



ON THE INFLUENCE OF CAPITAL EXPENDITURE AND IMPLICIT PRICE DEFLATOR ON ECONOMIC GROWTH IN NIGERIA BETWEEN 2001 – 2020

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ABSTRACT

Capital expenditure involves spending on assets. It has a lasting impact on the economy and helps provide a more efficient, productive economy. There is the need to examine the impact of government capital expenditure and implicit price deflator on economic growth in Nigeria. The data used is secondary in nature from Nigeria Bureau of Statistics. The statistical package used is SPSS Version 23. The objectives of this research work includes the determination of a model for predicting the growth of the GDP, to authenticate and validate the model for use and finally to predict the GDP given the revenue and implicit price deflator (IPD). From the analysis on multiple regression, it was observed that the $p < 0.05$, indicating that the model is significant, also Adjusted R² (0.984) depicts that 98.4 percent of the variation in GDP is explained by the model; hence the model is seen to be adequate. The findings also revealed that IPD with $p < 0.05$ is the only variable contributing to GDP for the period under study. It is therefore recommended that economic policy should be designed in such a manner that Government expenditure on per capital will reflect on growth of the domestic economy.

Keywords: Goss Domestic Product (GDP), Capital Expenditure, Economic Growth, Price Deflator, Inflation, Deflation

INTRODUCTION

The importance of the capital market as an efficient channel of financial intermediation has been well recognized by the researchers, both developed and developing economics growth in a modern economy hinges on an efficient financial sector that pools domestic savings and mobilizes foreign capital for productive investments. Underdeveloped or poorly functioning capital markets typically are illiquid and expensive which deters foreign investors. Furthermore, illiquid and high transactions costs also hinder the capital raising efforts of larger domestic enterprises and may push them to foreign markets (Akpan (2005), Aregbeni & Kolawole (2015)).

Theoretically, literature on financial development and growth identifies three fundamental channels through which capital markets and economic growth may be compared with (Pagano, 1995). First capital market development increases the proportion of savings that is channeled to investments. Second, capital market development may change the saving rate and hence, affect investment. Third, capital market development increases the efficiency of capital allocation.

According to Miller & Russek (1997), the Nigerian capital market has witnessed obvious transformation over the years, evident by the increased level of participation of the private and public investors at the floor of the stock exchange and various public offers of quoted companies. The emerging market has also attracted and embraced the attention and the interest of international investors thus increasing capital inflows.

Overtime, the Nigerian nation has witnessed a tremendous increase in her revenue profile through oil exports. She has equally enjoyed cycle of oil boom with successive government harnessing the resources of the nation to execute its budget (Anyafor, 1996). Ironically, there has been an increase too in her expenditure pattern overtime paradoxically, it does not appear as if the increase in capital expenditure has translated into increased capital formation

and consequent economic growth and development (Kano, Ozurumba & Ithemefe, 2014). This scenario is quite disturbing. It is far from being satisfactory and obviously point towards an ailing economy.

Osaze (2000) sees the capital markets as the driver of any economy to growth and development because it is essential for the long term growth capital formation. It is crucial in the mobilization of savings and channeling of such savings to profitable self-liquidating investment. The Nigerian capital market provides the necessary lubricant that keeps turning the wheels of the economy. It provides not only the funds required for investment but also efficiently allocates those funds to projects of best returns to fund owners. This allocative function is critical in determining the overall growth of the economy. The functioning of the capital market affects liquidity, acquisition of information about firms, risk diversification savings mobilization and corporate control (Anyanwu, 1998). Therefore, by altering the equity of these services, the functioning of the stock markets can alter the rate of economic growth. The interest by economists in Nigeria and other jurisdictions on the role of government expenditure is still inconclusive (Akpan, 2005).

Barro (1990) describes government spending in a growth model and analyzed the relationship between size of government and rates of growth and savings. He concluded that an increase in resources devoted to non-productive government services is associated with lower per capita growth. Therefore, government expenditure which enhances economic growth should be tailored towards productive services.

According to Barro and Grilli (2004), Government spending (or government expenditure) includes all government consumption and investment but excludes transfer payments made by a state. Government expenditure can be for the acquisition of goods and services for current use to directly satisfy individual or collective needs of the members of the community or it can be for acquisition of goods and services

intended to create future benefits such as infrastructure investment and the expenditures can represent transfers of money, such as social salaries and cost of administration.

Soeze, (2005) said the over dependence on oil of the Nigeria economy has created the vulnerability to the vagaries of international market, which he said is evident in the recent rise in crude oil prices at the global markets, which meant more external earnings for Nigeria, but which has also increased the expenses burden on imported refined petroleum products that the nation depends on to survive.

The relationship between public expenditure and economic growth has continued to generate series of controversies among scholars in economic literature. The nature of the impact is inconclusive and while some authors believed that the impact of government expenditure on economic growth is negative or non-significant (Akpan, 2005), others believed that the impact is positive and significant Aregbeni & Kolawole (2015). According to the first, it is the differences in the set of conditioning variables and initial conditions across studies that are responsible for the lack of consensus in the results (Levine & Renelt, 1992). In contrast, the second category consists of a handful of studies (Helms 2005) that suggest this variation in the results, in part at least, reflects the wide spread tendency among researchers to ignore the implications of the government budget constraint for their regressions. In particular, the latter view emphasizes the need to consider both the sources and the uses of funds simultaneously for a meaningful evaluation of the effects of taxes or expenditures on economic growth.

Aregbeyen (2007) established a positive and significant correlation between government capital and public investment and economic growth, while he found that current and consumption expenditures were negatively associated with it. Other studies also confirm either a negative or a positive correlation/relationship between fiscal policy (with government expenditure, public investment or related variables used as proxies) and economic growth. Laudau (1986) studied the effect of government (consumption) expenditure on economic growth for a sample of 96 nations. His result was that there is a negative effect of government expenditure on growth of real output. Levine & Renelt (1992) studied the economy of Thailand. They made use of the Granger causality tests. Their finding was that government expenditures and economic growth are not co-integrated but indicated a unidimensional relationship. This is because, causality runs from government expenditure to growth, and also detected a significant positive effect of government spending on economic growth. Gregorious and Ghosh (2007) made use of the heterogeneous panel data to study the impact of government expenditure on economic growth. The result was that countries with large government expenditure tend to experience higher growth. Donald and Shuanglin (2010) studied the differential effects of different forms of expenditure on economic growth for 58 sampled countries. They came up with the result that government expenditure on education and defense has positive impact on economic growth and that of welfare was insignificant and negative. Barro (1990) believed that expenditure on investment and productive activities is expected to contribute positively to economic growth, while government consumption spending is expected to be growth retarding. Government controls the economy through the use of public expenditure. This instrument of government control promotes economic growth in the sense that public investment contribute to capital accumulation.

Other importance of government expenditure includes the provision of those facilities that are not covered by the market

economy such as health and economic growth. (Afonso, 2014). That is, human capital promotes high benefit associated with economic growth, but the financial source for public expenditure which is the taxation reduces the benefits of the taxpayers and as such reduces the benefits associated with economic growth. The beauty of public expenditure in promoting economic growth lies with the way it is being spent. In empirical literature, while some authors believed that there is no impact of public expenditures on economic growth (Gupta et al., 2002), others believed that the impact is negative (Folster and Henrekson, 1999), while some believed that the relationship is insignificant. Economic growth is an essential ingredient for sustainable development. Akpan (2005) made use of disaggregated approach in order to determine the components of government expenditure that enhances growth. He concluded that there was no significant relationship between most components of government expenditure and economic growth in Nigeria.

Laudau (1986) pointed out that composition of government expenditure might exert more influence as compared to the level of government expenditure on economic growth. Devarajan (2006) using a sample of 140 ECD countries found that expenditure on health, transport and communication have positive impacts) on economic growth. Spending education and defense did not have a positive impact on economic growth. The nature, size and direction of government spending would surely determine its impact on the economy, which will directly or indirectly affect the size and the output of the economy. Government spending and economic growth are directly related. It has been established in literature by some authors that there is a link between economic growth and government spending; they believe that there is a nexus between government spending and economic growth.

While we have expenditure that are productive according Barro and Sala-i-Matin (2005), there are others that are not productive. Government spending has direct impact on the rate of economic advancement. Infrastructure is a key to economic growth. A good infrastructural development will enhance productivity and bring about a low unit cost of production, which will in turn increase competitiveness and effective participation in the international market.

In addition to producing conflicting views, the existing literature displays a disturbing trend. Most of the conclusions drawn recently regarding the growth effects of public spending are based either on the experiences of a set of developed countries or on the basis of large samples consisting of a mixture of developed and developing countries. (Afonso, 2014).

Accordingly, there remains little by way of understanding the process by which public expenditure policies shape the prospect of economic growth for developing countries. This trend has continued despite the long standing view among development experts that there exists not only a significant difference in the composition of public expenditure between the developed and developing countries, but the difference is also profound in the way in which public expenditures shape the outcome in these two set of countries. The only exceptions to the above trend are the contributions by Laudau (1986), Devarajan (2006), and Miller & Russek (1997). Despite their commendable objective, these studies, however, share one of the aforementioned weaknesses that are pervasive in the existing literature. Hence, this paper examined the impact of government expenditure on economic growth through capital expenditure and implicit deflator approach.

The importance of the capital market as an efficient channel of financial intermediation has been well recognized by researchers, both developed and developing economics

growth in a modern economy hinges on an efficient financial sector that pools domestic savings and mobilizes foreign capital for productive investments. Underdeveloped or poorly functioning capital markets typically are illiquid and expensive which deters foreign investors. Furthermore, illiquid and high transactions costs also hinder the capital raising efforts of larger domestic enterprises and may push them to foreign markets.

According to Miller & Russek (1997), Abu & Abdullahi (2010) the Nigerian capital market has witnessed obvious transformation over the years, evident by the increase level of participation of the private and public investors at the floor of the stock exchange and various public offers of quoted companies. The emerging market has also attracted and embraced the attention and the interest of international investors thus increasing capital inflows according to Babatunde & Dandago (2014).

MATERIALS AND METHOD

This research employ the use of secondary data obtained from the publication of the research department of Central Bank of Nigeria titled “statistical bulletin: Nigerian major Economic, Financial and Banking Sector indicators” and “Nigerian economic growth drivers and financial challenges”.

The Multiple Regression Model is

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots + \beta_kx_k \dots \dots (1)$$

$$E(y) = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3x_3 + \dots + \beta_kx_k \dots \dots (2)$$

Estimated Multiple Regression Equation is :

$$\hat{y} = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_kx_k \dots \dots (3)$$

y = dependent variable, b₀ = the intercept or constant, b_k = Slope and X_k= the independent variables

Table 1: Analysis of Variance for Testing Significance of Regression in Multiple Regression

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F _{cal}
Regression	SS _r = β'(X'y) - nȳ ²	k	MS _r = SS _r /k	MS _r / MS _e
Residual (error)	SS _e = SS _T - SS _r	n - k - 1	MS _e = SS _e / (n - k - 1)	
Total	SS _T = y'y - nȳ ²	n - 1		

Where k = number of parameters, n = number of observations
 The null hypothesis that the model is insignificant is rejected if F_{cal} is greater than F_(k, n-k)

The ANOVA is usually applied in multiple regression analysis to test for the significance of all the regression coefficients.

Test for Multicollinearity

The effects of multicollinearity may be easily demonstrated. The diagonal elements of the matrix C = (X'X)⁻¹ can be written as

$$C_{jj} = \frac{1}{(1 - R_j^2)} \quad j = 1, 2, \dots, k \quad (4)$$

Where R_j² is the coefficient of multiple determination resulting from regressing x_j on the remaining regressor variables, and hence the stronger the multicollinearity, the larger the value of R_j² will be. Recall that V(β_j) = σ²c_{jj}. Therefore, we say

that the variance of β̂_j is inflated by the quantity (1 - R_j²)⁻¹.

Multicollinearity arises for several reasons. It will occur when the analyst collects data such that a linear constraint holds approximately among the columns of the X matrix. For example, if four regressor variables are the components of a mixture, such a constraint will always exist because the sum of the components is always constant. Usually, these constraints do not hold exactly, and the analyst might not know that they exist. The presence of multicollinearity can be detected in several ways. Two of the more easily understood of these are:

- i. The variance inflation factors are very useful measures of multicollinearity. The larger the variance inflation factor, the more severe the multicollinearity. Some authors have suggested that if any VIF exceeds 20, multicollinearity is a problem. Other authors consider this value too liberal and suggest that the VIF should not exceed 4 or 5; and
- ii. If the F-test for significance of regression is significant, but tests on the individual regression coefficients are not significant, multicollinearity may be present.

Several remedial measures have been proposed for solving the problem of multicollinearity. Augmenting the data with new observations specifically designed to break up the approximate linear dependencies that currently exist often suggested. However, this is sometimes impossible because of economic reasons or because of the physical constraints that relate the x_j. Another possibility is to delete certain variables from the model, but this approach has the disadvantage of discarding the information contained in the deleted variables. Since multicollinearity primarily affects the stability of the regression coefficients, it would seem necessary to estimate these parameters by some method that is less sensitive to multicollinearity than ordinary least squares such as ridge regression.

Statistical Tests for Normality

The Shapiro-Wilk test is a way to tell if a random sample comes from a normal distribution. The test gives you a W value; small values indicate your sample is not normally distributed (you can reject the null hypothesis that your population is normally distributed if your values are under a certain threshold). The formula for the W value is:

$$W = \frac{\left(\sum_{i=1}^n a_i x_{(i)} \right)^2}{\sum_{i=1}^n (x_i - \bar{x})^2} \dots \dots \dots (5)$$

Where: x_i are the ordered random sample values a_i are constants generated from the co variances, variances and means of the sample (size n) from a normally distributed sample. The test has limitations, most importantly that the test has a bias by sample size. The larger the sample, the more likely you'll get a statistically significant result.

The Durbin Watson Test

The Durbin Watson Test is a measure of autocorrelation (also called serial correlation) in residuals from regression analysis. Autocorrelation is the similarity of a time series over successive time intervals. It can lead to underestimates of the standard error and can cause you to think predictors are significant when they are not.

The Hypotheses for the Durbin Watson test are:

- H₀ = no first order autocorrelation.
- H₁ = first order correlation exists.
- (For a first order correlation, the lag is one time unit).

Assumptions are:

- That the errors are normally distributed with a mean of 0.
- The errors are stationary.

The test statistic is calculated with the following formula:

$$DW = \frac{\sum_{t=2}^T (e_t - e_{t-1})^2}{\sum_{t=1}^T e_t^2} \dots \dots \dots (6)$$

Where E_t are residuals from an ordinary least squares regression.

The Durbin Watson test reports a test statistic, with a value from 0 to 4, where:

- 2 is no autocorrelation.
- 0 to <2 is positive autocorrelation (common in time series data).
- >2 to 4 is negative autocorrelation (less common in time series data).

A **rule of thumb** is that test statistic values in the range of 1.5 to 2.5 are relatively normal. Values outside of this range could be cause for concern.

Test for Homoscedascity

This test is the test for the assumption of constant variance or the same variance or the random variable μ has its probability distribution to remain the same over all observation of X_1 and in particular that the variance of each μ is the same for all values of the explanatory variable.

Homoscedasticity Test for the Model

Hypothesis:

The hypothesis for the Spearman-rank correlation is given as follows

$H_0 : \varepsilon_i 's$ variance are homoscedastic (same variance)

$H_1 : \varepsilon_i 's$ variance are heteroscedastic (not the same variance)

Level of Significance:

$\alpha = 0.05$

Test Statistic:

$Z^* = r\sqrt{n-1} \dots \dots \dots (7)$

Decision Criterion:

Reject the null hypothesis if $|Z^*| > Z_{\alpha/2} = Z_{0.025} = 1.96$, at the $\alpha\%$ level of significance, or if $P < 0.05$.

RESULTS AND DISCUSSION

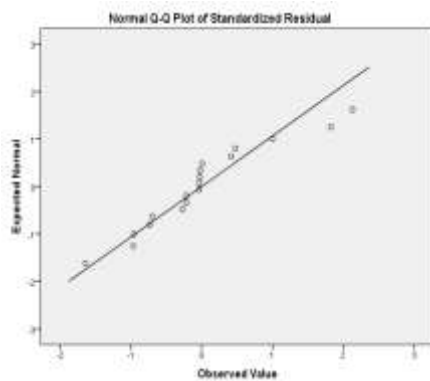


Figure 1: Plot of Expected against Observed Values

Figure 1 indicate the normal p-plot of the expected and observed value appears to be highly correlated which shows that the independent variables can explain the variation on dependent variable.

The result for multiple regression is shown below were, Y = Nominal GDP, X₁ = Federal government Per capital Expenditure, X₂ = Implicit Price Deflator

Table 2: SPSS Output on the Multiple Regression model

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	-3068.939	427.093		-7.186	.001
FGCE	-.490	1.493	-.037	-.329	.747
IPD	4.212	.456	1.028	9.237	.001

The regression equation, $\hat{y} = -3068.939 - 0.49x_1 + 4.212x_2$ can be used to estimate or predict the Nominal GDP (y) based on known Federal government per capital expenditure (X₁) and implicit price deflator (X₂) values. The negative sign of Federal government per capital expenditure coefficients in the model indicates that Federal government per capital expenditure has a negative impact to the growth of Nigeria economy which not significantly a P value (0.747), also The positive sign of implicit price deflator coefficients in the model indicates that an increase in implicit price deflator would cause an increase in the nominal GDP parameter coefficient is statistically significant, P value(0.001) which is less than α value (0.05), is significant on GDP growth. Finally when (X₁ and X₂) = 0, the nominal GDP will decrease at ₦ 3,068,939 million.

Table 3: Coefficient of Multiple Determinations

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of Estimate
1	.993	.986	.984	744.15415

a. Predictors: (Constant), implicit price deflator, Federal government capital expenditure

Table 3 shows that the correlation between the independent variables and the nominal GDP is 0.993, which indicate there's a linearity between the response and the predictor, the coefficient of determination R² is 0.986 implies that 98.6% of nominal GDP growth in Nigeria is jointly explained by changes or variation in the growth of the federal government per capital expenditure and implicit price deflator while the remaining 1.4% is due to other factors not considered in this study. The result of the Adjusted R² implies that 98.4% of GDP growth is jointly explained by changes or variation in the growth of federal government per capital expenditure and implicit price deflator.

98.4% of nominal GDP growth in Nigeria is jointly explained by changes or variation in the growth of the capital expenditure and price deflator.

RECOMMENDATIONS

Economic policy should be designed in such a manner that Government expenditure on per capital will reflect on growth of the domestic economy. The result of this study reveals that total government expenditure did not impacted positively on economic growth thus begging the question of the need to encourage private sector investment in Nigeria. The efficiency of the private sector particularly compared to the government sector cannot be over emphasized. A public organization can continue its activity even if the services it provides are no longer required. Its directors and the relevant staff will not be quick to relinquish power which is a function of the jobs they control and the funds at their disposal. The result is superfluous services, wasting personnel and capital, which could be directed to production that provides well-being and benefit to individuals in the economy

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APPENDIX 1

**Table: Nominal GDP, Federal Government Capital Expenditure and Implicit Price Deflators (₦ Billion)
from 2001 – 2020**

YEAR	GDP	FGCE	IDP
2001	1801.5	239.5	1024.29
2002	2410.1	438.7	1319.42
2003	2847.1	321.4	1495.58
2004	3231.4	241.7	1591.75
2005	3903.8	351.3	1805.55
2006	4753	519.5	2053.45
2007	5940.2	552.4	2389.49
2008	6757.9	759.3	2536
2009	7981.4	960.9	2818.53
2010	9186.3	1152.8	3063.9
2011	10310.7	883.9	3249.69
2012	11593.4	918.5	3458.87
2013	13413.8	874.8	3849.12
2014	14709.1	1108.4	4026.83
2015	14543.94	1185.18	4205.92
2016	15541.8	1254.41	4436.4
2017	16539.66	1323.64	4666.88
2018	17537.52	1392.87	4897.36
2019	18306.20	1541.40	5532.55
2020	19269.69	1622.53	5823.74

Source: National Bureau of Statistics (via Central Bank of Nigeria)



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