Government Expenditure and Economic Growth: An Empirical Analysis of the Armey Curve in Nigeria

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This paper discusses the theoretical and empirical basis for the existence of an optimal size of government as depicted by Armey Curve, which is an inverted U curve, where the size of government is on the horizontal axis and economic growth rate is on the vertical axis. The geometric nature of government expenditure in Nigeria, and the absence or little effect it had on the economy, put to question the importance of government expenditure in the country. Also, with the shifts in economic trend in the country from a government dominated economy to more private driven market economy, makes the need to determine the size of government in the economy in order to facilitates effective working of the economy. As a result of these, this study is very important, and also the study stated that, empirical analysis, the optimum size of government, e.g. the share of overall government spending that maximizes economic growth, is 11% of GDP (at a 95% confidence level) based on data from the Central Bank of Nigeria Statistical Bulletin 2012. Therefore, government and its policy makers need to ensure that her involve in the

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working is within the range of 11%. As it at this level that her spending in the economy can effectively propel aggregate demand and supply which will leads positive effects on other macroeconomic variables. In addition, the empirical result shows an evidence for the existence of the Armey Curve analysis in Nigeria. However, due to model and data limitations, it is probable that the results are understated, and the "true" optimum government level is even bigger than the existing empirical study indicates, as there are determinants of economic growth in the country. As a result of this, the study only covers between 1983 and 2012 (30 years), such there is a need for more comprehensive study in this regard

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1. Introduction

The vision of ensuring sustainable development and reduction of mass poverty at a meaningful magnitude is the main thrust governments' development plans in virtually all countries of the world, including the developed world. In this respect, Economic growth, which is usually measured as the annual rate of increase in a nation's real GDP, is taken as a main objective for overcoming persistent poverty and offering a hope for the possible improvement of society (Teshome Ketema, 2006).

In less developed and developing countries, such as Nigeria, the role of government is considerable in both scope and significance for accelerated economic growth. The importance of monetary and fiscal policies (which include taxation, expenditure, correcting market failure and providing a wide array of public goods) have become strong and essential instruments of economic growth in these countries.

Furthermore, the long-term effects of tax, expenditure, and other forms of government involvement in the economy are considered to be very important for developing countries towards achieving economic growth, as most time, government size in these countries is more than 50 percent of the economy. However important the level of government size in the economy, there is neither general consensus nor consistent evidence regarding the significant relationship between government expenditures and economic growth. (Gubta et al, 2004).

Some economists argued that increasing government spending can serve as a tool which stimulates aggregate demand for a stagnant economy and to bring about crowed-in effects on private sector. On the other hand, endogenous growth models such as Barro (1990), predict that only those productive government expenditures (most especially on infrastructural development) will positively affect the long run growth rate. In the Solow growth model (1956), government expenditure on capital formation will an incentive to investment in human or physical capital, which propel an increase in economic growth. While others like, Vedder and Gallaway (1998), argued that as government expenditures grow incessantly, the law of diminishing returns begins operating and beyond some point. Further increase in government expenditures contributes to economic stagnation and decline (Teshome Ketema, 2006).

In the last decade, Nigeria federal government spending has metamorphosed from the level of million to billion naira, and with the present trend, accumulating to trillion naira on the expenditure side of the budget. This will not be surprising if the economy is experiencing favourable signals or signs of improvement all basic necessities of life. Better still, if there are infrastructures to improve commerce with the

system or social amenities to raise the welfare of average citizen of the economy. All these are not there, yet we always have a very high estimated expenditure

Unfortunately, rising government expenditure has not translated to meaningful economic growth and development, as Nigeria is still ranked among the poorest countries in the world. In addition, many Nigerians have continued to wallow in abject poverty, while more than 50 percent live on less than US$2 per day (World Bank, 2011).

It is as a result of this stated fact that this study will be carried out to correct the imbalance in research efforts on the effects of fiscal policy instruments on economic growth and development. Also, the study is also structured towards determining the size of government will enhance economic growth. Further, attempt will be made at empirical testing of the Armey curve in Nigeria, with the aim of ascertain the expected size of government. This study is, therefore, very timely and significant and will fill the research gap created by the researches pattern and as well identify the role played by government expenditure on the growth of productive capacity of the economy. This study will investigate what went wrong either with the way government expands budget or with the ways and manners it has always been computed, which didn't translate to viable economic development in Nigeria with more attention on the time range of 1983 to 2012.

2. LITERATURE REVIEW

2.1 THEORITICAL REVIEW

The position and significance of government expenditure in the economy have a subject of great debate among various economists, among the classicalists. Some of them, like Wagner's hypothesis,

viewed public expenditure as an endogenous factor or an outcome of growth in national income, which has no effect on the economic growth, Wagner (1890) and Tang (2001). This position was supported by Abizadeh and Yousefi (1995), Ansari (1993) and Kim & Cayer (1997). This which was disputed by Keynes (1936), who postulated government spending is an incentive for economic growth.

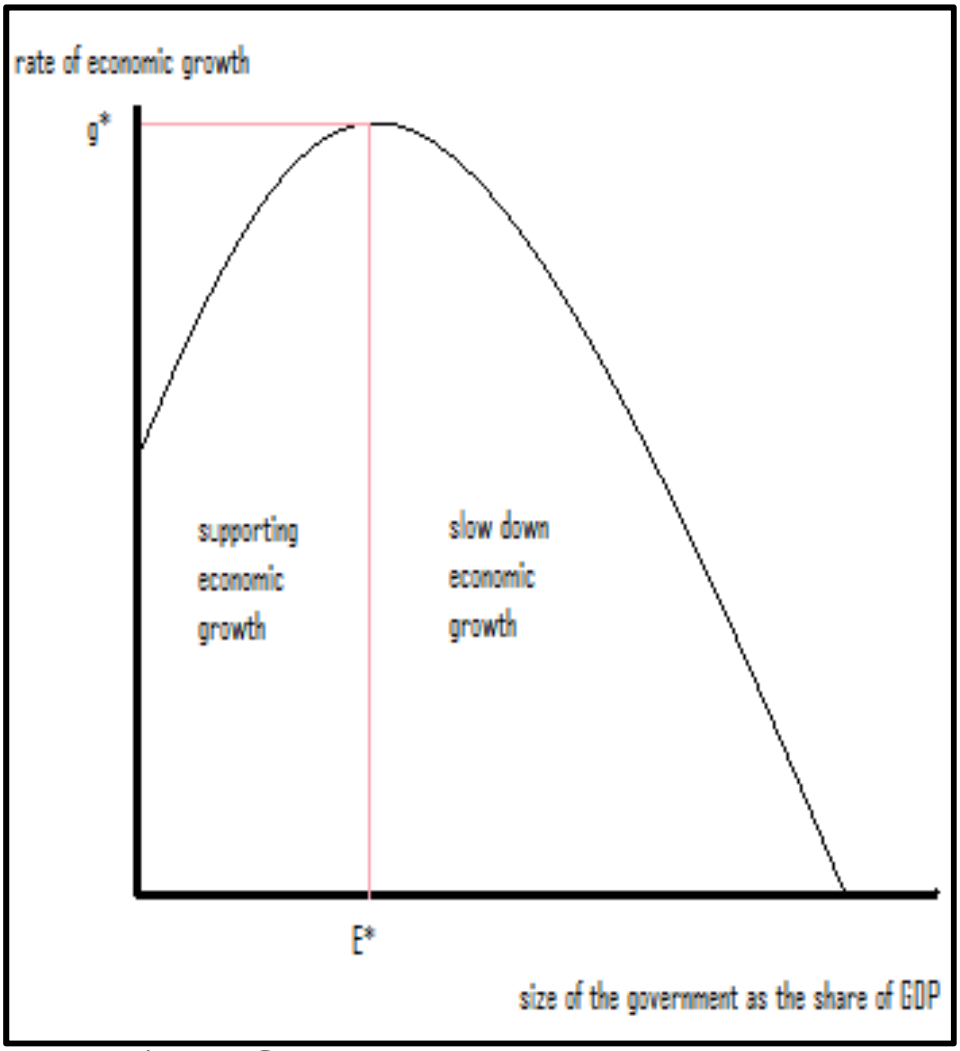
The debate on this continue till date as, the focus of it shifted to that impact of these government spending on the economy, as the position of Keynes solidified after the use of public policy to end the great depression of 1930s. Some group of economists, like Landua (1983), Engen and Skinner (1991), Menhdi and Mohammed (2001), have found a negative relationship between government expenditure and economic growth. According to them, excessive increase in government spending will have an adverse effect on economic growth and cause a crowding-out effect on private investment.

While the other group of economists, like Rubinson (1977), Kormendi and Meguire (1986) and Grossman (1988), hold the view that there is a positive relationship between governme expenditure and economic growth. Armey (1995), Vedder and Gallaway (19980, Sheehey (1993) and Forte and Magazzino (2010) concluded that the relationship between government expenditure and economic growth is inconsistent as it has a non-linear relationship. Therefore, confirming the assertion of Barro (1990) that government expenditure has different effects on economic growth and this is determined by its size (Sajjad, 2012).

2.1.2 THE CONCEPT OF ARMEY CURVE

The thrust of the theory was built on the Laffer curve by Dick Armey, as American Senator, to theorize the optimal level of government interference in relation to economic growth. The Armey curve demonstrates the relation between government expenditure and economic development and hypothesizes that an optimal size of government expenditure exists (Thanh, 2009). Barro (1990) has earlier studied the impact of government sector on economic growth with the simple endogenous growth model and he concluded that "the economy's growth rate and saving rate initially rise with the ratio of productive government expenditure to GNP, g/y, gut each rate eventually reaches a peak and subsequently declines" (Barro (1988) and Menhdi and Mohammed (2011)).

The model shows show the optimal size of government expenditure in the graph below:



Graph 1.1: Armey Curve

Source: Pham. T (2009)

The graph shows the threshold of government expenditure **g*** which guarantee optimal rate of economic growth, and any further increment in government expenditure or size will have negative effect or

slowdown economic growth. Also, the functional relationship between the government spending and rate of economic growth as a quadratic function specified as:

*RGDP = **(GC, GC^2) ……1**

*RGDP = **a_1+ a_2GC - a_3 GC^2 ……2**

RGDP= Rate of Economic growth

GC= Government Size/Expenditure

GC^2 = Square of Government Size/Expenditure

2.2 EMPIRICAL REVIEW

Many empirical studies have been conducted to determine the relationship between government expenditure and economic growth in an economy. Landau (1983) explained the relationship between government expenditure in 96 developed countries using the Ordinary Least Square methods. His result shows that negative relationship exists between government expenditure and economic growth. Also, Folster and Henrekson (2001) studied the trend between government expenditure and economic growth using data from 23 OECD countries and 7 developing countries, with the government size indicator as the average growth rate of total government expenditure/total private consumption expenditure in their study. The result shows a negative relationship exist between them.

Futhermore, Gwartney et al. (1998) also conducted a research into the nature of relationship between government expenditure and economic growth, using Total government expenditure and government non-

investment expenditure as an indicator of government size. They conducted the research using 2-Systems Least Square method get a negative relationship between government size and economic growth.

Other empirical studies like, Kormendi and Meguire (1986) using Ordinary Least Square method to analysis data from 47 countries with the government size indicator is the average growth rate of total government expenditure/total private consumption expenditure. The study shows a positive relationship between government size and economic growth.

Vedder and Gallaway (1998) using a Multi-regression to analysis the effect of government expenditure and economic growth in U.S., Denmark, Italy, Sweden, and United Kingdom. The study shows uncertain relationship but concluded that U.S. optimum total government expenditure size is 17.45%, at which rate of growth in economy will be optimized. Also following the same trend of determining the threshold level of government expenditure are, Chen and Lee (2005) using a threshold regression approach in Taiwan to observe the relationship between government expenditure and economic growth. The study concluded that before the threshold regime is positive and after the threshold regime is negative.

Cameron (1982) is an early simple study, presenting a negative bivariate correlation between the average percentage of GDP spent by government and the average rate of growth in real GDP over the period 1960–79. Cameron argued the size of the effect was not very large, noting that a very dramatic increase in spending, in the range of 20 percentage points of GDP-a magnitude of increase that occurred in

a few nations such as Sweden, the Netherlands, and Denmark would have reduced the rate of economic growth by only one percent [age point].

The evidence and arguments generated in early studies, typically strictly limited to cross-country regressions with no (or occasionally very few) control variables, is at most merely indicative of what is going on. As originally noted by Saunders (1986) the existing cross-country evidence was not sufficiently

Magazzino (2008) estimated the "BARS curve" for Italy in two different periods: in the first instance, using time-series which refer to the years between 1862 and 1998, the Government size maximizing the Italian economic growth is given by a ratio between public expenditure and GDP equal to 23.06%.

Chobanov and Mladenova (2009) examined the optimal size of Government (defined as the share of the total public expenditure on GDP) able to maximize economic growth for a set of 28 countries adhering to the OECD in the period 1970-2007. The empirical results showed that the ratio between public expenditure and optimal GDP equals to 25%. Moreover, all the countries in the sample were situated in the right descending part of the curve.

3.0 RESEARCH METHODOLOGY

3.1 THEORETICAL FRAMEWORK

The model for this study will examine the relationship between gross domestic products and government consumption expenditure following the analyses carried out by Vadder and Gallaway (1998), Pevcin (2004), Chobanov and Mladenova (2005), Davies (2008) and Forte and Magazzino (2010) in estimating the stated relationship.

$$GDP = a_1 + a_2 GC + a_3 GC^2 + e \text{.....2}$$

GDP= gross domestic products (current basic price)

GC= Government consumption expenditure.

As stated above, according to Armey Curve, excessive increase in government spending triggers inverse effect economic growth, which is expected to bring about decrease in economic growth. Therefore, according to Forte and Maggazzino (2010), the relationship economic growth, government expenditure and variations of government expenditure is estimated as;

$$\Delta GDP = GDP = a_1 + a_2 GC + a_3 GC^2 + e \text{.....3}$$

From equation 2, any further increase in public expenditure will trigger new negative effect on economic growth (Forte and Magazzino, 2010). Then, the relationship between economic growth and government expenditure according to model specification s,uggested by Vadder and Gallaway (1998), Pevcin (2004), Chobanov

and Mladenova (2005), Davies (2008) and Forte and Magazzino (2010).

$$GDP = a_1 + a_2 GC + a_3 GC^2 + e \quad \text{.....5}$$

GDP= gross domestic products (current basic price)

GC= Government consumption expenditure.

GC^2= Square of Government consumption expenditure.

a_1 and $a_2 >$ and $a_3 <0$.

The level of government expenditure which guarantee the optimal level of economic growth is derived by taking the first derivative of the equation (3) in respect to GC (Government Expenditure) and then equated to zero.

3.2 UNIT ROOT TEST

As mentioned above, the first point of our analysis is to conduct the unit root test of stationarity using the Augmented Dickey-Filler (ADF) test. The result is presented in table 4.1

Table 2

Unit Roots Test (ADF AND PP Tests)

Variable	ADF	Critical Values		Order of Integration	PP	Critical Values		Order of Integration
		1%	5%			1%	5%	
Gdp	-5.0895	-3.73779	-2.99 19	I(2)	-3.6025	-3.6892	-2.9719	I(1)
GC	-3.4619	-3.72 41	-2.98 62	I(0)	-3.6071	-3.6892	-2.9719	I(1)
GC^2	-1.5242	-3.80 85	-3.02 07		-3.1544	-3.6999	-2.9763	I(2)

***** indicates significance at 5% and 1% levels and indicates the order of integration.***
Source: Researcher's Computation from EViews 7.

Decision Rule: Reject the null hypothesis if the t – adf calculated is > the value of the two critical values; that is at 1% and 5%.

As shown in Table 4.1, the variables have different order of stationary, Gross Domestic Products was stationary at second differenced using ADF-test and first differenced while other variables are stationary at different order of integration. That is, they are integrated of order 0 ~ (1) and 1 ~ (2). Evidence of co-integration was shown from the order of integration presented above, which proves that the dependent variable has the same order with some of the explanatory variables. And for this reasons, we conduct co-integration test as shown below.

3.3 CO-INTEGRATION TEST

Given the unit root properties of the variables, we proceeded to implementing the Johasen Co-integration Test. Since the dependent variable has the same order of integration with some explanatory variables, we estimate their linear combination at level form without the intercept and obtain their residual, which is then subjected to co-integration test as shown below:

TABLE 3: JOHANSEN CO-INTEGRATION TESTS

Date: 09/18/13 Time: 16:26
Sample (adjusted): 1985 2012
Included observations: 28 after adjustments
Trend assumption: Linear deterministic trend
Series: GDP GC GC2
Lags interval (in first differences): 1 to 1

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.818057	81.98157	29.68	35.65
At most 1 **	0.571586	34.26789	15.41	20.04
At most 2 **	0.313527	10.53327	3.76	6.65

Trace test indicates 3 cointegrating equation(s) at both 5% and 1% levels
*(**) denotes rejection of the hypothesis at the 5%(1%) level

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	5 Percent Critical Value	1 Percent Critical Value
None **	0.818057	47.71369	20.97	25.52
At most 1 **	0.571586	23.73462	14.07	18.63
At most 2 **	0.313527	10.53327	3.76	6.65

Max-eigenvalue test indicates 3 cointegrating equation(s) at both 5% and 1% levels
*(**) denotes rejection of the hypothesis at the 5%(1%) level

The result presented in table 2 shows that there is presence of at 3 co-integrating equation , which confirm the relationship among the variables, the Gross Domestic Products (at Current Price), and Government Consumption Expenditure and the Square of Government Consumption Expenditure (GDP, GC and GC^2) at 5% and 1% levels of significance.

3.4 EMPIRICAL MODEL ESTIMATION

Dependent Variable: GDP

Method: Least Squares

Date: 09/18/13 Time: 16:27

Sample: 1983 2012

Included observations: 30

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1002448.	1068068.	0.938561	0.3563
GC	125.1286	38.97391	3.210573	0.0034
GC^2	-5.730760	0.000150	0.038152	0.9698

R-squared	0.917300	Mean dependent var	9436867.
Adjusted R-squared	0.911174	S.D. dependent var	12010434
S.E. of regression	3579544.	Akaike info criterion	33.11401
Sum squared resid	3.46E+14	Schwarz criterion	33.25413
Log likelihood	-493.7101	Hannan-Quinn criter.	33.15883
F-statistic	149.7413	Durbin-Watson stat	0.589391
Prob(F-statistic)	0.000000		

Source: Researcher's Computation from EViews 7.
$R^2 = 0.9173$, DW = 0.589391

$$GDP = 1002448 + 125.13GC - 5.731\ GC^2$$
$$(0.9386) \quad (3.2106) \quad (0.03815)$$

3.5 RESULT EXPLANATION

From the result above, index of GC (Government Consumption Expenditure) has a coefficient of 0.0125. According to the result, GC (Government Consumption Expenditure) positive sign shows that improved growth in the amount of the Government Expenditure will increase the Economic Growth witnessed in the country. Holding all other variables constant, a unit (1 Billion) increase in index of Government Expenditure will increase Gross Domestic Products by 125.13units (Billion). Also, the square of Government Consumption Expenditure ($GC^{2)}$ has a negative parameter. These are in conformity with the theoretical framework of the model as stated in the Armey Curve Model (1995) and also the results are similar to that of Vedder and Gallaway (1998), Percin (2004), Scully (2004) and Forte and Magazzino (2010).

From the result above, the optimal level of government expenditure is gotten at 11% and this is observed in the GDP growth rate that the highest level of GDP growth in Nigeria between 1981 and 2012 is in the year 1990 where Government expenditure as a share of Gross Domestic Products is 11.62778. Also, the R^2 is 0.9173, which show the significant impact that government consumption has on the total products of the economy. Also Durbin Watson of 0.589391 shows that there is no autocorrelation among the variables used in the study.

4.0 CONCLUSION AND RECOMMENDATION

The estimation results reveal that the explanatory variables jointly account for approximately 91.7 percent changes in economic growth. The Durbin Watson statistic (0.5894) illustrates the absence of auto correlation. The estimation results show that the variable (Government Consumption Expenditure (GC)) is statistically significant in explaining changes in economic growth. These findings are in line with the fact that government expenditure may slowdown economic growth, using the Armey curve assumption of inverse relationship between government expenditure and economic growth after the optimal level, which is estimated at 11%. The negative impact government size may not be unconnected with mismanagement and diversion of public funds by government officials and government ostentation spending.

As of a result of the above, the following recommendations are put forward;

1. Government should promote efficiency in the allocation of development resources through emphasis on private sector participation and privatization\commercialization.
2. The guiding principle for public investment should be complimentary rather than compete with private investment.
3. Prudent fiscal policy should be pursued to widen and strengthen the revenue base in order to avoid costly or distortionary financing of the ever increasing government expenditure. For example, government should reduce her level of ostentation as it observed among all levels of government.
4. Government has a bigger responsibility in creating stable and conducive economic and political environment, building general

consensus and mobilizing its people in developmental endeavour if the country has to direct itself into long-run growth path.

5.

5.0 LIMITATIONS OF THE STUDY

This study encountered challenges ranging from non-availability of data on the variables used for previous period before 1983. Thereby, limiting the span of years used in the study. The study scope is also hindered by fund and other personal and environment induced challenges.

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