Assessing Government Expenditure's Impact on Nigeria's Manufacturing Sector: "A VAR Approach"

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ABSTRACT

The study uses secondary data from the Central Bank of Nigeria Statistical Bulletin (2020) that spans 41 years, from 1981 to 2020, to examine the effect of government spending on the manufacture of Nigeria's manufacturing sector. Employing secondary methodology, the study begins by determining the order of integration of individual time series through unit root tests and conducting stationary tests on all variables. Subsequently, cointegration tests are performed, followed by the implementation of a Vector Autoregressive (VAR) model.

The results show that, at lags one and two, capital spending and the manufacturing sector in Nigeria have a positive association, while at lag three, there is a negative correlation. Conversely, recurrent expenditure exhibits a negative relationship with the manufacturing sector at lag one and lag two, but a positive correlation at lag three. Additionally, the study identifies a positive correlation between interest rates and manufacturing sector output with (8.4% ECT (-1), indicating the speed of adjustment to long-run equilibrium.

The report emphasizes how important targeted government spending on the manufacturing sector is for the growth of a country's economy, especially in Nigeria. It recommends that concerted efforts be made to improve and encourage manufacturing sector output, emphasizing the role of government in providing support and incentives for investment in the sector.

Keywords: VAR model, Manufacturing sector, Government expenditure, Nigeria.

INTRODUCTION

The development of the manufacturing sector is vital for economic growth and development, not only in Nigeria but also globally (Echekoba and Ananwude, 2016). Governments worldwide implement industrialization policies to promote this sector's growth. Theoretical perspectives vary, with proponents of Keynesian and endogenous theories advocating planned government expenditure as a tool for sustained growth. Conversely, classical and neoclassical theories view governments as bureaucratic and less efficient, hindering economic growth (Twumasi, 2017). Beyond these arguments, Ricardian economists suggest that growth and development can occur without government expenditure, highlighting challenges in altering citizens' consumption patterns despite government injections into the economy (Barro, 1990; Barro and Sala-i-Martin, 1992; Neill, 1996; Tullock, 1980).

In Nigeria, government expenditure, particularly on assets and investment goods like healthcare, education, infrastructure, and manufacturing, plays a significant role in economic output and the capacity utilization of

the manufacturing sector. However, Nigeria's manufacturing sector faces challenges, including declining productivity rates and employment generation due to factors such as inadequate electricity supply, smuggling of foreign products, trade liberalization, and insufficient government investment in infrastructure (Tomola, Adebisi, and Olawale, 2012). Despite various government policies aimed at improving industrial production and capacity utilization, the manufacturing sector's contribution to the economy remains insignificant compared to the oil and agricultural sectors (CBN, 2008). Previous studies in Nigeria have focused on the impact of total public expenditure on manufacturing output and economic growth, yielding conflicting findings (Mwafaq, 2011; Muritala and Taiwo, 2014; Sikiru and Umaru, 2011; Nurudeen and Usman, 2010). The lack of disaggregated analysis of government expenditure components contributes to this controversy.

It is the purpose of this study to ascertain the precise effects of interest rates and capital and ongoing government spending on Nigeria's manufacturing industry. This research aims to offer insights into the wise use of public monies to promote economic growth and development by developing the manufacturing sector through both short- and long-term studies. To examine this fundamental impact, this study adopts the Vector-Autoregressive (VAR) approach which is a multi-equation framework to capture all plausible effects of government expenditure on Nigeria's manufactural sector between 1981 and 2020. The other part of the document is structured as follows: An overview of the literature on the relationship between government spending and economic growth is given in section 2. Section 3's explanation of the theoretical foundation and technique comes next. The empirical results are covered in Section 4, and the concluding observations with policy implications are presented in Section 5.

LITERATURE REVIEW

Much research has looked into how government spending affects long-term economic growth, but it is still difficult to find solid evidence about how it affects growth in the manufacturing sector. The relationship between government spending and economic growth varies across countries and depends on the analytical methods used as well as the categorization of government expenditures. For instance, Samson (2019) employed vector error correction and Granger causality models to examine the relationship between government expenditure and economic growth in Nigeria's industrial sector. The study revealed a significant negative relationship between government spending and the industrial sector of the economy. These findings underscore the importance of effectively channeling public funds towards productive sectors in Nigeria. Additionally, employing techniques like the three-stage-least square (3SLS) and macro-econometric models of simultaneous equations can provide further insights into these complex dynamics.

A study on the connection between Nigeria's manufacturing sector and economic growth from 1990 to 2013 was carried out by Adofu, Taiga, and Tijani (2015). They examined variables such as real gross domestic product, average manufacturing capacity utilization rate, manufacturing sector output, interest rate, exchange rate, government expenditure, and inflation rate using the ordinary least squares (OLS) method. The average manufacturing capacity utilization rate had a positive and large impact on real GDP, whereas the manufacturing sector's output had a negative and minor effect. It's interesting to note that factors like interest rates and currency rates had no discernible impact on real GDP, suggesting that macroeconomic instability existed. On the other hand, the inflation rate positively but insignificantly affected real GDP, while government expenditure significantly influenced the economy's real GDP.

From 1981 to 2013, Chukwuedo & Ifere (2017) investigated the connection between Nigeria's manufacturing production and economic expansion. Their research made use of an eclectic model that combined the endogenous growth model with Kaldor's first law of growth. After examining several factors, including real gross domestic product, manufacturing output, contract-intensive money, gross fixed capital, and labor force, they concluded that the main drivers of Nigeria's economic growth were capital,

technology, and manufacturing sector output. Surprisingly, variables like labor force and the quality of institutions did not exert a significant influence on economic growth.

John and Sarah (2016) looked into how macroeconomic indicators affected Nigeria's industrial productivity between 1981 and 2013. They examined several factors, such as the interest rate, broad money supply, consumer price index, factory credit, foreign direct investment, exchange rate, and gross domestic product, using the ordinary least squares (OLS) technique. Their research showed that the productivity index of Nigerian industries was highly impacted by the exchange rate. Moreover, foreign direct investment, interest rate, and gross domestic product positively influenced the industrial production index, while variables like broad money supply, consumer price index, and credit to the manufacturing sector negatively affected industrial development in Nigeria.

Emmanuel & Saliu (2017) used the ordinary least squares (OLS) technique to analyze how Nigeria's manufacturing sector affected economic growth from 1981 to 2015. They examined the gross domestic product (GDP) as the dependent variable and the manufacturing output, government spending, investment rate, and money supply as the independent factors. The results showed that manufacturing output had a favorable impact on Nigeria's economic expansion. Nonetheless, the investigation also unveiled noteworthy risks confronting the manufacturing industry, including chemical, physical, and psychosocial concerns.

Charles (2018) explored the impact of monetary policy on Nigeria's manufacturing industry. The money supply was shown to have a positive correlation with the manufacturing index, whereas the performance of the sector was found to be negatively impacted by the firm loan rate, income tax rate, inflation rate, and currency rate. This underscores the importance of monetary policy in fostering growth within the manufacturing sector, which in turn contributes to overall economic growth.

Tomola, Adebisi, and Olawale (2016) utilized co-integration and vector error correction model (VECM) techniques to explore the relationship between bank lending, economic growth, and the manufacturing sector in Nigeria. Their findings indicated that manufacturing capacity utilization and bank lending rates significantly impacted manufacturing output in the country. However, despite this relationship, the growth of manufacturing output was not substantial enough to drive significant economic growth.

In conclusion, the review depicts some variables like monetary policy effectiveness, energy consumption patterns, and electricity supply reliability emerge as pivotal factors influencing manufacturing sector outcomes and broader economic development trajectories. Overall, the impact of government spending on economic growth through the manufacturing sector in Nigeria remains unclear, with evidence for both positive and negative relationships. The effectiveness likely depends on various factors like exchange rate, foreign investment, and energy availability. Therefore, a multifaceted approach that considers these various factors alongside government spending is crucial for fostering sustainable economic growth in Nigeria.

THEORETICAL FRAMEWORK AND RESEARCH METHODOLOGY

Theoretical Framework

Drawing from Keynesian theory, which posits that government expenditures can be leveraged as policy instruments to drive economic growth, this study adopts a perspective that views public spending as a means to stimulate economic activity, particularly in the industrial sector. Keynesian economics suggests that an increase in government consumption can positively impact employment, profitability, and investment through multiplier effects on aggregate demand. This implies that higher government spending can lead to increased output, supported by expenditure multipliers. Policymakers often use Keynesian analysis to argue that adjustments in government spending levels can either stimulate or dampen economic growth, depending on the prevailing economic conditions. This theory is relevant to the study as it highlights the multiplier

effect of government spending on the manufacturing sector, ultimately contributing to overall economic growth.

Research Design

The research design employed for this study is Ex Post Facto, chosen for its quasi-experimental nature in examining the impact of independent variables on a dependent variable. Utilizing econometric methodology, economic, statistical, and econometric tools will be employed to analyze and present the data. The Augmented Dickey-Fuller test will assess the unit root, while the Autoregressive Distributed Lag Model will be used for cointegration analysis. Covering the period from 1981 to 2020, the study aims to determine the effect of government expenditure on manufacturing output in Nigeria and ascertain long-run equilibrium relationships among the variables. The analysis will involve economic/theoretical a priori tests, statistical significance tests, and econometric or second-order tests, with Eviews10 regression software facilitating the process.

Model Specification and Techniques of Analysis

This study adopts a modified version of Adofu, Taiga & Tijani (2015) to analyze the impact of government capital expenditure on manufacturing output in Nigeria. The model specifies manufacturing sector output as the dependent variable, with government expenditure (capital and recurrent) and interest rate as independent variables. The study adopts an error correction modeling approach. Hence, the functional model for this work is as specified in the model (2)

MANU = f (CAXP, REXP, INTR) … (1)

$MANU=\beta 0+ \beta 1CAXP + \beta 2REXP+ \beta 3INTR +\varepsilon$ … (2)

Where;

MANU = Manufacturing sector output

CAXP = Public Capital Expenditure,

REXP= Public Recurrent Capital Expenditure

INTR = Interest Rate

£t = white noise or stochastic error term.

The residuals from the cointegration model are extracted and used to form an ADF regression.

Sources of Data

This research work uses secondary data which were obtained from the Central Bank of Nigeria Statistical Bulletin. The data which are obtained from the Central Bank of Nigeria Statistical Bulletin include value capital expenditure, recurrent expenditure, and interest rate in the Nigerian economy. The data will be collected for the period between; 1981 to 2020.

EMPIRICAL RESULT

Analysis of Unit Root

To test for the time-series properties of the variables, the Augmented Dickey-Fuller (ADF) test was employed.

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Table 4.1 Unit Roots Test Result

VARIABLE	ADF at Level	5% sig	p-value	ADF at 1st diff	5% sig	p-value	Order of Int
INTR	-2.354039	-2.941145	0.1612	-6.144514***	-2.941145	0.0000	I (d)
LOG_CAXP	-0.891523	-2.936942	0.7807	-6.781602***	-2.938987	0.0000	I(1)
LOG_MANU	-1.207133	-2.938987	0.6617	-4.685851***	-2.938987	0.0000	I(1)
LOG_REXP	-1.628701	2.938987	0.4587	-8.487015***	-2.938987	0.0000	I(1)
							I(1)

Source: Author's Computation (2022) using EViews 10: *, **, * represent significance at 1%, 5% and 10* respectively**

All of the variables are non-stationary in their level form, since their ADF values are smaller than their critical values at a 5% level of significance, as shown in table 4.1. The null hypothesis of a unit root was accepted in the investigation. Because all of the variables' ADF values exceeded their critical values at a 5% level of significance, the null hypothesis of the unit root was rejected at the first difference. Since the study adopted the vector autoregressive (VAR) model, Johanson's cointegration test was employed as below to determine the number of cointegrating equation(s) if any. The results of Johanson's cointegration test are shown below with both the Trace and Maximum Eigenvalue test statistics showing evidence of one cointegrating equation.

Table 4.: Trace Test Statistics				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.805505	86.76791	47.85613	0.0000
At most 1	0.433444	27.82340	29.79707	0.0831
At most 2	0.136254	7.368957	15.49471	0.5351
At most 3	0.056555	2.095803	3.841466	0.1477

Source: Author's computation (2021) using Eviews 10

Johansen co-integration test is based on the sequencing of the tests to determine the rank of the matrix which means if the null hypothesis of the first test is not rejected, the sequencing of the test stops there and if the null hypothesis is rejected, we move to the next test. For instance, the first test of the trace statistics is given below as;

1) H_0 : r=0 and H_1 : r=1. From Table 4.4, H_0: r=0 means that none of the equations is cointegrated, and H_1 : r=1 implies evidence of one cointegrated equation. From the trace test above, trace statistics has a probability of 0.0000, implying there is no cointegration since at the null hypothesis the probability value is less than 5%

H_0: r=0 at a 5% level of significance. This in other words implies that there is one cointegrated equation as a result of 0.0831 probability value which is more than 5% critical value. Moreover, since the null hypothesis is rejected, the next hypothesis is as below;

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Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.805505	58.94451	27.58434	0.0000
At most 1	0.433444	20.45445	21.13162	0.0620
At most 2	0.136254	5.273154	14.26460	0.7070
At most 3	0.056555	2.095803	3.841466	0.1477

2) H_0 : r ≤1 and H_1 : r=1. As earlier said from the trace test above, trace statistics have the probability of 0.0831, implying the rejection of the null hypothesis H_0: r ≤1 at a 5% level of significance. This in other words implies that there is only one cointegrated equation.

Source: Author's computation (2021) using Eviews 10

Similar to the Trace test, the Maximum Eigenvalue Test Statistic also shows evidence of only one cointegrating equation.

Empirical Analysis

Table: 3 Estimatig Short run VEC relationship

Variable	**Coefficient**	**Std. Error**	**t-Statistic**
C	0.000638	0.02982	0.02139
D(LNMANU(-1))	0.306665	0.15073	2.03455
D(LNMANU(-2))	-0.083658	0.12572	-0.66541
D(LNMANU(-3))	0.322090	0.13551	2.37681
D(LNCAXP(-1))	0.004803	0.04218	0.11389
D(LNCAXP(-2))	0.077839	0.04381	1.77675
D(LNCAXP(-3))	-0.020196	0.04153	-0.48627
D(LNREXP(-1))	-0.029211	0.07834	-0.37289
D(LNREXP(-2))	-0.178023	0.07026	-2.53367
D(LNREXP(-3))	0.185841	0.06164	3.01498
D(INTR(-1))	0.007235	0.00481	1.50317
D(INTR(-2))	0.013984	0.00549	2.54848
D(INTR(-3))	0.016217	0.00501	3.23877
ECM(-1)	-0.083720	0.02175	-3.84980

Source: Author's Computation (2022) using EViews

Table 3 above shows a model of the estimated impact of government expenditure on the manufacturing sector in Nigeria. The study finds evidence of a positive correlation between both capital expenditure and the manufacturing sector in Nigeria at lag one and lag two but a negative relationship between them at lag three. Moreover, recurrent expenditure and the manufacturing sector in Nigeria are negatively related at lag one and lag two but positively related at lag three. The signs of the coefficient of capital expenditure at lag one and two conform to the economic theory of the expected positive relationship between government spending and growth, while that for recurrent expenditure at the same lags conforms to the theory as well. The result aligns partly with Emmanuel, & Oladiran, (2015) finding that capital expenditure has a positive

relationship with manufacturing sector output in Nigeria while recurrent expenditure exerts a negative effect on manufacturing sector output. However, the interest rate is positively correlated with manufacturing sector output. This contradicts the theory that interest rates impact negatively manufacturing sector output. The adjustment parameter is given by the coefficient of error term at lag 1, ECT (-1), and shows the speed of adjusting to long-run equilibrium has the value of. -0.083720. The coefficient is significantly negative, implying that about 8.4 percent disequilibrium is being corrected at a subsequent period.

Table: 4 Variance Decomposition

Period	S.E.	LNMANU	LNCAXP	LNREXP	INTR
1	0.075847	100.0000	0.000000	0.000000	0.000000
2	0.124503	91.88345	0.070323	1.247853	6.798373
3	0.162687	77.21611	3.243567	10.83923	8.701096
4	0.192241	73.03719	3.918653	11.43635	11.60781
5	0.216448	69.09229	3.472939	12.19279	15.24199
6	0.249775	60.07017	2.693539	12.50315	24.73314
7	0.279925	53.41804	2.147457	13.63142	30.80309
8	0.311970	45.77957	1.745501	15.63797	36.83696
9	0.345185	39.88667	1.586314	17.49618	41.03083
10	0.374229	35.99945	1.665579	18.58202	43.75294

Source: Author's Computation (2022) using EViews

Variance decomposition measures how much of the variability in the dependent variable is explained by its shock and the shocks in other variables within the system. In the first period, LNMANU explained 100% of its variations, implying that capital expenditure, recurrent expenditure, and interest rate explained none of the variation in manufacturing output in the short run. Subsequently, the variation of manufacturing output occasioned by its shock dwindled over time till the 10^{th} period while the shocks from other recurrent expenditures and interest rates explained increasingly the variation in growth till the last period. However, the contribution of capital expenditure to the variation of manufacturing output rose through lag two to lag three and fell till period nine but had a slight rise in period 10.

Impulse Response Function

Impulse response shocks show how a variable responds to shocks emanating from itself or other variables in the system. In the study, the focus is on how manufacturing sector responds to shocks from capital expenditure, recurrent expenditure, and interest rate

From the first graph, which is the response of government expenditure to the manufacturing sector, the evidence is that none of the variables has a contemporaneous effect on the manufacturing sector, because of their zero values at lag 1. The response of manufacturing output to capital expenditure shock rises to the third period and falls continuously till the last period of 10. However, the response of manufacturing to shocks fall continuously beginning from period one through 10.

Discussion of Findings

The study has successfully examined the effect of government expenditure on manufacturing sector output in Nigeria. Expenditure was measured using capital expenditure (CAXP), recurrent expenditure (REXP), and interest rate (INTR). Unit root test shows that all of the variables are non-stationary in their level form,

since their ADF values are smaller than their critical values at a 5% level of significance, as shown in table 4.1. The null hypothesis of a unit root was accepted in the investigation. Because all of the variables' ADF values exceeded their critical values at a 5% level of significance, the null hypothesis of the unit root was rejected at the first difference. Since the study adopted the vector autoregressive (VAR) model, Johanson's cointegration test was employed.

The study finds evidence of a positive correlation between both capital expenditure and the manufacturing sector in Nigeria at lag one and lag two but a negative relationship between them at lag three. Moreover, recurrent expenditure and the manufacturing sector in Nigeria are negatively related at lag one and lag two but positively related at lag three. The signs of the coefficient of capital expenditure ate lag one and two conform to the economic theory of the expected positive relationship between government spending and growth, while that for recurrent expenditure at same lags conforms to theory as well.

However, the interest rate is positively correlated with manufacturing sector output. This contradicts the theory that interest rates impact negatively manufacturing sector output. The adjustment parameter is given by the coefficient of error term at lag 1, ECT (-1), and shows the speed of adjusting to long-run equilibrium has the value of. -0.083720. The coefficient is significantly negative, implying that about 8.4 percent disequilibrium is being corrected at a subsequent period.

The evidence from the impulse response shows that none of the variables has a contemporaneous effect on the manufacturing sector, because of their zero values at lag 1. The response of manufacturing output to capital expenditure shock rises to the third period and falls continuously till the last period of 10. However, the response of manufacturing to shocks fall continuously beginning from period one through 10.

SUMMARY & CONCLUSION

The study delved into the impact of government expenditure on Nigeria's manufacturing sector, employing ordinary least square regression models and the Vector Autoregressive Model. Analyzing annual time series data spanning from 1981 to 2020, the findings unveiled several key relationships. Firstly, both capital expenditure and the manufacturing sector exhibited a positive correlation at lag one and lag two, but a negative association emerged at lag three. Similarly, recurrent expenditure displayed a negative relationship with the manufacturing sector at lag one and lag two, but turned positive at lag three. Furthermore, the study identified a positive correlation between interest rates and manufacturing sector output. Overall, the empirical results suggest that capital, recurrent expenditure, and interest rates exert a negative influence on Nigeria's manufacturing sector. The coefficient of multiple determinations R^2 stood at 0.598611, indicating that approximately 60 percent of the growth variation can be attributed to the set of exogenous variables. This underscores the relative explanatory power of the exogenous variables in elucidating the behavior of the dependent variable in the short run.

Policy Recommendations

Based on the findings from the study, the following recommendations were made;

1. The study recommends that a larger percentage of government expenditure in the annual budget should be on capital component coupled with improved implementation of expenditure policies rather than recurrent which does not have a significant impact on the manufacturing sector.
2. It is recommended in the light of the study that, for any nation to grow, especially in Nigeria, the focused expenditure on the manufacturing sector should not be underestimated, thus, by all available means, the government should improve and encourage the output of manufacturing sector.
3. The government should also make the manufacturing sector more attractive to investors by making loans available to private individuals who want to invest in the sector.

Value Addition

The use of the manufacturing sector as a dependent variable as against using economic growth to measure how government expenditure affects the manufacturing sector using a stronger estimation method that measures both the long run and short run effect is what gives the work the value addition to the body of knowledge. Unlike other works, this study divided government expenditure into capital and recurrent expenditure to see how the independent variables explained the endogenous variable (manufacturing sector).

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