — Fiscal policy variables, oil price shocks, sectoral output, Vector Error Correction Model, economic growth, macro-economic objectives.

1.0 Introduction

Developed and emerging economies have placed a high value on macroeconomic policies and their impact on development (Andabai, 2016). One of the areas in the economics literature that can stimulate the rate of growth and development in an economy is fiscal policy and its effect on real sector growth in Nigeria. According to an empirical study conducted by (Omitogun and Ayinla, 2007), increased government spending promotes real sector growth and development. The consequence is that a greater share of total spending should go toward capital investments that help the real sector grow and thrive. In any contemporary economy, efficient and effective government fiscal policy promotes real sector growth and development (Nzotta, 2014).

Government interference in the economy by fiscal policy, according to Alex and Ebieri (2014), has been to manipulate the receipt and expenditure sides of the budget to achieve those national objectives. According to Abdulrauf (2015), the use of fiscal policy as a major tool for economic stabilization is very important in every society, especially in LDCs. Crude oil has been highly important to the global economy since its discovery in the 1800s as an energy source. According to Gronwald (2008), the value of oil has risen to the point that, in the event of a world without oil, all major distribution networks that induce economic transactions on a global scale will fail, and the world economy will collapse.

Crude oil is Nigeria's largest source of foreign exchange earnings and the country's primary source of income, and its high dependency serves as the foundation for the country's revenue distribution, budgeting, and capital allocations as a result, the upward or downward movement in oil prices (fluctuation) has a multiplier impact on crude oil and Nigerian economic development. Therefore, the study examined impact of fiscal policy variables and oil price shocks on sectoral output growth in Nigeria: Evidence from Vector Error Correction Model.

Statement of the Problem

According to (Englama 2010) the absolute dependence on oil export revenue has made the level of Nigeria economy vulnerable to sudden oil price movements. Factors such as periods of favourable oil price shock triggered by conflict in oil-producing countries of the world, rise in the demand for the commodity by the consuming nations due seasonality factors, trading positions, and so on; enhance Nigeria favourable terms of trade. On the converse, when crude oil prices are low, occasioned by factors such as low demand, seasonality factors, excess supply, Nigerian economy experiences unfavourable terms of trade evidenced by budget deficit and slow economic growth.

Nigeria has a long profile of fiscal imbalances, with respect to running large fiscal deficits. The imbalances have been costly to the economy, fuelling inflation problem and reducing the competitiveness of the non-oil sector, thereby restraining economic development (Kwakwa, 2003). Over the last four decades, between 1970 and 2017, for most of the years, the fiscal operations of the Nigerian government have resulted in deficits. This is as a result of the volatility in revenue generations combined with increasing expenditure profile of government, thus making the incidence of fiscal deficits unavoidable (Ezeabasili and Mojekwu, 2011). This study therefore examined impact of fiscal policy variables and oil price shocks on sectoral output growth in Nigeria.

Objectives of the Study

The general objective of the study was to evaluate impact of fiscal policy variables and oil price shocks on sectoral output growth in Nigeria. The specific objectives were to:

- i. examine the extent to which fiscal policy and oil price shocks impact on agricultural sector in Nigeria.
- ii. analyze the effect of fiscal policy and oil price shocks on industrial sector in Nigeria.
- iii. determine the how fiscal policy and oil price shocks influence trade and services sectors in Nigeria.

Literature Review

Omitogun and Ayinla (2007) attempt to establish whether there is a link between fiscal policy and economic growth in Nigeria using the Solow growth model estimated with the use of ordinary least square (OLS) method. It was found that fiscal policy has not been effective in the area of promoting sustainable economic growth in Nigeria. This finding did not agree with the Keynesian theory which is anchored on the need for an active policy to sustain economic growth. This is a research gap on the factors capable of hampering the effectiveness of fiscal policy.

Ogbole, Sonny and Isaac (2011) focused on the comparative analysis of the impact of fiscal policy on economic activities in Nigeria during regulation and deregulation, using the econometric methods of co-integration and error correction model. The study indicates that there is a difference in the effectiveness of fiscal policy in stimulating economic growth during and after regulation period. They recommend that government fiscal policy should refocus and redirect government expenditure towards production of goods and services so as to enhance GDP growth. This study fails to determine the contribution of fiscal policy on the economy during and after regulation.

Peter and Simeon (2011) adopted vector auto regression (VAR) and error correction mechanism techniques to ascertain impact of fiscal policy variables on Nigerian economic growth between 1970 and 2009. The study revealed that there is a long-run relationship between fiscal policy variables and economic growth in Nigeria. Nevertheless, the research fails to consider other variables, such as interest rate, exchange rate, in defining fiscal policy and its influence on economic growth.

Rasheed (2010) investigated the productivity in the Nigerian manufacturing subsector using co-integration and an error correction model. The study indicates the presence of a long-run equilibrium relationship index for manufacturing production, determinants of productivity, economic growth, interest rate spread, and bank credit to the manufacturing subsector, inflation rates, foreign direct investment, exchange rate and quantity of graduate employment. This finding has research gap on the area of factors that affect manufacturing sector in Nigeria.

Nurudeen and Usman (2010) investigated the effect of government expenditure on economic growth, in a disaggregated analysis and observed that rising government expenditure has not translated to meaningful development as Nigeria still ranks among world's poorest countries. The study revealed that government total capital expenditure (TCAP), total recurrent expenditures (TREC), and government expenditure on education (EDU) have negative effect

on economic growth. On the contrary, rising government expenditure on transport and communication (TRACO), and health (HEA) results to an increase in economic growth.

Theoretical underpinning

Mainstream theory: **Mainstream theory of economic growth:** postulates that production is the most important determinant of growth of any economy, and production which is the transformation of matter in some way, requires energy. This theory categorizes capital, labour and land as primary factors of production; these exist at the beginning of the production period and are not directly used up in production (though they can be degraded or added to). While energy resources (such as; oil and gas, fuels, coal) are categorized as intermediate inputs, these are created during the production period and are entirely used up during the production process. In determining the marginal product of oil as an energy resource useful in determining economic growth, this theory considers in one part its capacity to do work, cleanliness, amenability to storage, flexibility of use, safety, cost of conversion and so on, it also considers other attributes such as; what form of capital, labour or materials it is used in conjunction with. The theory estimates the ideal price to be paid for crude oil as one that should be proportional to its marginal product (Oriakhi and Osazee, 2013).

Linear/Symmetric: The Linear/Symmetric relationship theory of growth: which has as its proponents, Hamilton (1983), Gisser (1985), Goodwin (1985), Hooker (1986) and Laser (1987) postulated that shock in GNP growth is driven by oil price shock. They hinged their theory on the happenings in the oil market between 1948 and 1972 and its impact on the economies of oil-exporting and importing countries respectively. Hooker (2002), after rigorous empirical studies demonstrated that between 1948 and 1972 oil price level and its changes exerted influence on GDP growth significantly. Laser (1987), who was a late entrant into the symmetric school of thought, confirms the symmetric relationship between oil price shock and economic growth. After an empirical study of her own, she submitted that an increase in oil prices necessitates a decrease in GDP, while the effect of an oil price decrease on GDP is ambiguous, because its effects varied in different countries. Oriakhi and Osazee (2013).

Asymmetry-in-effects theory of economic growth: Asymmetry-in-effects theory of economic growth used the U.S economy as a case study. The theory posits that the correlation between crude oil price decreases and economic activities in the U.S economy is significantly different and perhaps zero. Mark *et al.* (1994), members of this school in a study of some African countries, confirmed the asymmetry in effect of oil price shock on economic growth. Federer (1996) another member of this school explained the asymmetric mechanism between the influence of oil price shock and economic growth by focusing on three possible ways: Counter-inflationary monetary policy, sectoral shocks and uncertainty. He finds a significant relationship between oil price increases and counter-inflationary policy responses. Balke (1996) supports Federer's position/submission. He posited that monetary policy alone cannot sufficiently explain real effects of oil price shock on real GDP (Oriakhi and Osazee, 2013).

3.0 Methodology

This study empirically examined fiscal policy and oil price shocks impact on sectoral output growth in Nigeria between 1981 and 2018. The research designs adopted in this study was historical research design. It was used to study and appraise the chronological impact of fiscal policy variables and oil price shocks on sectoral output growth in Nigeria. For the purpose of this study, the researcher made use of secondary data obtained through from Central Bank of Nigeria (CBN) Statistical Bulletin, National Bureau of Statistics (NBS), World Economic and Financial Surveys. The period covered by the study is from 1981 to 2018.

In order to achieve the stated objective of the study, the time series statistics of the included variables will be used in the estimation procedure. The ordinary least square (OLS) method of regression analysis will be used to estimate the model and Vector Error Correction Models (VECMs) to test for long run relationship among the variables.

Model 1

To determine extent of fiscal policy variables and oil price shocks impact on agricultural sector in Nigeria.

$$AGRICQ = f(GREV, GEXP, EXTREV, FEXR, EXTDEBT, OPS, \mu) \quad (1)$$

$$AGRICQ = \alpha + \beta_1 GREV + \beta_2 GEXP + \beta_3 EXTREV + \beta_4 FEXR + \beta_5 EXTDEBT + \beta_6 OPS + \mu \quad (2)$$

Model 2

To analyze the extent of fiscal policy variables and oil price shocks impact on industrial sector in Nigeria

$$INDSTQ = f(GREV, GEXP, EXTREV, FEXR, EXTDEBT, OPS, \mu) \quad (3)$$

$$INDSTQ = \alpha + \beta_1 GREV + \beta_2 GEXP + \beta_3 EXTREV + \beta_4 FEXR + \beta_5 EXTDEBT + \beta_6 OPS + \mu \quad (4)$$

Model 3

To determine the impact of fiscal policy variables and oil price shocks on trade and services sectors in Nigeria

$$TRADSEVQ = f(GREV, GEXP, EXTREV, FEXR, EXTDEBT, OPS, \mu) \quad (5)$$

$$TRASEVQ = \alpha + \beta_1 GREV + \beta_2 GEXP + \beta_3 EXTREV + \beta_4 FEXR + \beta_5 EXTDEBT + \beta_6 OPS + \mu \quad (6)$$

Where:

GREV= Government Revenue

GEXP = Government Expenditure

EXTREV = Foreign external reserve

EXTDEBT = External debt

FER = Foreign exchange rate

INDSTQ = Industrial Output

AGRICQ =Agriculture Output

TRADSERV= Trade and Services Output

OPS = Oil Price Shock

4.0 Results and Discussion

Extent to which fiscal policy and oil price shocks impact on agricultural sector in Nigeria

Findings from the result on the extent to which fiscal policy and oil price shocks impact on agricultural sector in Nigeria in model one, according Table 1 and 2 Johansen normalization restriction imposed table, one percent increase in GREV reduce AGRICQ out by 6.7 % in the long run, this shows that there was negative relationship between GREV and AGRICQ. Also, one percent increase in GEXP, reduces AGRICQ by 0.54 % in the long run, this shows that there was a negative relationship between the variables in the long run. One percent increase in EXTREV, will increase AGRICQ by 5.8 % in the long run, this shows that there is a positive significant relationship between EXTREV and AGRICQ in the long run. One percent increase in EXTDEBT will have positive effect on AGRICQ by 1.2% in the long run, this also shows that there was a negative significant relationship between EXTDEBT and AGRICQ in the long run. One percent increase in OPS, will decrease AGRICQ by 12.3 % in the long run, this shows that there was a positive significant relationship between OPS and AGRICQ in the long run. Coefficient is statistically significant confirmed by P which is 0.000. Overall, the output indicates that the model fits well. The coefficient on AGRICQ in the cointegrating equation is statistically significant, as well as all the adjustment parameters

Table 1: Vector Error- Correlation Model.

Equation	Parms	RMSE	R-sq	chi2	P>chi2
AGRICQ	16	.14047	0.8389	98.92001	0.0000
GREV	16	.278439	0.7143	47.51034	0.0001
GEXP	16	.182923	0.7637	61.40595	0.0000
FEXR	16	.292762	0.6314	32.54908	0.0085
EXTDEBT	16	1.31188	0.3847	11.87798	0.7523
OPS	16	.407565	0.6957	43.44629	0.0002
EXTREV	16	.511091	0.6546	36.00344	0.0029
AIC = 5.751566		HQIC = 7.561706		SBIC = 10.99531	

Source: Author's Computation (2024)

Table 2: Johansen normalization restriction imposed

Beta	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
_cel						
AGRICQ	1					
GREV	6.768981	2.406047	2.81	0.005	2.053216	11.48475
GEXP	.5488866	3.560494	0.15	0.877	-6.429553	7.527326
FEXR	-7.09091	1.694363	-4.19	0.000	-10.4118	-3.77002
EXTREV	-5.839098	.877659	-6.65	0.000	-7.559278	-4.118918
EXTDEBT	-1.234407	.3590461	-3.44	0.001	-1.938124	-.5306898
OPS	12.01927	4.325887	2.78	0.005	3.540689	20.49785
_cons	30.42792					

Source: Author's Computation (2024)

Effect of fiscal policy and oil price shocks on industrial sector in Nigeria

Findings from the result of analysis on the effect of fiscal policy and oil price shocks on industrial sector in Nigeria in model two. according to Table 3 and 4 Johansen normalization restriction imposed table, one percent increase in grev increases INDUSTQ by 1.2 % in the long run, this shows that there was positive relationship between GREV and INDUSTQ Also, one percent increase in GEXP, increases INDUSTQ by 2.45 % in the long run, this shows that there was a positive relationship between the variables in the long run. One percent increase in EXTREV, decreases INDUSTQ by 1.38 % in the long run, this shows that there was negative significant relationship between EXTREV and INDUSTQ in the long run. One percent increase in EXTDEBT will have positive effect on INDUSTQ by 0.11 % in the long run, this also shows that there was a positive insignificant relationship between EXTDEBT and INDUSTQ in the long run. One percent increase in OPS, will decrease INDUSTQ by 1.34 % in the long run, this shows that there was a negative insignificant relationship between OPS and INDUSTQ in the long run. One percent increase in FEXR, decreases INDUSTQ by 2.4 % in the long run, this shows that there was a negative significant relationship between FEXR and INDUSTQ in the long run.

Coefficient is statistically significant confirmed by P which is 0.000. Overall, the output indicates that the model fits well. The coefficient on INDUSTQ, in the cointegrating equation is statistically significant, as well as all the adjustment parameters.

Table 3: Vector Error- Correlation Model

Equation	Parms	RMSE	R-sq	chi2	P>chi2
INDUSTQ	16	.171791	0.7630	61.17221	0.0000
GREV	16	.285177	0.7003	44.40441	0.0002
GEXP	16	.146165	0.8491	106.9334	0.0000
FEXR	16	.307927	0.5922	27.59654	0.0353
EXTDEBT	16	1.2758	0.4180	13.64883	0.6249
OPS	16	.475819	0.5853	26.81597	0.0436
EXTREV	16	.489258	0.6834	41.0221	0.0006
AIC =4.885924		HQIC 6.696064	=	SBIC = 10.12967	

Source: Author's Computation (2024)

Table 4: Johansen normalization restriction imposed

Beta	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
_cel						
INDUSTQ	1					
GREV	-1.289352	.3835232	-3.36	0.001	-2.041043	-.53766
GEXP	-2.454814	.5570365	-4.41	0.000	-3.546585	-1.363042
FEXR	2.4724	.2748903	8.99	0.000	1.933625	3.011175
EXTREV	1.389756	.1419115	9.79	0.000	1.111614	1.667897
EXTDEBT	-.105235	.0544496	-1.93	0.053	-.2119541	.0014842
OPS	1.346492	.5702647	2.36	0.018	22879362.46419	
_cons	-3.598982					

Source: Author's Computation (2024)

How fiscal policy and oil price shocks influence trade and services sectors in Nigeria

Findings from the result of analysis on how fiscal policy and oil price shocks influence trade and services sectors in Nigeria in model three, according to table 4.3.4: and 4.3.5 Johansen normalization restriction imposed table, one percent increase in GREV increases tradservq by 1.4% in the long run, this shows that there was positive relationship between GREV and tradservq.

Also, one percent increase in GEXP, increases TRADSERVQ by 0.83 % in the long run, this shows that there was a positive relationship between the variables in the long run. One percent increase in EXTREV, decreases TRADSERVQ by 0.52% in the long run, this shows that there was negative significant relationship between EXTREV and TRADSERVQ in the long run. One percent increase in EXTDEBT will have negative effect on TRADSERVQ by 0.125 % in the long run, this also shows that there was a negative significant relationship between

EXTDEBT and TRADSERVQ in the long run. One percent increase in OPS, will decrease TRADSERVQ by 0.38 % in the long run, this shows that there was a negative insignificant relationship between OPS and TRADSERVQ in the long run. One percent increase in *FEXR*, decrease TRADSERVQ by 1.06 % in the long run, this shows that there was a negative significant relationship between *FEXR* and TRADSERVQ in the long run.

Coefficient is statistically significant confirmed by P which is 0.000. Overall, the output indicates that the model fits well. The coefficient on TRADSERVQ, in the cointegrating equation is statistically significant, as well as all the adjustment parameters.

Table 5: Vector Error- Correlation Model

Equation	Parms	RMSE	R-sq	chi2	P>chi2
TRADSEV	16	.087309	0.9089	189.4501	0.0000
GREV	16	.258673	0.7534	58.06314	0.0000
GEXP	16	.14293	0.8557	112.6973	0.0000
FEXR	16	.336371	0.5134	27.59654	0.0353
EXTDEBT	16	1.31993	0.3771	20.0491	0.2180
OPS	16	.353323	0.7713	64.09149	0.0000
EXTREV	16	.558017	0.5882	27.14141	0.0399
AIC =3.854959		HQIC = 5.665099		SBIC = 9.098703	

Source: Author's Computation (2024)

Table 4: Johansen normalization restriction imposed

Beta	Coef.	Std. Err.	Z	P> z	[95% Conf. Interval]	
_ce1						
TRADSERV	1					
GREV	-1.418988	.2051358	-6.92	0.000	-1.821047	-1.016929
GEXP	-.8332221	.2759645	-3.02	0.003	-1.374103	-.2923416
FEXR	1.067699	.1264631	8.44	0.000	.8198362	1.315563
EXTREV	.5211359	.0735277	7.09	0.000	.3770243	.6652474
EXTDEBT	.1258516	.0285892	4.40	0.000	.0698178	.1818855
OPS	.3876208	.3507169	1.11	0.269	-.2997716	1.075013
_cons	-3.421778					

Source: Author's Computation (2024)

5.0 Conclusion and Recommendations

This study was able to examine the impact of fiscal policy variables and oil price shocks like government expenditure, revenue public debt, external reserve, foreign exchange rate on sectoral output growth using Vector Error Correction Models (VECMS) to test for long run relationship among the variables. The following sectors were examined: agricultural, industrial, trade and services. It was deduced that public expenditure have a long-lasting positive impact on Agricultural output growth. The empirical result shows that Foreign exchange rates and external debt both have a negative significant effect on the industrial sector in Nigeria both in the short run and long run. The implication for Nigeria is that the unstable foreign exchange rates damages investments flows into the country, and reduces return to capital in the industrial sector which ultimately reduces the level of investment thereby creating unemployment problem and lack of confidence by investors. But other components of fiscal policy impacted industrial sector positively both in the short run and the long run in Nigeria. Oil price shocks have a negative effect on the industrial sector in Nigeria. government revenue and expenditure increase trade and services sector in the country, this shows that taxation and expenditure on the sector was not counter-productive to the growth of the sector. Based on the findings in the course of this study, the following recommendations were suggested:

- i. Government should also consider harnessing its revenue potentials by expanding its revenue base via effective and efficient taxation system, diversification of Nigeria's revenue base by tapping into our solid minerals and agricultural potentials.
- ii. Government should put in place flexible policies that will create enabling environment for industrial sectors to thrive so as to complement government efforts in trade and services enhancement.
- iii. Government should implement structural reform that will be targeted at eliminating unstable exchange rates in the country, which will create enabling environment for industrial sectors to thrive so as to complement government efforts in trade and services enhancement.
- iv. Government should implement structural reform that will be targeted at eliminating structural inflexibility, enhance production, and promote global competitiveness of our products and services. Such reforms should aim at fashioning institutions to prevent politicians from violating inter-temporal budget constraints, and more generally, from engaging in short-sighted, time inconsistent policies that in the end impasse economic growth.

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