GOVERNMENT SPENDING AND INDUSTRIAL DEVELOPMENT IN NIGERIA: A DYNAMIC INVESTIGATION

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ABSTRACT: *In this study, the effect of public spending on the industrial sector in Nigeria is examined within a dynamic structure. The goal of the study is to present a position in which industrial production could be enhanced by properly channeling public sector spending. Using data covering the period 1980 to 2013, econometric tools are employed to empirically examine the main effects of some public sector spending factors on industrial development. It is found in the study that that public spending has no significant effect on industrial production in the short run. Moreover, government spending has a relatively weak effect on industrial production even in the long run, suggesting a disconnection between public spending and the real sector of the economy. The proper focus for policymakers bent on improving industrial performance in Nigeria, thus, is on the process of fiscal management restructuring, at least in the medium-term.*

KEY WORDS: *Government spending, Industrial development, Dynamic analysis*.

JEL CLASSIFICATION: *H31, H54, L52*.

1. INTRODUCTION

The relative effect of government spending on the economy and its sectors has been fraught with lack of consensus among researchers and pundits. Many of the approaches agree that increases in government spending lead to rises in output, but they differ in their predictions concerning other key variables. In this direction, both the neoclassical and the standard New Keynesian models predict that an increase in

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government spending raises labor supply through a negative wealth effect while the New Keynesian approach assumes imperfect competition, sticky prices or price wars during booms, and increasing returns to scale (Nekarda & Ramey, 2011). This model predicts that a rise in government spending lowers the markup of price over marginal cost, leading to a rise in both real wages and hours. These effects tend to cause rises in average labor productivity if returns to scale are sufficient.

Essentially, the debate on government spending effects on the real sector extends to concern on its industry level effects (Nekarda & Ramey, 2011; Burnside, Eichenbaum & Fisher, 2004). The focus on industrial development aspects of government spending in modern structures of economic development derives from the fact that the industrial sector is the vehicle for sustained growth in the long run. This sector provides the necessary leverage for a competitive participation in foreign trade, expansion of domestic capacity and the generation of quality employment opportunities. This indicates that the focus of government should be how to nourish and make this sector viable.

Public expenditure policy is one of the most important instruments of public sector policy, especially in developing economies (Iyoha, 2004; Cavallo, 2005). Traditionally, the normative theory of public finance starting with Musgrave, identifies three functions of fiscal policy as: allocation, distribution and stabilization of resources. By means of fiscal policy, most governments attempt to ensure effective utilization of limited resources, equitable distribution of income and stability of economic development (Musgrave and Musgrave 1984).

Industrial development in Nigeria has not been as concrete as expected for an economy that intends to be in the league of top twenty industrial players in the nearest future. Manufacturing value-added as a percentage of GDP has been consistently below five percent over the past decade (less than the proportion at independence in 1960-8.6 percent), making Nigeria one of the 20 least industrialized countries in the world. Industrialization in Nigeria soared during the oil boom era (1973-81 with manufacturing share of GDP reaching 11 percent), but has had a precipitous decline to less than five percent in 2013. In the same year, manufacturing export was barely 0.5 percent of exports, while import of manufactured goods was about 15 percent of GDP or more -than 60 percent of total imports. Thus, there has been rapid de-industrialization, continuing loss of market shares in traditional export markets, and increasing import dependence in the country (Ikpeze et al, 2004). This is in spite of government's huge investment in the industrial sector and institutionalized industrial policies. Moreover, four different national development plans (1962-1985) had industrialization as the major priority of successive governments in Nigeria.

The role of government activities in promoting the industrial sector is thus a veritable aspect to be considered in the drive to promote the sector. One point to note is the efficiency and level of effectiveness of government spending in terms of resource allocation and its growth implications. Kroeda and Kramarenko (2008) showed in their study that while both Nigeria and Saudi Arabia experienced large initial expenditure increases in the mid-1970s, Saudi Arabia saw much higher real non-oil GDP growth than Nigeria, especially in the industrial sector. They argued that the noticed differences may be as a result of more effective expenditure management, more liberal

trade, and better access to low-wage foreign labor. This indicates that the pattern and use of public spending is essential in discerning public spending effects on industrial development.

In this study therefore, we examine the effects of government spending and other fiscal activities in industrial development in Nigeria. The role of direct government spending as well as its debt and deficits patterns towards boosting the industrial sector is considered. We argue that for an economy as Nigeria's where human capital and other non-technology factors are relatively abundant, improved government spending tends to improve the growth and development of the industrial sector, especially in the long run. Moreover, the dynamic aspects of the relationships in terms of the short run movements and long run adjustments are empirically examined.

2. THE LITERATURE

One major aspect of government participation in industrial activities that has been highlighted in literature is through industrial policy. Despite its widespread use, industrial policy remains controversial in many respects. Haque (2007) shows that there is better tolerance of policies that aim only to create a favourable environment for industrialization, such as macroeconomic stability, public provision of education, guaranteed property rights, and legal enforcement of contracts. But there can be considerable resistance to policies designed to promote specific industries especially when it directly presupposes exclusion of others. The failure of industrialization in many developing countries is one reason why this viewpoint prevails (Pack & Saggi 2006). However, the main reason is that policies intended to promote particular industries go against the basic tenets of the prevailing economic orthodoxy. Interventions are held to distort market signals, governments are seen as incapable of successfully "picking winners", and the protected infants are believed never to grow up (UNCTAD, 2011; Lehmann and O'Rourke, 2008). As Rodrik (2004) also noted, government can help to create conditions that permit a country to become particularly good at producing certain things, whether it is aircraft manufacturing in Brazil, steel in the Republic of Korea, or cut flowers in Kenya. Lin and Chang (2009) for example, argue that countries that protect sectors that do not exploit their (latent) comparative advantage grow more slowly.

The relationship between public expenditure and industrial sector development is often considered within growth model analysis. There are several neoclassical growth models allowing for the impact of government operations on resource allocation and growth. These models are based on various combinations of assumptions regarding the government, including the presence of lump sum or distortionary taxes, the inclusion of government purchases and transfers to households, the incorporation of public goods or public capital in the production function or the household utility function Koeda and Kramarenko (2008).

In his seminar work, Barro (1988) develops a simple endogenous growth model of government spending. In this model, he finds a non-linear relationship between public expenditures which are complementary inputs to private production and a negative relationship between government consumption and growth of the

economy. Tanzi and Zee (1997), classified the fundamental causes of growth to include efficiency of resource allocation, accumulation of productive resources, technological progress. In this direction, the effect combination of technology with the available resources guarantees growth. This relationship is also seen in industrial output growth analysis; when public sector resources are effectively spent and utilized, industrial output tends to improve over time (Devarajan et al., 1996).

One of the main effects of government is to increase the quantity and/or quality of public goods and services (Nekarda & Ramey, 2011). The private sector will typically not supply public goods and services because they cannot charge a price for their uses. Therefore, such goods are provided by the government through its ability to raise revenues from domestic taxation or foreign aid. In this case, the amount of the good or service which is provided, and which any one firm or household can use is in effect rationed. It is therefore clear that fiscal policy can influence the dynamics of industrial growth through its consequences for the effectiveness of resource allocation and accumulation of productive resources. Both of these conditions assume the influence on the productivity of private sector. For instance, an increase in government expenditures on a public intermediate good (e.g. building road, bridge or financing of education) has significant influence on industrial productivity (Carbajo & Fries, 1997).

Moreover, the relationship between public expenditure and industrial sector growth can be analysed both in the short run and in the long run. This simply means that time is a significant factor in analyzing the relationship between a policy action and its influence on the industrial productivity (Lall, 2003). So, the distinction between short-run and long-run impacts of public expenditure is relevant for policy making. According to Anderson *et al* (2006) the effects of public expenditure is divided into macro-economic effect and microeconomic effect. To analyze the macro-economic effects of public expenditure on industrial growth, they examine five channels through which public investment can affect industrial growth, namely: complementing private capital, crowding-in private investment, increased market integration, increased aggregate demand, and increased national savings.

It is obvious from literature that for any industrial setup to experience significant changes in its status, there is need for a well-designed and holistic execution of fiscal policy in that country. Moreover, in most studies on the issue of public spending policy, industrial growth is regarded as an integral part of economic growth and it is viewed as a long-run phenomenon. So the analysis is focused on the effects of government expenditures in the long run equilibrium leaving aside the short-run effects. However, investigation of the short-run effects is also an important issue. Firstly, it is important to explain why public expenditure policy within the short term often has a variable effect from the expected long-run effect. Secondly, distinguishing the time lag between short-run and long-run effects allows one to assess the outside lag inherent in public expenditure policy. It is in addressing this pattern of effects that this study is carried out.

3. METHODOLOGY

3.1 Theoretical Framework

Most discussions on the effect of fiscal policy on industrial growth begin with the assumption that public and private capitals are complements (Barro, 1990). This is justified on the grounds that public and private capital are made up of quite different things, with public capital consisting mainly public goods (e.g. roads, electricity supply) and private capital consisting of private goods (e.g. buildings, machinery). In this case, the aggregate production function for an economy is stated as.

$$Y = A.f\ (K, G, N, L) \qquad (1)$$

where Y is aggregate output, K is private capital (human and/or physical), G is public capital, N is natural resources, L is the labour force, and A is the level of technology, or total-factor productivity.

When modeled in this way, an increase in the public capital stock raises aggregate output. It also raises the productivity of all other factors of production, including labour. If labour markets are competitive, and labour supply is inelastic, an increase in the productivity of labour leads to an increase in real wages.

When public and private capital are complements in this way, an increase in public investment will raise a country's rate of growth, at least up to a point. To illustrate, assume that Equation (1) can be approximated by a cob-Douglas function of the form.

$$y = A.\ k^{\alpha}g^{\beta} \qquad (2)$$

where y = Y/L is output per worker, k = K/L is private capital per worker, and g = G/L is public capital per worker, and the parameter α and β represent the elasticity of aggregate output with respect to private and public capital respectively.

The prediction is that, in the long-run, countries with higher rates of public investment will have higher levels of output per worker (ceteris paribus). As the short to medium run approach their long-run steady-state level of output per worker, countries with higher rates of public investment will have higher rates of economic growth (centers paribus).

3.2 Model Specification

The model specified in this study is based on the theoretical foundations expressed in the preceding chapter, especially the formulations by Barro (1990). Based on the dynamic nature of the fiscal policy-industrial growth nexus, a model that fits the cointegration and error correction methodology is specified. In this model, the index of industrial production is taken as the dependent variable which is hypothesized to respond to fiscal policy factors both in the short run and in the long run. The fiscal policy factors included are government expenditure (GEXP), fiscal balance (FBAL),

the tax level (TAX), and external debt level. The tax used in the model is the company income tax. Other control variables are included in the model such as capital supply which is proxied by electricity utilization by firms, labour input (proxied by secondary school enrolment), and a measure of industrial efficiency. The functional form of the model is then specified as:

$$INDP = f(GEXP, FBAL, TAX, XDEBT, CAP, LAP, CU) \quad (3)$$

where GEXP = government expenditure
FBAL = fiscal balance ratio
TAX = company income tax
XDEBT = external debt
CAP = capital input in industrial production
LAB = labour input in industrial production
CU = industrial capacity utilization

The econometric form of the model is then specified below using logarithms.

$$\Delta LRGDP_t = \beta_0 + \beta_1\Delta GEXP_t + \beta_2\Delta FBAL_t + \beta_3\Delta TAX_t + \beta_4\Delta XDEBT_t + \beta_5\Delta CAP_t + \beta_6\Delta LAB_t + \beta_7\Delta CU_t + \delta ECM_{t-1} + \varepsilon_t \quad (4)$$

where Δ is first difference operator, δ is the error correction term which is expected to be negative, and ε is the stochastic error term.

Also, the expected signs for the parameters are: $\beta_1, \beta_5, \beta_6, \beta_7 > 0$; $\beta_3 < 0$; $\beta_2, \beta_4 >$ or < 0; and

Theoretically, the effect of fiscal policy in terms of government spending is expected to be positive. Government spending boosts aggregate expenditure which stimulates equilibrium income and all the other components. This tends to improve the investment level as well as income which in turn, positively affects all forms of production. On the other hand, higher taxes tend to discourage production effort and reduce industrial production. Fiscal balance and external debt do not have clear-cut effects on industrial production. It may stimulate the industrial sector or slow it down, especially depending on the nature of financing the deficits or debt. All the other input factors in terms of industrial production possess positive coefficients.

3.3 Data Issues and Estimation Procedures

The data used in this analysis are annual time series data covering the period 1980 to 2013. The data were sourced the Central Bank *Statistical Bulletin* (2014) and World Bank (*World Development Indicators*, 2013). In order to obtain the objectives of the study, the cointegration and error correction modeling (ECM) technique is used for the estimation of the relationships specified in the models. Four processes are involved in this technique; unit root testing, cointegration analysis, the dynamic short run model and the long run estimation.

4. EMPIRICAL ANALYSIS

The dynamics of the effect of public spending on industrial development in Nigeria is the focus of this empirical research. Thus, the short run or temporary changes in industrial growth as well as the long run pattern of its behaviour arising from persistent movements in public spending are examined. The nature of the research therefore requires that the time series properties of the data used in the study are to be investigated.

4.1 Unit Root Analysis

The Augmented Dickey Fuller (ADF) test is employed in order to analyze unit roots. The results are presented in levels and first difference. This enables us determine in, comparative terms, the unit root among the time series and also to obtain more robust results. Table 4.1 presents results of ADF test in levels without taking into consideration the trend in variables. The reason for this is that an explicit test of the trending pattern of the time series has not been carried out. In the result, the ADF test statistic for each of the variables is shown in the second column, while the 95 percent critical ADF value is shown in the third column. The result indicates that the time series are non-stationary in their levels but stationary after first differences. This implies that the variables are actually difference-stationary. Thus, we would accept the hypothesis that the variables possess unit roots. Indeed, the variables are integrated of order one (i.e. I[1]).

Table 4.1: Unit Root Test for Variables in Levels

Variable	ADF Test Statistic		Order of Integration
	Level	First Difference	
INDQ	-1.914	-5.793	I[1]
LGEXP	-0.149	-7.101	I[1]
FBYR	-2.946	-6.865	I[1]
LTAX	-0.207	-6.693	I[1]
LXDEBT	-2.894	-3.817	I[1]
LCAP	0.513	-4.135	I[1]
LAB	-1.907	-3.008	I[1]
CU	-3.328	-3.088	I[1]

Source: Authors' computations

4.2 Cointegration Analysis

The Engle and Granger two-step method is employed for the test of cointegration. This method follows a simple procedure. The result of the cointegration test is summarized in Table 4.2 below. From the results, the null hypothesis of no cointegration among the variables at the 5 percent level cannot be accepted. Therefore, long run relationships exist between the industrial production and the selected

independent variables. An inter-temporal model can therefore be estimated for the relationships.

Table 4.2: Results of Engle and Granger Residual Based Cointegration Tests

ADF Lag	ADF Test Statistic	95% Critical ADF Value	Remark
3	-4.721	-2.968	Stationary

Source: Authors' computations

4.3 The Error Correction Mechanism (Short-Run Analysis)

The short-run dynamics of the behaviour industrial production within the context of short term movements in public spending factors in Nigeria is captured within an error correction model (ECM) and the results are shown in Table 4.3 below. The error correction mechanism result for the model indicates that the model has impressive diagnostic statistics. The goodness of fit of the model is relatively high. The R-squared value of 0.606 indicates that over 60 percent of the systematic variation in industrial production at any given time is explained by the explanatory variables and the ECM term.

The overall performance of the model is determined by observing the F-statistic in the model. The F-statistic value of 4.03, passes the significance test at the 1 percent level, since this value is greater than the 1 percent critical F-value of 3.01. Thus, we cannot reject the hypothesis of a significant linear relationship between industrial production and all the independent variables combined in the short run. Indeed, the model has a very high overall significance level.

Table 4.3 The Short-run Dynamic Model Result

Variables	Coefficient	T-Ratios
Constant	-1.396	-0.357
ΔLGEXP	4.212	0.481
ΔFBYR	0.131	0.306
ΔLTAX	-6.414	-1.228
ΔLXDEBT	1.352	0.429
ΔLCAP	-0.939	-0.726
ΔLAB	14.46	1.577
ΔCU	0.160	0.413
ECM(-1)	-1.024	-4.731
$R^2 = 0.606$	F = 4.03	DW = 2.12

Source: Authors' computations

The particular contribution of each of the variables to short term movements in industrial production is determined by observing the individual coefficients of the explanatory variables in terms of sign and significance. A close investigation of the individual coefficients of the variables reveals that only the coefficient of CAP does

not have the expected (positive) sign, thus suggesting that the variable tends to reduce industrial production in the short run. All the other variables have the expected a priori signs in line with a priori determination.

More importantly, particular attention is paid to the significance of the coefficients of the variables. The significance test in the result shows that none of the coefficients of the explanatory variables passes the significance test at the 5 percent level. This suggests that short term movements in the industrial production may not be predicted by any of these variables in Nigeria. In particular, the result shows that government spending activities do not affect the pattern of industrial production in the long run. Changes in government spending have no significant impact on the industrial sector in the short run.

The error correction term has the correct negative sign and also passes the significance test at the 5 percent level. This goes to show that any short-term deviation of industrial production from equilibrium in the short-run can be restored in the long run. The very high value of the error correction term that is greater than one (-1.24) means that adjustment to equilibrium in the long run is oscillatory in nature. The adjustment seems to move from negative to positive over time. The DW statistic value of 2.12 is close to two and shows absence of autocorrelation in the model. The implication of this is that the short-run estimates in the model above are reliable for structural analysis and policy directions.

4.4 The Long Run Results

The long run steady state result of the industrial growth function is shown in table 4.5. The result has impressive diagnostic statistics with high R squared value rising to 0.715. Over 71 percent of the systematic variations in industrial production is captured in the long run model. This implies that the selected public spending variables actually tend to represent the industrial production determinants for in the sample in the long run. The other diagnostic coefficient, F-test, is also highly significant at the 1 percent level. This shows that the hypothesis of a significant log-linear relationship between industrial production and all the independent variables combined cannot be rejected.

Table 4.5: The Long Run Model

Variables	Coefficient	T-Ratios
Constant	20.33	0.980
LGEXP	2.577	0.231
FBYR	0.678	1.102
LTAX	-9.017	-1.371
LXDEBT	10.34	4.300
LCAP	1.196	2.414
LAB	4.638	0.486
CU	0.622	2.591
$R^2 = 0.715$	F = 8.24	DW = 1.71

In particular, we focus on the individual performance of the coefficients of the variables in the model. In the same vein, the result shows that the coefficients of XDEBT, CAP and CU pass the significance test at the 5 percent level, indicating that these are the significant variables that affect industrial production in the long run. All the other coefficients fail the significance test at the 5 percent level. The results indicate that external debt accumulation by the government tends to have better positive effects on economic growth than direct government spending. The coefficient of TAX has the right negative sign, indicating that higher taxes discourage production, but this coefficient is not significant.

4.5 Policy Implications of Results

The results obtained from the empirical analysis presents pertinent implications. First, short term changes in industrial production are not determined by any of the public spending variables. Actually, it is the case that internal combination of resources as well as other firm-specific factors is responsible for short term changes in industrial production. The effects of external factors such as public spending would only occur after some lags.

The only significant public spending variable is the external debt variable which is also positive. This implies that as external debt rises, industrial production also rises. Indeed, it has been chronicled that some external debt applications are project-tied and are often directed at improving domestic infrastructure. Improved infrastructure directly impacts positively on industrial production.

Among the significant coefficients, that of CAP has a negative sign, suggesting that as capital input increases and is sustained over a long period, industrial output seems to diminish. The rationale behind this result may be found in the fact that capital is expensive to acquire in Nigeria since it is mostly imported. With the application of the new capital, real output from the industrial sector tends to fall in the long run because the prices of output rise very dramatically.

Capacity utilization also contributes positively to industrial growth in Nigeria as shown in the long run result. This implies that focus should be laid on boosting the capacity utilization of industries in Nigeria since this will boost long tern industrial development.

5. CONCLUSION

In this study, the effect of public spending on the industrial sector growth in Nigeria was examined. The goal of the study was to present a position in which industrial production could be enhanced by properly channeling public sector spending in order to prepare a more adaptive environment for industrial growth. It is argued that for a country like Nigeria where capital is scarce, yet industrialisation drive is critical, the place of the government as a major supplier of resources for industrial growth is essential. Using data covering the period 1980 to 2013, econometric tools of dynamic analysis were employed to empirically examine the main effects of some public sector

spending factors on industrial development. The findings of the study suggest that public expenditures do not generally stimulate industrial growth in Nigeria.

Essentially, short term growth in the industrial sector in Nigeria does not appear to respond to either government spending or tax accumulation. The long run effects indicate that domestic debt accumulation tends to exert long run positive impacts on the industrial sector. Apparently, direct government spending do not promote the industrial sector in the country, rather, there appears to be a secondary positive impact that stems from government participation in the debt market in Nigeria.

Thus, the proper focus for policymakers bent on improving industrial performance in Nigeria should be on the process of economic restructuring, as described above, at least in the medium-term. Although public spending policy that is configured in incentives and instruments to achieve (industrial) scope and scale economies seem to be quite relevant in proactively shifting the production patterns and export structures, the long term effects are not clear. As shown from this study, the adequate bias should be given to public spending patterns that are financial market-based and would tend to improve the debt market in the country.

Such spending patterns need to be seriously considered in the country, especially when long term industrial development is the aim. This implies that requisite policy craft to attain long term industrial development needs to be devised and applied in space and time over the very long term, by successive governments. This is in order to build up levels of 'stock' (human capital, social capital, physical capital, coordination and transaction cost reducing institutional capital) that cannot be easily 'eroded' by exogenous shocks.

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