Does the Composition of Public Expenditure Matter for Growth in Nigeria: A Vector Error Correction Approach

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Abstract: This study investigated the effect of the composition of public expenditure on growth in Nigeria. A vector error correction modeling approach was adopted. Annual time series data for the study covering the period 1970-2008 were extracted from the Central Bank of Nigeria Statistical Bulletin. The estimation results revealed that expenditure on transfers significantly impacted growth negatively in Nigeria. However, expenditures on economic services and social community services were found to impact growth positively. Researchers therefore recommend that proper attention be given to expenditure on social and community services as they form greater part of human capital formation that are vital to growth and development.

Key words: Vector Error Correction Approach, growth, composition of public expenditure, social community, Nigeria

INTRODUCTION

There has been growing interest among researchers in an attempt to verify and understand the dynamic linkages between fiscal policies and economic growth. Most of the recent deliberation on ways to trigger growth, reduce poverty and improve the quality of human life in low-income developing countries have centred on the necessity to promote a large increase in public investment. United Nations (2005) and the World Bank (2005a, b) reports have indeed dwelt on the significance of a Big Push in public investment in core infrastructure as it is critical to spurring growth and development. Over the past decades, a substantial volume of empirical studies have been geared towards identifying the building block of public expenditure both at the aggregate or disaggregated levels that bear significant impact on economic growth. These studies vary in terms of data sets, methodology and often left us with no direction (Bose et al., 2003).

For instance, Saad and Kalakeeh (2009) investigated the growth effects of government expenditure in Lebanon over a period from 1962-2007 with a particular focus on sectoral expenditures. The study disentangled governmental expenditures and used a multivariate cointegration analysis to examine the effect of each sector on economic growth. Four sectors were taken into account: defense, education, health and agriculture. It was found that government spending on education has a positive effect on growth in the long-run and negative impact in the short-run. While spending on defense has a negative effect on economic growth in the long run and insignificant impact in the short-run. As to health spending, it is negatively correlated to growth in the long-run and there is insignificant linkage in the short-run. Finally, spending on agriculture is found to be insignificant in both cases. Accordingly, the allocation of government resources towards the education sector should be favored in order to enhance growth.

Afonso and Furceri (2008) analyzed the effects of government revenue and spending in terms of size and volatility on growth in OECD and EU countries. The results of the paper suggest that both variables are detrimental to growth. In particular, looking more closely at the effect of each component of government revenue and spending, the results point out that indirect taxes (size and volatility), social contributions (size and volatility), government consumption (size and volatility), subsidies (size) and government investment (volatility) have a sizeable, negative and statistically significant effect on growth.

Gupta et al. (2005) assessed the effects of fiscal consolidation and expenditure composition on economic growth in a sample of 39 low-income countries during the 1990s. The study found out that strong budgetary positions are generally associated with higher economic growth in both the short and long terms. The composition of public outlays also matters: countries where spending

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is concentrated on wages tend to have lower growth while those that allocate higher shares to capital and nonwage goods and services enjoy faster output expansion. Finally, initial fiscal conditions also have a bearing on the nexus between fiscal deficits and growth.

Lopez and Islam (2008) identified a key feature of the structure of government expenditures as a determinant of economic growth: the public goods/private goods expenditure ratio. In a context of market failure, the concept of public goods broadens considerably to include expenditures that mitigate the effects of such failures. The study develops a theoretical and empirical analysis showing that shifting government expenditures from private goods or non-social subsidies to public goods broadly defined, promotes economic efficiency and growth. Using data for 87 countries from 1980-2004, the study confirmed this hypothesis. Increasing the share of public goods by one half of a standard deviation induces a one percentage point increase in the annual per capita growth rate of GDP.

Fan and Rao (2003) examined the trends in government expenditures in the developing world so as to access the causes of change and to develop an analytical framework for determining the differential impacts of various government expenditures on economic growth. Contrary to common belief, their study found that structural adjustment programs increased the size of government spending but not all sectors received equal treatment. As a share of total government spending, expenditures on agriculture, education and infrastructure in Africa on agricultural and health in Asia and on education and infrastructure in Latin America, all declined as a result of the structural adjustment programs. The impact of various types of government spending on economic growth is mixed. In Africa, government spending on agriculture and health was particularly strong in promoting economic growth. Asia's investments in agriculture, education and defense had positive growth-promoting effects. However, all types of government spending except health were statistically insignificant in Latin America. Structural adjustment programs promoted growth in Asia and Latin America but not in Africa. Growth in agricultural production is most crucial for poverty alleviation in rural areas. Agricultural spending, irrigation, education and roads all contributed strongly to this growth. Disaggregating total agricultural expenditures into research and non-research spending reveals that research had a much larger impact on productivity than non-research spending.

Jung and Thorbecke (2001) examined the impact of public expenditure on human capital, growth and poverty in Tanzania and Zambia. The study employed a multisector CGE Model and found that education expenditure can raise growth in these countries. However, to maximize this benefit from education expenditure, a sufficiently high level of physical investment is needed and that a well targeted pattern of education expenditure can be effective for poverty alleviation.

Nurudeen and Usman (2010) observed that rising government expenditure has not translated to meaningful development as Nigeria still ranks among world's poorest countries. In an attempt to investigate the effect of government expenditure on economic growth, the study employed a disaggregated analysis. The results reveal that government total capital expenditure, total recurrent expenditures and government expenditure on education have negative effect on economic growth. On the contrary, rising government expenditure on transport and communication and health results to an increase in economic growth. The researchers therefore recommended that government increases both capital expenditure and recurrent expenditure including expenditures on education as well as ensuring that funds meant for the development of these sectors are properly managed. Secondly, government should increase its investment in the development of transport and communication in order to create an enabling environment for business to strive. Thirdly, government should raise its expenditure in the development of the health sector since, it would enhance labour productivity and economic growth. Lastly, government should encourage and increase the funding of anti-corruption agencies in order to tackle the high level of corruption found in public office.

Loto (2011) investigated the growth effects of government expenditure in Nigeria over the period of 1980-2008 with a particular focus on sectoral expenditures. Five key sectors were chosen (security, health, education, transportation and communication and agriculture). Security as indicated by protection function of a nation consists of the creation of the rule of law and enforcement of property rights, life and property from external aggression health and education enhances the efficiency of labour which will increase the growth of national production. Also, expenditure on infrastructure such as transportation and communications enhances efficient production by minimizing the cost of production. This will encourage more private investment which increases the chance of firms to make more profit and hence, foster economic growth. The variables were tested for stationarity and cointegration analysis was also carried out using the Johansen co-integration technique. The essence of the use of the techniques is to identify the interactions between government spending on these

sectors (education, health national security, transportation and communication and agriculture) and economic growth in Nigeria. The result shows that in the short-run, expenditure on agriculture was found to be negatively related to economic growth. The impact of education, though also negative was not significant. The impact of expenditure on health was found to be positively related to economic growth. Though, expenditures on national security, transportation and communication were positively related to economic growth, the impacts were not statistically significant. It is possible that in the long-run, expenditure on education could be positive if brain drain could be checked.

Adesoye *et al.* (2010) examined the link between government spending and economic growth in Nigeria over the last three decades (1977-2006) using time series data. Three variants of models were developed-regressing real GDP on private investment, human capital investment, government investment and consumption spending at absolute levels, regressing it as a share of real output and regressing the growth rate, real output to the explanatory variable as share of real GDP in other to capture the precise link between public investment spending and economic growth in Nigeria based on different levels. Empirical result showed that private and public investments have insignificant effect on economic growth during the period under review. The study tested for presence of stationary using Augmented Dickey Fuller (ADF) unit root test. The result reveals that all variables incorporated in the model were non-stationary at their levels. In an attempt to establish long-run relationship between public expenditure and economic growth, the result reveals that the variables are cointegrated at 5 and 10% critical level. With the use of Error Correction Model to detect short run behaviour of the variables, the result shows that for any distortion in the short-run, the error term restore the relationship back to its original equilibrium by a unit. The study's main policy recommendation was that government spending should be channel in order to influence economic growth significantly and positively in Nigeria, especially on education and infrastructural facilities.

This present study is at variant with these previous studies as it considers the particular case of the growth effects of the composition of the Nigeria's public expenditure and as well as adopting the Vector Error Correction Modeling (VECM) approach. The idea behind analyzing the particular case of Nigeria's public expenditure composition is that an inquiry into the fiscal responsibilities of the federal government showed that Nigeria classified its expenditure into four groups base on purpose namely: administration, economic services, social

community services and transfers. It is against this backdrop that this study intends to examine the economic effect of these classifications base on purpose on the Nigeria economy.

Background issues
Public expenditure on education in Nigeria: Here we analyze the trend of public expenditure on education as shown in Fig. 1.

Figure 1 shows that education expenditure as a percentage of total Federal government expenditure ranged from 4.82% in 1977, 8.83% in 1982 at its highest and dropped to 7.09% in 1985 during the Pre-SAP period. It also revealed that the percentage share of education in the total government expenditure during the SAP period was 9.88, 4.41, 3.96 and 7.14% in 1986, 1987, 1992 and 1993, respectively. In the Post-SAP period as shown in the above analysis, the share was 9.33, 5.76 and 10.16% in 1984, 1997 and 2000, respectively. This is at variance with the UNESCO proposed 26%. The expenditure on education has been largely fluctuating instead of maintaining an increasing proportion of the yearly budget. Regardless of incessant strikes and negotiation to stimulate government to increase the proportion, it has been dwindling. The economic multiplier effect is that the Federal and State government have found it increasingly difficult to meet recurrent and capital costs required to support the rapid expansion in education hence, the educational institutions have been in a deplorable state of neglect. This has serious implications for growth.

Public expenditure based on grouping: In this study researchers examine the trend of public expenditure on the four classifications vis-a-vis: administration, economic services, social community services and transfers. Expenditure on administration includes general administration, national assembly, defence and internal security whereas expenditure on economic services includes agriculture, construction, transport and communication. Social community services compose of education, health and others while transfers include
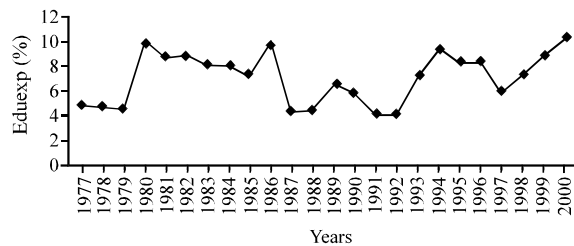

Fig. 1: Public expenditure on education as percentage of total expenditure

public debts charges both internally and externally as well as external obligations. Present below is the trend of public expenditure to these classifications.

From Fig. 2, administration, economics services, social community services and transfers take 15.2, 59, 17 and 8.7% of total government expenditure in Nigeria in 1961. In 1971 after 10 years, administration and transfers increased to 26.4 and 22.5%, respectively while economic services and social community services fell to 33.5 and 7.6%, respectively. In 1981, administration fell to 11%, economics services increased to 55%, social community services stood at 19.8% while transfers was 14%. During the Structural Adjusment Programme (SAP), administration fell to 3.1%, economics services was 12.9%, social community services was 7.7% while transfers increased to 76%. This is an indication that the SAP policy of reduce government expenditure mannifested in all the classifications except for transfers both internally and externally. It implied that government obligations increased. In 2000, it was 39.2, 47.7, 8.6 and 4.5% for administration, economics services, social community services and transfers, respectively. It could be deduced that social community services which include education and health that are key determinants of human capital formation and quality attracted less government attention and experienced a dwindling attention compared to the others. However, despite the attention given to administration and economics services, insecurity and poor transport system have been the bane of the country.

Public expenditure and growth relationship: Figure 3 also, revealed that economic growth in Nigeria is at its low ebb.
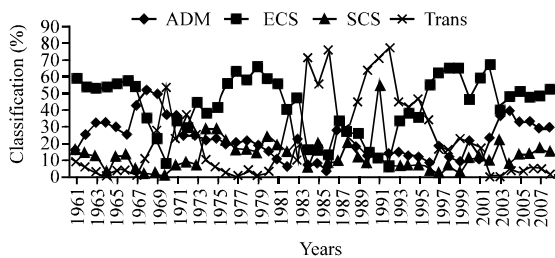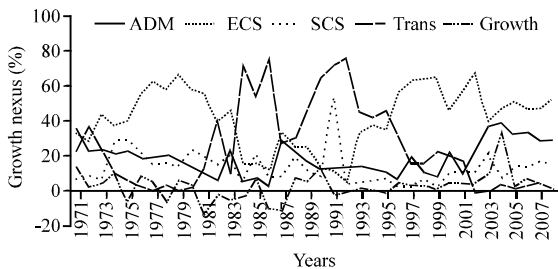

Fig. 2: Expenditures to the classifications

Fig. 3: Expenditure growth nexus

For example, a cursory look at the figure indicates that in 70s, economics services and administration were higher in terms of government attention whereas economic growth during the period was dwindling. Growth in the period was dwindling to the extent of experiencing a negative growth. This trend continued the until in the late 90s when growth was above zero. Social community services were insignificant and dwindling throughout the period just above growth. In the late 80s to early 90s, social community services surged and this surge was also experienced though little in growth.

MATERIALS AND METHODS

Data definition and sources: The first step in developing a restricted VAR Model is to make a choice of variables essential for the analysis. The variables employed in analyzing the effect of Nigeria's public expenditure composition on economic growth are growth rate (gdp), gross fixed capital formation (kst), public expenditure on economic services (ecs), public expenditure on administration (adm), public expenditure on social community services (scs) and public expenditure on transfers (trans). Data employed covers the period 1970-2008 and were extracted from the Central Bank of Nigeria (CBN) statistical Bulletin, 2010.

Model specification: To analyze the effect of public expenditure composition base on classifications and purpose on growth, researchers adopted the Vector Error Correction Modeling (VECM) approach. The VEC Model was employed to capture the effect of the composition of public expenditure on growth in Nigeria. The concern here is on the joint behaviour through time of a vector of variables. The model is thus specified as:

$$Z_t = \alpha + \psi_i Z_{t-1} \ldots , + \psi_k Z_{t-p} + \mu_t \tag{1}$$

where, $Z_t = (Z_{1t}, \ldots, Z_{kt})$, ψ_i are (KxK) coefficient matrices and $\mu_t = (\mu_{1t}, \ldots, \mu_{kt})$. This is K-dimension white noise with zero mean E $(\mu_t) = 0$ and contemporaneous covariance matrix E $(\mu_t \mu_t') = \Sigma\mu\Sigma\mu$ is a diagonal matrix where diagnonal elements are the variance of the structural disturbances and off-diagonal elements are zero (structure errors are assumed to be uncorrelated). Thus, Eq. 1 can be written compactly as:

$$Z_t = \alpha + \sum_{i=0}^{p} \Psi 1 Zt - 1 + \mu_t \tag{2}$$

where, Z_t is a (6×1) vector of observations at time t on the variables under consideration (con, pgdp, sfd, spd, ftw, cmt and brs).

$\alpha = [(\alpha_{i_{\cdots}}\alpha_n)$, n = 6] is the (6×1) intercept vector of the VAR Model, ψ_i is a sequence of (6×6) matrix of autoregressive coefficients for i = 1, 2, 3,..., p and $\mu_t = (\mu_{1t},..., \mu_{6t})$, the (6×1) generalization of a white noise process or vector of stochastic disturbances. The dynamic behaviour of Z_t is governed by the following structural model:

$$B (L) = Z_t = \alpha + \mu_t \qquad (3)$$

where, B (L) is a 6th order matrix polynomials in the lag operator (L):

$$B (L) = B_0 - B_1 L - B_2 L^2,.., B_6 L^6 \qquad (4)$$

B_0 is a non-singular matrix normalized to have one on the diagonal and summarizes the contemporaneous relationship between the variables contained in the vector Z_t.

RESULTS AND DISCUSSION

Unit root results: The analysis begins by conducting stationarity test to establish the stationarity or otherwise of the variables and the appropriateness of the specification of the restrictedVAR Model. Thus, both the Augmented Dicky Fuller (ADF) and the Philips Perron (PP) tests are employed. The ADF-test and PP-test are shown in Table 1.

The results in Table 1 show that the variables are non-stationary in their levels. The variables only became stationary after first difference. This is confirmed by both the ADF-test and the PP-test statistics in Table 1. Since, the variables follow order one [I (1)] process, the next step is to test if there exists a long run relationship (cointegration) among the variables.

Cointegration test result: To establish a long run relationship among the variables, researchers employed the Johansen Maximum-likelihood approach. The number of cointegrating relations from all the models on the basis of trace statistics and the maximal eigenvalue statistics using critical values at 5% are shown in Table 2. The results of the maximal eigenvalue and the trace statistics in Table 2 shows that the hypothesis of no cointegration among the variables can be rejected for Nigeria. The results revealed that at least five cointegrating vectors exist among the variables of interest. Considering the establishment of long run equilibrium relationship among the variables as shown in Table 2, the analysis employs a restricted VAR system (VECM).

Estimation result for the vector error correction model: Base on the establishment of the long run relation among the variables of interest, researchers proceed to present the parsimonious VECM result selected on the basis of Akaike information criterion and Schwarz criterion (Table 3).

It could be deduced from the economic growth (gdp) Model that a year lag growth had a significant effect on contemporary growth in Nigeria. The model also shows that expenditure on transfers significantly impact growth negatively in Nigeria and the implication is that transfers form both external and internal debt obligations of the government which might undermine investment and invariably affect growth in the short run. Expenditures on economic services (ecs) and social community services (scs) were found to impact growth positively however, the expenditure on social community services is insignificant. The implication is that expenditure on education and health are insignificant to trigger growth in Nigeria in the short run and this point to the dwindling and

Table 1: Unit Root Test results

Variables	Augmented Dickey Fuller test				Philips Perron test			
	Without trend		With trend		Without trend		With trend	
	Level	1st diff.	Level	1st diff.	Level	1st diff.	Level	1st diff.
adm	7.31	-2.14	4.39	-3.82**	12.29	-1.93	7.85	-4.02**
ecs	0.23	-7.88*	-1.59	-8.42*	0.89	-7.77*	-1.47	-8.38*
scs	2.43	-7.08*	0.89	-8.79*	5.24	-7.03*	2.55	-8.33*
trans	-2.82	-9.69*	-3.37	-9.57*	-2.77	-9.92*	3.46	-9.79
kst	-	-	-	-	-1.58	-4.21**	-1.78	-4.11**
gdp	9.75	-1.51	5.52	-3.13***	9.57	-1.08	5.63	-3.12***

*, **, *** indicate 1, 5 and 10% level of significance, respectively

Table 2: Johansen Cointegration Test result

Rank	Max eigen value	Trace statistics
r≤0	0.96*	331.84*
r≤1	0.92*	213.31*
r≤2	0.78*	122.11*
r≤3	0.63*	66.96*
r≤4	0.42*	30.83*
r≤5	0.27*	11.16*

* denotes 5% level of significance

Table 3: Vector error correction result

Variables	d (gdp)	d (kst)	d (trans)	d (scs)	d (ecs)	d (adm)
d (gdp (-1))	0.81*(3.17)	3.19*(2.47)	-0.005(-0.51)	0.01*(3.29)	-0.09*(-4.24)	-0.003(-0.67)
d (kst (-1))	-0.0034(-1.08)	0.43*(2.73)	-0.048(-0.40)	-0.0006(-0.02)	-0.029(-1.12)	-0.0007(-0.13)
d (trans (-1))	-10.18***(-1.61)	-0.19(-0.62)	-0.22(-0.41)	-0.24*(-2.56)	-0.31(-0.59)	-0.02(-0.18)
d (scs (-1))	4.24(0.56)	0.18(0.48)	0.11(0.38)	-0.56*(-5.07)	1.22**(1.90)	0.07(0.54)
d (ecs (-1))	9.28*(4.25)	3.27*(2.97)	-0.11*(-2.31)	-0.007(-0.20)	-0.76*(-4.11)	0.04(1.07)
d (adm (-1))	20.03***(1.80)	4.60(0.82)	-0.31(-0.70)	0.07(0.41)	-0.63(-0.67)	-0.20(-1.06)
contant	71749.12	18.17	133.35	-1857.26	-5403.09	-1112.26
ect (-1)	-0.09**(-1.86)	-0.19**(-2.52)	-0.004(-0.74)	-0.01*(-5.17)	-0.06*(-4.75)	-0.009*(-3.33)
JB	1.22	0.55	22.51	1.32	28.98	37.35
F-stat	36.18*	2.27**	5.62**	86.59*	8.82**	172.5*
R^{-2}	0.92	0.57	0.74	0.92	0.76	0.94

*, **, *** represent 1, 5 and 10% significant level; JB = Jarque Bera normality test; ect = error correction variable

insignificant attention given to these key sectors of human capital development. Expenditure on general administration including defense and security were found to have positive and significant effect on growth in the short run in Nigeria. The error correction variable had the expected characteristics. It is less than unity, significant and negative. It implies that it can rightly correct 9% of any deviation of economic growth from its long run equilibrium value. In the capital stock model, lag value of capital stock, growth and economic services were found to positively and significantly influence contemporary capital stock in the short run. For the model of expenditure on social community service, growth was found to have a significantly positive effect while a transfers and lag expenditure on social community services were found to have negative effect.

CONCLUSION

This study attempts to examine the effect of public expenditure on economic growth in Nigeria. This is because Nigeria's annual budgetaryallocation groups expenditure on the basis of purpose. It is against this backdrop that this study examined the composition of public expenditure on growth in Nigeria. The study employed a Vector Error Correction Modeling Approach. The study first undertake to examine the stationarity status of the variables with the ADF-test and the PP-test, the result revealed that all the variables became stationary after first difference. Researchers then proceeded to use the Johansen cointegration test to establish long run relationship. The estimation results indicate that expenditure on transfers significantly impacted growth negatively in Nigeria. However, expenditures on economic services and social community services were found to impact growth positively though, the expenditure on social community services is insignificant. The implication is that expenditure on education and health are insignificant to trigger growth in Nigeria in the short run and this point to the dwindling and insignificant attention given to these key sectors of human capital

development in Nigeria. Similarly, expenditure on general administration including defense and security were found to have positive and significant effect on growth in the short run in Nigeria. Researchers therefore recommend that proper attention be given to expenditure on social and community services as they form greater part of human capital development that are vital to growth and development.

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