



# Government Expenditure and its Effect on the Industrial Sector in Nigeria

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## Authors' contributions

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

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## ABSTRACT

This study examined the effect of government expenditure on the growth of the industrial sector in Nigeria. A regression analysis was applied in the analysis of the data. The study found that government capital expenditure has positive and significant effect on the industrial sector; tax has positive and significant effect on the industrial sector; monetary policy rate has positive and significant effect on the growth of the industrial sector, while real interest rate has a negative and no significant effect on the growth of the industrial sector. From the findings, we conclude that government policy has significant effect on the growth of the Nigerian industrial sector. It recommends that government fiscal policies such as public expending should be directed toward improving the quality of infrastructures in the country, especially the power sector, so that the cost of production can reduce. Government should examine should create an enabling environment with the right infrastructure, improve the security situation and reduce the epileptic power supply related issues. Also, government should examine its monetary policy variables such as interest rate and monetary policy rate. Furthermore, to promote growth, government should develop the industrial sectors of the economy through its capital expenditure.

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## 1. INTRODUCTION

The growth and development of the industrial sector has been the major policy thrust of the Nigerian government since after independence. This is because of its perceived positive relationship between industrialization and the general growth and development of the economy. For developing countries such as Nigeria, the need for economic development cannot be over-emphasized – with the increasing levels of unemployment, rising inflation, deficits in infrastructure and difficult economic environment, the role of government in driving economic growth and development is one that has been given considerable attention.

Governments in developing countries have been tasked with the monumental responsibility of driving economic growth through raising funds and channeling those funds for developmental purposes. To enhance economic growth and development, governments in developing countries can use monetary and fiscal policy. Monetary policy plays a crucial role in increasing development through the influence of cost, controlling inflation, directing payments and making credit available to critical sectors of the economy. As one of the developing countries in Africa that is actively encouraging national development, Nigerian government understands the importance of ensuring the welfare of its citizens and improving their standard of life as an important element of national development. Across board, the success of any development initiative is assessed based on increasing level of economic growth. Economic growth is normally expected to enhance productive factors – which in turn, given a conducive environment, should stimulate large scale economic development over a considerable period of time. Consistent and stable economic growth should have a positive impact on the welfare and living conditions of the people through increasing the population's income, and the government has a responsibility and obligation to improve the livelihood of its people.

For this to be attained, it is important for the government to empower and encourage productive activities of the private sector – as the private sector plays an important role in improving people's welfare. Consequently, stimulating economic growth through improving

the productivity and efficiency of the industrial sector is considered one of many methods of increasing productivity of the private sector. To maintain and sustain high levels of economic growth, it is important that governments in developing countries such as Nigeria carefully channel and direct government spending towards enhancing the industrial sector. Thus far, an extensive debate in the literature has discussed the role of government in spurring growth and development in public economic theory. The grey areas or controversy usually focuses on the extent of government involvement in economic activities and what role the government should play; should the government be actively involved in economic activities or should the government be focused on creating the enabling environment that allows the private sector and private individuals to thrive [1,2]?

Given the numerous challenges faced by the industrial sector in Nigeria, the government has adopted several measures to encourage and stimulate the industrial sector. In the 1960s, 1970s and early 1980s, government policy was aimed at protecting the infant industries in the manufacturing sector including the Small and medium scale enterprises [3]. The deregulation of the economy, macroeconomic reforms, investment policy reforms and the financial sector reforms such as the establishment of Second Tier Security Exchange Market were directed towards stimulating the industry sector. The Nigeria industrial revolution plan of 1960, Nigerian Industrial Reform master plan of 1980 and other structural and institutional reforms are to stimulate the sector to achieve set monetary and macroeconomic goals such as increased productivity of the economy as in other developed countries.

However, the extent to which these policies have affected the growth of the sector remain a matter of interest. An examination of the industrial sector shows that the sector is lagging behind compared with other countries such as Indonesia, Singapore, South Korea and Malaysia. The poor implementation of these policies has resulted in huge idle resources, poor capacity utilization, increased rate of unemployment, huge importation and over-dependence on the oil sector which has threatened the Nigerian economy.

To make matters worse, in the last one year in Nigeria, the corona virus pandemic had a huge impact on global oil market as oil prices came crashing down, consequently leading to a sharp reduction in foreign exchange earnings [4]. The implication on the macroeconomic performance in the Nigerian economy has been enormous – the balance of payment deficit problems has worsened because of the excessive dependence and reliance on imports for capital goods and domestic consumption, dysfunctional economic and social infrastructure, negligence of the agricultural sector and drastic decline in the capacity utilization in the industry, amongst others. In general, this has resulted in increasing poverty, declining standards of living, fallen income and enormous suffering for the Nigerian people [3]. Given the significance of the industrial sector as the bedrock and engine of economic growth in Nigeria, it has become important to revisit the issue of increasing the productivity of the sector as a means of attaining sustainable economic growth and returning the economy to the path of development.

It is for this reason that the issue of government expenditure in the Nigerian industrial sector needs to be revisited. Government expenditure has been on the increase as a result of the enormous demand for economic and social infrastructures such as motorable roads, educational needs, power generation, and health (Alao, 2006). More importantly, there is also the need for increase in external and internal security – as a result of the increasing tensions caused by militants, Boko Haram, bandits and other criminal elements that have continued to disturb the Nigerian state. Statistics from the Central Bank of Nigeria and National Bureau of Statistics reveal that government expenditure (recurrent and capital) has increased enormously. For example, government total recurrent expenditure increased from N13.97 billion in 1993 to N1405.84 billion in 2019. A similar expenditure pattern was observed for capital expenditure which increased from N5.51 billion in 1993 to N316.69 billion. In the same vein, a breakdown of the composition of government expenditure shows that expenditure on internal security, defense, education, health, construction, agriculture, transport and communications increased during the period.

Thus far, the research investigating government expenditure and its impact on the industrial sector and economic growth and development has been mixed. For example, Ademola [1]

investigated the relationship between government expenditure in the manufacturing sector and economic growth and found a positive impact of government expenditure on economic growth, but so far, no meaningful development has taken place. Falade and Olagbaju [2] had a similar finding in their examination of the relationship between government expenditure on the manufacturing sector and economic growth. The findings of the econometric result indicated that real government recurrent and capital expenditure had a significant and positive influence on output. And this continues to be an issue of concern – where government expenditure enhances growth but fails to translate into any meaningful and sustainable economic development.

However, some other research tends to have a contrary view on the relationship between government expenditure on the manufacturing sector. Akpan [5] used a disaggregated analysis to determine the components (that include recurrent, capital, economic, administrative, social and community services) of government expenditure that influence economic growth. The author found that there was no significant relationship between the various components of government expenditure and economic growth in Nigeria. With these conflicting views on the impact of government expenditure on the industrial sector, it is important that these issues be revisited. The aim of this research is to examine the impact of government expenditure on the industrial sector in Nigeria to see if the expenditure contributes in any meaningful way to an increase in economic growth and economic development. The rest of this paper is organized as follows: the theoretical literature and empirical literature review are discussed, the methodology and findings of the research are explained in great details. Finally, the conclusion and recommendations are explained.

## **2. LITERATURE REVIEW**

### **2.1 Theoretical Foundation**

#### **2.1.1 Neo-classical growth theory**

This is an economic growth theory that was propounded by Robert Solow and Trevor Swan over 40 years ago. The neo-classical growth theory concentrates on the process through which capital-labour ratios approach long-run equilibrium. The aim of the theory is to enhance the understanding of specific important elements

in the growth. The theory posits that the economic growth of a country will decrease with increasing population and finite resources. Such assumption has serious consequences, as classical growth theory economists believed that a temporary increment in gross domestic product would lead to population expansion, which in turn would limit a country's resources, eventually lowering gross domestic product [6].

The model states that in the absence of external change in technology – all economies will eventually converge to zero growth. As such, the neoclassical theory states that rising gross domestic product should be regarded as a temporary phenomenon that results from short term equilibrating changes or technological change as an economy approaches long run equilibrium [7]. The marginal product of additional units is assumed to decline and thus an economy eventually moves back to a long-term growth-path with the real GDP growing at the same rate as the growth of the workforce plus factors to reflect improving productivity.

Neo-classical economists who subscribe to the Solow and Swan model believe that to raise an economy's long term trend rate of growth requires an increase in labour supply and also a higher level of productivity of labour and capital [8]. Differences in the rate of technological change between countries are said to explain much of the variation in growth rates. The neo-classical models treat productivity improvements as an exogenous variable which means that productivity improvements are assumed to be independent of the amount of capital investment. An important element of the neo-classical theory is the description of the equilibrium of a competitive economy over an extended period of time. The theory distinguishes between two types of equilibria, momentary equilibrium and long run equilibrium. Momentary equilibrium can be described as periods when the stock of capital, technological knowhow and working population can be taken as fixed. In the long run equilibrium, none of these three variables are taken as given. The theory clearly suggests that the bulk of economic growth results from technological process; as such the low capital-labour ratios in developing countries should result in high rates of returns on investments.

### **2.1.2 Endogenous growth theory**

The emergence of endogenous growth theory in the 1980s resulted as an alternative to the

neoclassical growth theory. It identified and questioned how gaps in wealth between underdeveloped and developed countries could persist when investments in capital such as economic and social infrastructure are subject to the law of diminishing returns [9]. Paul Romer, the economist, put forth the argument that change in technology is not an exogenous by-product of independent scientific innovation. He suggested that government policy, an enabling environment such as intellectual property law, as well as investment in research and development considerably help in enhancing endogenous innovation that fuels sustainable economic growth [10].

The endogenous growth theory has a different perspective on what causes economic growth and economic development. As earlier stated, the Neo-classical theory explains external factors responsible for economic growth and focuses on the importance of technology as a tool to enhance economic growth [6]. The endogenous theory takes a different position and stance. It argues that economic growth and prosperity can be influenced by internal processes such as innovation, human capital and investment capital, rather than external forces.

As a result, endogenous growth theorists believe that improvement and efficiency in productivity can be attributed to quicker innovation and increased investment in human capital [11]. Consequently, they emphasize the need for government and private sector institutions to encourage innovation and provide incentives for individuals and business to be inventive. There is also the central role of the accumulation of knowledge as a determinant of growth i.e., knowledge industries such as telecommunications, electronics, software or biotechnology are becoming increasingly important in developed countries.

Proponents of endogenous growth theory believe that there are positive externalities to be exploited from the development of a high value-added knowledge economy which is able to develop and maintain a competitive advantage in fast growth within the global economy. They are of the opinion that the rate of technological progress should not be taken as a constant in a growth model-- government policies can permanently raise a country's growth rate if they lead to more intense competition in markets and help to stimulate product and process innovation. They believe that a key source of technological

progress is an increase in returns to scale from new capital investment and private sector investment, and that investment in human capital is an essential ingredient of long term growth. However, one of the weaknesses of the endogenous growth theory is that it is virtually impossible to authenticate with empirical evidence. Also, the endogenous growth theory has been questioned and queried for being based on postulations that cannot be precisely measured.

## **2.2 Empirical Review**

Ezeaku, Ibe and Ugwuanyi [12] assessed the industry effects of monetary policy transmission channels in Nigeria within the period 1981-2014. Techniques of analysis employed in the study are the Johansen cointegration and the error correction model (ECM). The findings of their research reveal that the private sector credit, interest rate, and exchange rate channels have negative effects on real output growth, both in the long run and in the short run. The results further show that, relatively, the degrees of the established effects are higher in the long run than in the short run. We employed the Johansen cointegration approach to determine the nature of the relationship that exists between our dependent variable and the independent variables. The results show that, in the Nigerian case, monetary policy transmission channels jointly have a long-run relationship with real output growth of the industrial sector, and disequilibrium in the system is corrected at the speed of 72.2% annually.

Moreira, Chaiboonsri and Chaitip[13] applied the Markov-switching models and a Bayesian VAR to verify empirical linkage between expected and effective short-term interest rates in Brazil. The main findings support the theoretical idea which argues that Central Bank can smooth adjustments of effective short-term interest rates, given that these last ones have effects on expected short-term rates, thereby influencing long-term interest rates, which are essential for controlling output activity and price changes. Also, the MS-models showed that the magnitude or significance of these empirical relationships is more under a higher response regime.

Kalu [14] analyzed the nature of the relationship between monetary policy and private sector credit in Nigeria. The cointegrating regression results revealed evidence of a long-run relationship between monetary policy and credit

to private sector. The long-run parameter estimate stability tests support cointegration in the presence of structural breaks. On the contrary, error correction model (ECM) results showed that changes in credit have positive and significant short-term influences on changes in monetary policy. The findings further indicate unidirectional causality running from credit to monetary policy.

Fu and Liu [15] investigated the monetary policy effects on corporate investment adjustment, using a sample of China's A-share listed firms within the period 2005 and 2012. The results showed that corporate investment adjustment is faster in expansionary than contractionary monetary policy periods. The study showed that an increase in the growth rate of money supply or credit, accelerates adjustment. The monetary channel was also found to have significant asymmetry, whereas the CRDT has none.

Li et al. [16] constructed a fixed effect model to study whether enterprise innovation performance would be affected under the interaction of fiscal and tax incentives and R&D investment. It is found that both tax incentives and financial subsidies have a significant impact on the innovation performance of manufacturing enterprises through the intermediary variable of R&D input, but private enterprises enjoying tax incentives have a crowding out effect on the improvement of innovation performance by R&D input. At the same time, the interaction between tax incentives and enterprises' R&D investment is more conducive to the improvement of enterprises' innovation performance, while the combination of financial subsidies and capitalization R&D investment also has a positive impact on the improvement of innovation performance.

Cao and Chen et al. [17] studied the impact of tax incentives on corporate innovation efficiency. The stimulation effect of R&D tax incentives may be heterogeneous across industries, enterprise-scale and tax type. Wang and Kesan [18] found that a stringent corporate tax policy with narrowly tailored R&D thresholds for tax credits can positively incentivize research and development and patent applications by small and medium enterprises (SMEs), and that value-added tax credits cannot incentivize research and development when they do not confer subsidies or a competitive advantage on small and medium enterprises. After the introduction of the personal income tax and income tax withholding, the

value-added tax stands out as one of the most important tax policy innovations. In many cases, the VAT was accompanied by a reduction in customs duties and tariffs tax policy in developing countries.

Alavuotunki, Haapanen, and Pirttilä [19] examined the impact of the introduction of the value-added tax on inequality and government revenues, using newly released macro data, and found income-based inequality has increased due to the VAT adoption, whereas consumption inequality has remained unaffected. Yang and Liu [20] used the method of propensity score matching and quantile regression analysis to explore the impact of fiscal and tax incentive policies on the substantive innovation of manufacturing enterprises from two perspectives. They found that fiscal incentivized research and development subsidy and tax incentive promoted the substantial innovation activities of Chinese manufacturing enterprises, but their effects were different. The incentive effect of fiscal incentivized research and development subsidy was obviously better than that of tax incentive policy. Compared with state-owned enterprises, non-state-owned enterprises' substantive innovation behavior is more sensitive to the stimulus feedback of fiscal incentivized research and development subsidy and tax incentive. However, state-owned enterprises based on institutional arrangement are closely connected with government politics, which weakens the effect of fiscal and tax policies. State-owned enterprises prefer the strategic innovation of seeking support. From the perspective of fiscal and tax incentives, the effect of incentivized research and development fiscal subsidies with "exclusivity" on innovative heterogeneous enterprises shows a trend of monotonicity increasing while the effect of tax incentives shows a trend of "monotonicity decreasing". Wang et al. [21] analyzed the impact of incentivized research and development subsidies on corporate innovation and found that different fiscal and tax policies (fiscal subsidies and tax incentives) have different incentive effects on the innovation of enterprises. Specifically, some scholars (Zhang and Du, 2019) [22] believe that, in the innovation input stage, the incentive effect of fiscal subsidies is more significant. In the output stage, the incentive effect of tax incentives is more significant.

### 3. METHODOLOGY

This study used ex-facto quasi-experimental research design to examine the effect of

government policies on the growth of the industrial sector. This study employed secondary data sourced from the Central Bank of Nigeria (CBN) statistical bulletin.

### 3.1 Model Specification

The study models are specified below:

$$IG = F(GCE, TAX, RIR, MPR) \quad (1)$$

Transforming equation 1 to econometrics form, we have equation 2 below:

$$IG = \alpha + \beta_1 GCE + \beta_2 TAX + \beta_3 RIR + \beta_4 MPR + \mu \quad (2)$$

Where:

IG = Growth of the industrial sector proxy by contribution of industrial gross domestic product to total gross domestic product.

GCE = Government capital expenditure proxy capital expenditure to gross domestic product

TAX = Tax revenue to gross domestic product

RIR = Real Gross Domestic Product

MPR = Monetary Policy Rate

$\mu$  = Error term

The above model has been used by various authors; however the authors could not include all the variables that influence growth of the industrial sector in Nigeria.

A-priori Expectation

$$(\beta_1) > 1, (\beta_2) > 1, (\beta_3) > 1 \text{ and } (\beta_4) > 1 \quad (3)$$

Government policies are expected to have a positive effect on the growth of Nigeria industrial sector.

### 3.2 Method of Data Analysis

In the first order test, the researcher regressed the dependent variable against the explanatory variables to obtain the parametric coefficients of t-ratio F-ratio and the coefficient of determination. The researcher employed the Engle Granger and Johansen co- integration approaches to establish the long- run relationship among the variables used in this study.

This process usually starts with the testing of the time series data for stationary. The Augmented

Dickey Fuller test for unit root was employed for this purpose. After the co-integration relationship has been established, the error correction model will be estimated to tie the short run to the long run equilibrium. This is to show how far the variables return back to equilibrium when a shock arises. This speed is represented by the error correction term. The coefficient of this error correction term is expected to be negative.

### 3.3 First Order Test

The T-test: The 'T-test is a test for the statistical significance of the individual regression coefficient. When the value of the test statistic lies in the critical region, the null hypothesis is rejected as the test is said to be statistically significant. The null hypothesis is said to be statistically significant when the value of the test statistics does not lie in the critical region.

The t-test is calculated by dividing the estimated by its standard error:

$$t = \beta_0/\beta_1 \quad (4)$$

$\beta_1$ = parameter estimate = Standard error

Using a 5percent level of significance, the degree of freedom, (N - K). The tabulated t-ratio (to. 025) is compared with the computed value

### 3.4 Decision Rule

If the computed t-ratio ( $t^*$ ) is greater than (t a/2) or (t0. 250) we rejected the null hypothesis. If otherwise, we accepted  $H_0$

### 3.5 The F-test

This is a test of the joint influence of the explanatory variable on the dependent variables; it tests for the statistical significance of the entire regression plane it is computed by

$$F = \frac{K-1}{e^2/n-k} \text{ or } \frac{R^2/K-1}{(1-R^2)/N-K} \quad (5)$$

The computed F - ration,  $F^*$  is compared with the theoretical F (0.05)

$V_1 = K - 1$  and  $V_2 = n - k$  degree of freedom

Where

$V_1 =$  degree of freedom for numerator

$V_2 =$  degree of freedom for denominator

$K =$  No of Bs

$n =$  Sample size

$F_{0.05} = (V_1, V_2, d.f)$

### 3.6 Decision

If computed  $F^*$  is greater than  $F_{0.05}$ , we rejected the null hypothesis. If otherwise, we accept  $H_0$

#### 3.6.1 Coefficient of determination $R^2$

This is a test of the goodness of fit of the regression model. It measures the percentage of variations in the dependent variables attribute to the independent variable. It lies between 0 and 1. The closer it is to 1, the better the fit otherwise, the worse the fit.

### 3.7 Second Order Test

#### 3.7.1 Test of stationary

##### 3.7.1.1 Unit root test

The Stochastic properties of the time series was checked using the Augmented Dickey - Fuller (ADF) unit root test and Person tests.

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \alpha_2 trend + \sum_{j=1}^p \alpha_j \Delta Y_{t-j} + \epsilon_t \quad (6)$$

Where  $\Delta$  indicates the first difference of  $Y_t$  and  $P$  is the lag length of the augmented terms for  $Y_t$ . The equation above allows the researcher to test whether the variable  $Y_t$  is a satisfactory series. The null hypothesis in the ADF test is that  $Y_t$  is a satisfactory.

##### 3.7.1.2 Co-integration

One of the objectives of this work is to assess the long run dynamic relationship/impact between the independent variable and the dependent variable. The Engle-Granger test is a procedure that involves an OLS estimation of a pre-specified co-integrating regression between the variables. The Engle- Granger two-step procedure is applied by estimating the equation using OLS and then testing the level of stationary of the residual terms.

The null hypothesis of no co-integration is rejected if it is found that the regression residuals are stationary at level.

$$\Delta Y_t = a_0 ECM_{t-1} + \sum_{-j+vt}^t J = 1aj \Delta Y_{t-j} + \sum^t J = 1aj \Delta Y_t \tag{7}$$

Where:  $\Delta$  denotes first difference operator:  $ECM_{t-1}$  is the error correction term  $t$  is the number of lags necessary to obtain “white noise” and  $V_t$  is the random disturbance term.

### 3.8 Data Required and Sources

The data used in this research work consists mainly of secondary data, in order to implement the fundamentals of the study. The time series data for the period 1981 to 2015 was selected and used. The data are accessed from the Central Bank of Nigeria Statistical Bulletin Various issues.

## 4. RESULTS AND DISCUSSION

In this section, we shall present the empirical results of the impact of government policies on the growth of Nigeria industrial sector. The Unit root test is first conducted in order to determine

whether the macroeconomic variables are stationary or otherwise, and then followed by regression. Test for the stationary of the variables are presented in Table 1.

The result in Table 1 shows that none of the variables were stationary at level. This can be seen by comparing the observed values (in absolute terms) of the ADF test statistics at 1%, 5% and 10% levels of significance. The result provides some evidence that none of the variables were stationary when differenced at levels, hence there is evidence of non-stationarity. However, differencing once induced stationarity in five variables, the table therefore revealed that all the variables were stationary at first difference therefore, the variables are integrated in the order of 1(1).

The Table 2 is the result of the static regression analysis where gross of industrial sector was regressed on government capital expenditure, tax, real interest rate and monetary policy rate. We expected a positive relationship between government policies and the growth of the industrial sector.

**Table 1. Unit root test**

Variable	ADF Statistic	MacKinnon 1%	MacKinnon 5%	MacKinnon 10%	Prob.	Decision	Summary
<b>Unit Root at Level</b>							
IG	-0.663196	-3.724070	-2.986225	-2.632604	0.1257	1(0)	Not stationary
GCE	2.159987	-3.653730	-2.957110	-2.617434	0.9999	1(0)	Not stationary
TAX	-1.516255	-3.653730	-2.957110	-2.617434	0.5127	1(0)	Not stationary
RIR	-1.527309	-3.661661	-2.960411	-2.619160	0.5068	1(0)	Not stationary
MPR	-1.681914	-3.661661	-2.957110	-2.617434	0.27381	1(0)	Not stationary
<b>Unit Root at Difference</b>							
ICU	-7.772777	-3.670170	-2.963972	-2.621007	0.0000	1(1)	Stationary
GCE	-5.426378	-3.661661	-2.960411	-2.619160	0.0001	1(1)	Stationary
TAX	-5.354711	-3.679322	-2.967767	-2.622989	0.0001	1(1)	Stationary
RIR	-12.85131	-3.661661	-2.960411	-2.619160	0.0000	1(1)	Stationary
MPR	-8.463896	-3.674942	-2.845880	-2.563116	0.0000	1(1)	Stationary

Source: Computed from E-View 9.0

**Table 2. Regression results**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GCE	0.128356	0.046261	2.774618	0.0096
TAX	1.217617	0.057892	21.03254	0.0000
RIR	-0.022292	0.199731	-0.111610	0.9119
MPR	0.375212	0.314575	1.192759	0.0026
C	172.8025	0.517571	1.637672	0.1123
R-squared	0.993439	Mean dependent var		3294.688
Adjusted R-squared	0.922534	S.D. dependent var		4262.548



Variable	Coefficient	Std. Error	t-Statistic	Prob.
S.E. of regression	368.3126		Akaike info criterion	14.79079
Sum squared resid	3933972.		Schwarz criterion	15.01526
Log likelihood	-246.4435		Hannan-Quinn criter.	14.86734
F-statistic	6.976742		Durbin-Watson stat	1.389375
Prob(F-statistic)	0.000000			

Source: Computed from E-View 9.0

From the Table 2, the overall statistical significance of the estimated equation is satisfactory based on the F-statistics and probability. The joint influence of the endogenous variables was 92.2 percent (the adjusted R<sup>2</sup>) meaning that 92.2 percent variation in the growth of Nigeria industrial sector can be traced to government policies. This also reveals that government policies significantly affect growth of the industrial sector. The result of the study further reveals the presence of auto correlation based on the coefficient of the Durbin Watson test.

The results further prove that government capital expenditure has a positive and significant effect such that a unit increase in the variable affects the growth of the industrial sector by 0.13 units; tax has a positive and significant effect such that a unit increase in the variable affects the growth of the industrial sector by 1.2 units; monetary policy rate has a positive and significant effect such that a unit increase in the variable affects the growth of the industrial sector by 0.38 units while real interest rate has negative and no significant effect such that a unit increase in the variable negatively affects the growth of the industrial sector by 0.02 units. The positive effect of the variables confirms government policies directed towards the growth of the industrial sector such as the industrial development master plan. Empirically the findings are in line with our a-priori expectations and validates the findings of Kalu [14] whose finding supports co-integration in the presence of structural breaks, the findings of Li et al. [16], Cao and Chen et al. [17], Wang

and Kesan [18], Alavuotunki, Haapanen, and Pirttilä [19], Yang and Liu [20], but contrary to the findings of Ezeaku, Ibe and Ugwuanyi [12] that the private sector credit, interest rate, and exchange rate channels have negative effects on real output growth, both in the long run and in the short run.

Moving from the logged variables, the data had been subjected to Augmented Dickey Fuller (ADF) test for identifying those variables with stationarity problems. The test was carried out using the ADF test. The result shows some of the variables indicating considerable significance at various levels of 1%, 5% and 10%. The Table 3 shows the co-integration test of the government policies and growth of the industrial sector.

The significant variables at levels can be cointegrated given that they are of the same order. The essence of the cointegration test is to find a long run relationship between the variables in the regression after ensuring that the variables are of the same order to avoid spurious regression. The regression that has been estimated employed variables that have been tested for stationarity, though some have very low coefficients but are nonetheless not plagued with the stationarity problems. The cointegration result reported above indicates that as least one cointegrating equation. This implies the presence of long relationship between government policies and growth of the industrial sector. The normalized co-integration found that government capital expenditure and tax have positive long run relationship while monetary policy rate have

**Table 3. Unrestricted Cointegration Rank Test (Trace Statistics)**

No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.773796	47.56212	27.58434	0.0000
At most 1 *	0.720588	40.80221	21.13162	0.0000
At most 2	0.316882	12.19480	14.26460	0.1035
At most 3	0.076503	2.546819	3.841466	0.1105
<b>Normalized cointegrating coefficients (standard error in parentheses)</b>				
IG	GCE	TAX	MPR	
1.000000	0.928718 (0.19890)	2.278281 (1.39837)	-14.89958 (2.29082)	

Source: Computed from E-View 9.0

**Table 4. Vector error correction estimates**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.078253	91.51040	0.066421	0.9476
D(IG(-1))	1.581445	0.321395	4.920562	0.0000
D(GCE(-1))	0.121686	0.094883	1.282477	0.2114
D(TAX(-1))	-0.599519	0.308713	-1.941993	0.0635
D(RIR(-1))	0.078765	0.373731	0.210754	0.8348
D(MPR(-1))	-0.023694	0.508095	-0.046634	0.9632
ECM(-1)	-1.300154	0.347724	-3.739043	0.0010
R-squared	0.661734	Mean dependent var		444.8703
Adjusted R-squared	0.580550	S.D. dependent var		569.7573
S.E. of regression	369.0033	Akaike info criterion		14.85013
Sum squared resid	3404086.	Schwarz criterion		15.17076
Log likelihood	-230.6020	Hannan-Quinn criter.		14.95641
F-statistic	8.151040	Durbin-Watson stat		1.875661
Prob(F-statistic)	0.000060			

Source: Computed from E-View 9.0

**Table 5. Pairwise granger causality tests**

Null Hypothesis:	Obs	F-Statistic	Prob.
GCE does not Granger Cause IG	32	1.04333	0.3661
IG does not Granger Cause GCE		3.76651	0.0361
TAX does not Granger Cause IG	32	2.17309	0.1333
IG does not Granger Cause TAX		2.50524	0.1005
RIR does not Granger Cause IG	32	2.50516	0.1005
IG does not Granger Cause RIR		6.62455	0.0046
MPR does not Granger Cause IG	32	5.13978	0.0128
IG does not Granger Cause MPR		7.20990	0.0031

Source: Computed from E-View 9.0

negative long run relationship with growth of the industrial sector.

From the Table 4, the Error correction term is negative which confirms to expectations, that is to say it has a negative sign, implying that the error obtained has high possibilities of moving much further away from the equilibrium path as time goes on. Also the ECM (-1) coefficient shows that 130 of the errors produced in the previous period are corrected in the current period. The error term however not statistically significant ECM (-1) is speed of adjustment towards equilibrium or error correction term. The independent variables can explain 58 percent variation on the dependent variable.

The co-integration results alone are not adequate enough to explain the relationship between bank intermediation and Nigeria economic growth. We need to establish the direction of this relationship, hence the causality test. From the findings we conclude that there is a causal relation from industrial sector growth to government capital expenditure, uni-directional

causality from industrial sector growth to real interest rate and a bi-directional causality from monetary policy rate to industrial sector growth and from industrial sector growth to monetary policy rate.

## 5. CONCLUSION AND RECOMMENDATIONS

Differences in asymmetries in impact of government policies across industries can then be related to industry-specific factors such as government fiscal and monetary policy, which give important insights as to which factors affect sectorial growth. Government policy contributes to sustainable growth by maintaining price stability. Government policy has emerged as one of the most critical government responsibilities and is seen as providing a flexible and powerful instrument for achieving medium-term stabilization objectives, as it can be adjusted quickly in response to sectorial growth [23,24]. Factors that determine the growth of the Nigerian industrial sector remain a matter of concern to both private and public sector stakeholders

[25.26]. This study examined the extent to which government policies affect the growth of the industrial sector. Time series were sourced from publications of the Central Bank of Nigeria; from the findings we conclude that there is a significant relationship between government policies and growth of the Nigerian industrial sector.

Government fiscal policies such as public expending should be directed toward improving the quality of infrastructures in the country especially the power sector so that the cost of production can be reduced. Efforts should be intensified at all levels to ensure that funds are available for manufacturing activities through budget provision and by the banks. Also, funds should be monitored and used only for the purpose, which will go a long way to reduce corruption. Government should examine its monetary policy variables such as interest rate and monetary policy rate. To promote growth, government should develop the industrial sectors of the economy through its capital expenditure. With this, capital expenditure on productive activities and social overheads capital will contribute positively to industrial growth which will invariably enhance economic growth. Expansionary policies on fiscal policy measures should be encouraged as they play a vital role for the growth of the manufacturing sector output in Nigeria. There is need to redirect fiscal policy measures towards making Nigeria a producer nation through the manufacturing sector which in turn would lead to economic growth and development. Government economic policies should focus on diversification of the economy to enhance the performance of the manufacturing sector, so as to create more employment opportunities. This may be a more effective way of reducing the level of unemployment and increasing the growth of the economy.

#### **COMPETING INTERESTS AND DISCLAIMER**

Authors have declared that no competing interests exist. The products used for this research are commonly and predominantly used products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing

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