Public Education and Defence Spending in Nigeria: Implications for Economic Growth

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Abstract In this study, we examined the proposition that military expenditures "crowd-out" expenditures on education in Nigeria during the period 1973-2006 for which we obtained a fairly consistent data. Data for the study were obtained from the Statistical Bulletin of the Central Bank of Nigeria and the Peace Research Institute (SIPRI). A VAR model was estimated using the variables of the model. Forecast error variance decomposition and impulse response functions derived from the VAR enabled us to investigate the dynamic relationship between defence spending and expenditure on education. The result indicates that defence spending in Nigeria 'crowds-in' expenditures on education. The study revealed that there is a positive and significant relationship between defence spending and education expenditures. The study also found a negative and significant relationship between expenditures on education and economic growth as well as defence spending and economic growth. This indicates that the levels of funding of the two sectors are inadequate to stimulate economic growth. The paper recommends increased funding to the education and defence sectors.

Keywords: Defence, Education, Nigeria, Expenditures, Growth, VAR Model

1. Introduction

The development of human capital through public education has been described as a crucial requirement for the economic growth and development of nations in general and in the less developed countries in particular (Akram and Pada , 2009). Several studies (Romer, (1990); Barro, (2001); Abbas and Foreman – Peckb, (2007) have found a positive correlation between human capital development and economic growth. It has been argued that education in general contributes to skill acquisition that enables individuals to improve on their marginal productivities and those of the other co- operant factors in the production process.

Formal public education is seen in many countries as a social good because, first, it enables the government to plan the 'production' of the needed manpower for the country both in the short, medium and long term. Second, in designing the curricular for public schools, government is able to achieve a variety of local, regional or national objectives. Such goals include the teaching of indigenous languages, values and norms, as well as other societal objectives. Third, government is able to cater for the needs of the poor in terms of access and costs of education.

It is in recognition of these features of public education system that has made the provision of adequate finance to the education sector a priority of governments all other the world. For example, the World Bank has recommended that less developed countries should allocate 26 percent of their Gross Domestic Product (GDP) to the education sector annually. Although the less developed countries allocated an average 4.0 per cent of their GDP to the education sector in the 1980s, the corresponding figure for the defence sector is about 6.0 per cent (World Bank. 1992). This tends to suggest that there is an apparent conflict within government budgets between education expenditure, on the one hand and defence spending on the other (Adebiyi and Oladele 2005). The question that naturally comes to mind here is: does public spending on defence 'crowd-out' public spending on education? This question becomes very relevant in view of the fact that Nigeria had 30 years of military dictatorship out of its 50 years as an independent State. As noted by Roux (1994), defence spending may impact on the quantity and quality of human capital development. Against this background, this study aims at examining the interactions between public education expenditure

and defence spending in Nigeria. This study also aims at filling the apparent gap in previous studies by using an expanded data base. The rest of the paper is organized in sections. Following this introductory section, section 2 provides a brief review of the theoretical literature and the theoretical framework. Section 3 focused on an overview of the education and defense spending sectors in Nigeria. Section 4 presents the materials and methods for the study. Section 5 presents the results of the econometric analysis while section 6 concludes.

2. Literature Review and Theoretical Framework

Public education is usually designed to cultivate and develop skills, intellect, character, values and psychomotor potentials of individuals. Thus it is argued that human resource development ensures that the workforce needed by a country is continuously adapted for, and upgraded to meet the new challenges of social, cultural and technological environment (Adebiyi and Oladele, 2005). In this regard, Harbison (1973) noted: "human resources development constitute the ultimate basis for the wealth of nations, . . . human beings are the active agents who accumulate capital, exploit natural resources, build social, economic and political organization, and carry forward national development,…Clearly, a country which is unable to develop the skills and knowledge of its people and utilize them effectively in the national economy will be unable to develop anything else" (Harbison 1973, p 3).

Baro (1991) in a cross country study found that the growth rate of real per capita income is positively related to initial level of school enrollment rates. The study also found that as the level of education for women rises, a decline in fertility levels is recorded; this leads to better education for siblings.

Hanushek and Kimko (2000) in a study of the relationship between the quality of the labour force as measured by comparative tests of mathematics and science skills found that the quality of labour force has a consistent, stable and strong relationship with economic growth.

Bils and Klanow (2000) analyzed a model to quantify the effect of schooling on economic growth. The study argued that the impact of schooling on growth explains less than one third of the empirical cross-country relationship. This finding is similar to Sylvester (2000) which posited that countries with a higher level of income inequality also spend more on education relative to GDP. According to the study, inequality lowers economic growth; education in turn lowers inequality, hence educational expenditures lead to economic growth.

Sianesi and Reenen (2002) in a study of developing countries found that returns to schooling are higher in developing countries as compared to the developed countries. The study emphasized that the quality of schooling and the level of efficiency in school management are important determinants of the link between education and economic growth.

Although, some studies e.g. Barro (1991) argued that the simple correlation between per capita income growth and education expenditures may be weak and negative, the general consensus emerging from the literature is that education and human capital development are important in explaining growth across countries. The observed positive correlation is stronger in the developed countries as compared to the developing countries.

Despite the empirical findings of a significant positive relationship between education and human capital development on the one hand and the level and rate of economic growth on the other, many less developed countries allocate small proportion of their national income to the education sector. According to Olaniyi and Adam (2003), Bostwana allocated an average of 21 per cent of her GDP to the education sector between 1986 and 1992. Kenya, Malaysia and Uganda spent an average of 20 percent, 19 per cent and 15 percent respectively, of their GDP on the education sector during the 1986 to 1992 period. The allocation of resources to the education sector in Nigeria declined over the years reaching as low as 5.23 per cent in 2003.

The reason for the inadequate funding in the education sector is not far-fetched for many of the less-developing countries. In general while the level of national income is low in many of these countries their developmental needs are enormous and diverse. The education sector therefore has to compete with the other sectors of the economy such as defence, for developmental resources. In Nigeria during the long period of military rule, resource allocation to the social sector was highly skewed in favour of military spending. The military paid less attention to the education sector while the defence sector received greater attention. Although Smith (1980) noted that defence spending does not necessarily depress resource allocation to the social sector, there is some ample evidence however that military spending and expenditures on education are to a large extent mutually exclusive particularly in the face of declining resources. This implies that during economic down turn defence spending tend to be sustained if not increased while expenditures in the education sector decline. Dunne and Mohammed (1995) in a study of African countries found that military spending and educational expenditures are substitutes.

Tomori and Adebiyi (2002) noted that many less developed countries have tended to reduce the social wage including educational spending to enable them sustain or even increase defence expenditure. It further argued that this trend can be attributed to the virtual absence of institutional resistance. For example, in Nigeria while the Generals in the Army, Air Force, Navy and the Police could wield a lot of influence on the executive arm of government, the Nigerian Union of teachers (NUT) and the Academic Staff Union of Universities (ASUU) (which are about the most organized trade unions in the education sector) would not be able to command the attention of government over matters affecting the funding of the education sector. Adebiyi (2003) argued that relegation of the education sector to the background in resource allocation may have grave consequences for the socio economic development programmes such as education. It is the objective of this paper to examine the extent to which defence spending 'crowd-out' expenditures on education in Nigeria.

From the perspective of a developing country like Nigeria, the military is placed at an advantage in resources allocation than the education sector for the following reasons. First, security is considered a necessary requirement for the development of the various sectors of the economy including education. Second, the security chiefs have direct access to the presidency – a relationship which they could exploit to their advantage in presenting request for addition resources. Teachers do not have such direct access to the presidency. Third, the presidency is likely to be more sympathetic to the requests of the military as a strategy to dissuade them from military coups. It is therefore being suggested that a real competition for resources may exist between the defence and education spending. Deger (1986) noted that governments in the less developed countries (LDCS) have tended to reduce the social wage for education in order to increase defence expenditures. The real issue here is whether defence spending promotes economic growth at a rate that is higher than the contributions of educational spending. Benoit (1973) noted that military training involves acquisition of technical skills which augments the skill content of the indigenous labour force. Whynes (1979) also recognized the positive contributions of the military in dismantling social rigidities by promoting modernization of societies.

Aizenman and Glick (2003) in analyzing the links between military expenditure and growth found that military expenditures induced by external threat (and by extension, militant activities) increased growth. The study also revealed that the effect of military expenditure on growth is negative when external threat of war is low and high when threat is high. The study also revealed that military expenditures induced by rent seeking and corruption increases military spending and the optimal tax rate and hence, reduced growth. Adebiyi and Oladele (2005) in a study of the relationship between defence and educational spending found that the predominant sources of public education expenditure fluctuations and due to own shocks and to defence spending shocks.

Abu- Badar and Abu-Qarn (2003) used multivate cointegration and variance decomposition techniques to investigate the causal relationship between government expenditures and economic growth for Egypt, Israel and Syria. The study revealed that the military burden negatively affects economic growth. This evidence

somewhat contradicts Landau (1983) which found no evidence of negative relationship between military spending as share of GDP and peace time growth rate of LDCs. The paper argued that as military expenditure increases, government spending also increases which allows the level of spending on health, education and infrastructure to be maintained. This finding is similar to Stroup and Heckdman (2001) which found that using data from 44 African and Latin American countries and employing a Barro – Style model of economic growth, the relationship between the defence burden and economic growth is non-linear, with low levels of military spending increasing economic growth but higher levels of military spending decreasing economic growth.

From the literature reviewed, one may conclude that the results from the various studies are inconclusive as regards the nature of the relationship between the military burden and economic growth. While some studies reported a 'crowd –out' effect of the military burden on the social good and investment others reported the reverse.

3. Defence Versus Education Expenditures in Nigeria: Overview

Although the governments in Nigeria recognize the critical role of human capital development through formal education, its funding has become a subject of intense debate. Following the quadrupling of crude petroleum oil prices in the early 1970s, the Federal and State governments embarked on a rapid expansion of educational facilities at primary, secondary and tertiary levels. Government did not only build new schools, they also compulsorily acquired privately owned (including missionary schools) primary and secondary as well as tertiary institutions that were regional in character. These policies placed enormous financial responsibilities on the Federal government on the one hand and regional/state governments on the other. Government spending on education has exhibited tremendous instability in trend. The rise in government revenues in the early 1970s, resulted in increases in government spending, including expenditures on education and defence. For example, the share of education expenditure in total government expenditure rose from 0.86% in 1971 to 10.3% in 1978. As government revenues declined following oil price falls in the early 1980s, the share of education spending fluctuated from 8.27% in 1980 to 2.97% in 1990. In 2002, expenditures on education as share of total federal government expenditures decline to 1.91%. There was a significant rise in the share of expenditures on education beginning from 2004 when it stood at 21.18% of total expenditures. During the entire period under study the share of education in total federal government expenditures was consistently lower than the United Nations benchmark of 26% of gross domestic product (GDP).

Table 1. Government spending as % of GDP for selected African countries (1998 – 2001)

	Military	Education
Nigeria	1.1	0.8
Mozambique	2.4	4.0
Niger	2.3	1.4
Rwanda	3.9	3.1
Sierra Leone	2.2	2.6
Senegal	1.5	2.8
South Africa	1.6	3.6
Zimbabwe	3.2	2.8

Source: SIPRI. Downloaded. Http://www.sipri.org

Table 1 above shows government priorities in resource allocation between the defence and education. The table clearly reveals that Nigeria allocates much less to education, compared to the selected African countries.

Defence expenditures in Nigeria also recorded remarkable swings since the 1970s. The Nigerian civil war (1967 – 1970) and the long period of military dictatorship created the environment that sustained defence's sustained rising claim on national resources. Defence spending as proportion of total federal government expenditure declined from 21.1% in 1970 to 13.2% in 1973. The corresponding figures for education were 0.69% and 1.75% respectively. Although in absolute terms defence expenditure rose consistently over the period (see table 2). The reason for larger share of defence spending in the early 1970s was the large positive military establishments such as military housing construction, salary *increases for military personnel, expanded officer corps (including promotions) as* well as foreign arms procurement. From 1981 defence expenditures recorded a downward trend, declining from about =N=1 billion in 1`981 to about N803.2 million naira in 1986. As a portion of total government expenditure, it fell from more than 14% to 2.7% in 1987. Defence spending started to record an upward trend from 1988. Between 1988 and 1998 defence spending rose from =N=1.2 billion to =N=25 billion respectively. In 2007 defence spending doubled its 2006 figure at N122 billion following the security challenges in the Niger Delta. In 2010 defence spending stood at N292 billion. This recorded an increase of about 32% to N348 billion in the 2011 budget. These new upward trend in defence spending reflects the security challenges in the country.

4. Materials and Methods

4.1 Data

The following variables were used for this study

EDUEXPGDP	=	Public Education Expenditures as a ratio of gross domestic product (GDP)
DEFEXPGDP	=	Military Expenditure as a ratio of gross domestic product
RGDPG	=	Real Income (GDP) growth rate
FGEXPGDP	=	Total Federal Government Expenditure as a ratio of GDP

The series for the variables were for the period 1970 to 2009. The data on defence was obtained from the Military International Peace Research Institute (SIPRI) 2011. Data on other variables were obtained from the Central Bank of Nigeria (CBN) publications.

4.2 Econometric Methodology

Our assumption here is that a rise in military expenditures would deplete national resources available to the education sector. The effects of such shocks to public expenditures on education could be examined by specifying a vector autoregressive (VAR) model from which the forecast error variance decomposition and impulse responses are derived to provide information on impulse responses of one variable over the other (Adrangi and Allender (1998); Adebiyi and Oladele (2005). Consider a bivariate autoregressive process, AR(1). Let a_t be a measure of educational expenditure and b_t be the military spending. A VAR model may be written as:

$$\begin{pmatrix} a_t \\ b_t \end{pmatrix} = Y_0 + Y[L] \begin{pmatrix} a_{t-1} \\ b_{t-1} \end{pmatrix} + \begin{pmatrix} U_{at} \\ U_{bt} \end{pmatrix} \quad - \quad - \quad (1)$$

Where Y_0 is a vector of constants, Y (L) is a 2 x2 matrix of polynomial in the lag operator L, and U_{it} are serially independent errors for i.

The structural VARs may be written as

$$a_t = x_{10} - X_{11} b_i + X_{12}a_{t-1} + X_{13}b_{t-1} + U_{at} \quad - \quad - \quad - \quad (2)$$

$$b_t = X_{20} - X_{21} a_t + X_{22}a_{t-1} + X_{23}b_{t-1} + U_{bt} \quad - \quad - \quad - \quad (3)$$

re –writing (2) and (3) we have

$$a_t + X_{12}b_t = X_{10} + X_{11}a_{t-1} + X_{13}b_{t-1} + U_{at} \quad - \quad - \quad - \quad - \quad - \quad (4)$$

$$b_t + X_{21} a_t = X_{20} + X_{22}a_{t-1} + X_{23}b_{t-1} + U_{bt} \quad - \quad - \quad - \quad - \quad - \quad (5)$$

Equation (4) and (5) can be written in matrix notation as follows

$$\begin{pmatrix} 1 & X_{12} \\ X_{21} & 1 \end{pmatrix} \begin{pmatrix} a_t \\ b_t \end{pmatrix} = \begin{pmatrix} X_{10} \\ X_{20} \end{pmatrix} + \begin{pmatrix} X_{11} & X_{13} \\ X_{22} & X_{23} \end{pmatrix} \begin{pmatrix} a_{t-1} \\ b_{t-1} \end{pmatrix} + \begin{pmatrix} U_{at} \\ U_{bt} \end{pmatrix} \quad (6)$$

Assume

$$N = \begin{pmatrix} 1 & X_{12} \\ X_{21} & 1 \end{pmatrix}$$

$$P = \begin{pmatrix} a_t \\ b_t \end{pmatrix}$$

$$Q_0 = \begin{pmatrix} X_{10} \\ X_{20} \end{pmatrix}$$

$$Q_1 = \begin{pmatrix} X_{11} & X_{13} \\ X_{22} & X_{23} \end{pmatrix}$$

Employing the notations above we may write the structural VAR in a compact form as follows:

$NP_t = Q_0 + Q_1\ p_{T-1} + U_{it}$ - - - - - (7)

Assume that we multiply eqn 7 by N^{-1}, then eqn 7 becomes

$P_t = Y_0 + Y_1 P_{t-1} + \sum_{it}$

Where $Y_0 = N^{-1} Q_0$

$Y_1 = N^{-1}Q_1$

And $\sum_t = N^{-1}U_{it}$

Given that the a_{ij} is the element of the ith row and jth column, then the VAR in standard form becomes.

$a_t = X_{10} + X_{11}a_{t-1} + X_{12}b_{t-1} + \sum_{at}$ - - - - - (8)

$b_t = X_{20} + X_{21}a_{t-1} + X_{22}b_{t-1} + \sum_{bt}$ - - - - - (9)

And in matrix notation we have

$$\begin{pmatrix} a_t \\ b_t \end{pmatrix} = \begin{pmatrix} X_{10} \\ X_{20} \end{pmatrix} + \begin{pmatrix} X_{11} & X_{12} \\ X_{21} & X_{22} \end{pmatrix} + \begin{pmatrix} \sum a_t \\ \sum b_t \end{pmatrix} - \quad (10)$$

Equation (10) can be written as

$$\begin{pmatrix} \sum a_t \\ \sum b_t \end{pmatrix} = \begin{pmatrix} 1 & X_{12} \\ X_{21} & 1 \end{pmatrix}^{-1} + \begin{pmatrix} Ua_t \\ Ub_t \end{pmatrix} - \quad (11)$$

So that $\sum a_t = \dfrac{U\,a_t - X_{12}\,U\,b_t}{1 - X_{12}\,X_{21}}$ - - - (12)

$\sum b_t = \dfrac{U\,b_t - X_{21}\,U\,a_t}{1 - X_{12}\,x_{21}}$ - - - (13)

Note that U_{it} and $\sum_{it}$ are white noise. Observing equations 12 and (13) we found that policy errors are due to exogenous 'a' and policy disturbance. If we assume that βu be a 2 x 2 variance – covariance matrix of U_{it} and $\beta_\sum$ be that of $\sum_{it}$, then $\beta_\sum = N\beta N^{-1}$. If $X_{21} = 0$, then $\sum b_t$ is not equal to Ubt and therefore will not provide a measure of the policy shock of defense expenditures on education expenditures. To estimate the structural VAR in (8) and (9) we will need further restrictions to identify β_U and N otherwise equations 12 and 13 will yield less parameters than the structural VAR in equation (2) and (3). Following Simatele,(2003) we assume that the structural shocks are uncorrelated so that the off diagonal elements on the covariance matrix are zero (Adebiyi and Oladele (2005).

5. Empirical Results

Before proceeding to estimate the VAR model in (8) and (9) we check the order of integration of the variables and also test whether there is cointegration among the variables.

5.1 Unit Root Test

Two approaches were used to test for the presence of unit roots in the variables. The Augmented Dickey-Fuller (ADF) unit root test and the Phillips- Peron (PP) unit root tests. The test results reported in table 2 shows that all the variables except RGDPG are 1(1). RGDPG is however 1(0)

Table 2. Unit Root Test Results

ADF			PP	
Variable	At Level$_s$	Order of Integration	Level$_1$	Order of Integration
Rgdpg	-5.9108	1(0)	-8.2163	1(0)
FgExpgdp	-3.8317	1(0)	-2.0757	1(1)
Eduexpgdp	-2.3129	1(1)	-2.11359	1(1)
Defexpgdp	-0.8182	1(1)	-1.91491	1(0)

5.2 Cointegration Test

Following Johansen and Juseluis (1990) two likelihood ratio test statistics, the trace statistic and the maximal eignevalue are commonly used to determine the number of cointegrating vectors. The result of the cointegration test is reported in table 3. Since there is growing evidence in favour of the Trace Statistics compared to the maximum Eigen value statistics (Kasa, 1992) we accept the trace test result presented in table 3. The table reveals that there are four cointegrating equations. The evidence of cointegration among the variables, indicate that there is a long-run relationship among the variables. Since the variables are cointegrated the equations of the VARs also include lagged values of the variables to capture their long-run relationships.

Table 3. Johansen Cointegration Test

Date: 10/03/11 Time: 20:52
Sample (adjusted): 1973 2008
Included observations: 34 after adjustments
Trend assumption: No deterministic trend
Series: DEDUEXPGDP RGDPG DDEFEXPGDP DF GEXPGDP
Lags interval (in first differences): 1 to 1

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical value	Prob.**
None*	0.589250	76.64736	40.17493	0.0000
At most 1*	0.524852	46.39515	24.27596	0.0000
At most 2*	0.342321	21.09474	12.32090	0.0013
At most 3*	0.182411	6.847454	4.129906	0.0105

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level
*Denotes rejection of the hypothesis at the 0.05 level
**MacKinnon-Haug-Michelis (1999) p-values

5.3 Results of the VAR Model

The results of the estimated VAR model is presented in table 4. We must note that in practice most of the coefficients when a VAR model is estimated do not appear to be very precise. This is because the techniques of constructing standard errors may not be very accurate (Odusola and Akinlo, 2001). Nevertheless the results obtained gives useful information about the response of a variable to innovations in another.

Table 4. Vector Autoregression Estimates

Vector Autoregression Estimates Date: 10/05/11 Time: 19:19 Sample (adjusted): 1973 2006 Included observations: 34 after adjustments Standard errors in ( ) & t-statistics in [ ]				
	DEDUEXPGD	RGDP	DDEFEXPGD	DFGEXPGDP
DEDUEXPGDP (-1)	0.006632 (0.20960) [0.03164]	113505.2 (35221.2) [3.22264]	0.693698 (0.16432) [4.22154]	-3.625057 (3.31930) [-1.09211]
DEDUEXPGDP(-2)	0.030291 (0.25938) [0.11678]	7193.921 (43587.4) [0.16505]	0.218445 (0.20336) [1.07420]	-3.093016 (4.10775) [-0.75297]
RGDPG(-1)	-4.74E-06 (1.3E-06) [-3.51230]	0.570422 (0.22683) [2.51474]	-2.29E-06 (1.1E-06) [-2.16592]	-2.29E-05 (2.1E-05) [-1.07084]
RGDP(-2)	4.45E-06 (1.4E-06) [3.07029]	0.404283 (0.24345) [1.66067]	2.57E-06 (1.1E-06) [2.26201]	1.78E-05 (2.3E-05) [0.77382]
DDEFEXPGDP(-1)	0.123957 (0.24059) [0.51521]	53936.32 (40429.9) [1.33407]	0.662242 (0.18862) [3.51089]	6.599714 (3.81019) [1.73212]
DDEFEXPGDP(-2)	-0.195881 (0.18359) [-1.06695]	-1381.108 (30850.6) [-0.04477]	-0.111281 (0.14393) [-0.77315]	-13.62470 (2.90741) [-4.68620]
DFGEXPGDP(-1)	0.035523 (0.01069) [3.32334]	-4657.529 (1796.21) [-2.59297]	-0.003131 (0.00838) [-0.37357]	0.698347 (0.16928) [4.12545]
DFGEXPGDP(-2)	0.034384 (0.02399) [1.43325]	-272.1554 (4031.36) [-0.06751]	-0.015553 (0.01881) [-0.82694]	0.974730 (0.37992) [2.56561]
C	0.040954 (0.02047) [2.00065]	816.5975 (3439.86) [0.23739]	-0.007629 (0.01605) [-0.47539]	0.807446 (0.32418) [2.49075]
R-Squared	0.842562	0.980601	0.917473	0.860178
Adj. R. Squared	0.792182	0.974393	0.891064	0.815435

Sum sq. resids	0.102499	2.89E+09	0.063001	25.70634
S.E. Equation	0.064031	10759.87	0.050200	1.014028
F-statistic	16.72406	157.9660	34.74125	19.22489
Log likelihood	50.42859	-358.6584	58.70256	-43.49032
Akaike AIC	-2.436976	21.62696	-2.923680	3.087666
Schwarz SC	-2.032939	22.03100	-2.519643	3.491703
Mean dependent	0.123265	86559.61	0.138099	2.035442
S.D. dependent	0.140458	67240.47	0.152096	2.360347
Determinant resid covariance (dof adj.)		656.5936		
Determinant resid covariance		191.9292		
Log likelihood		-282.3468		
Akaike Information criterion		18.72628		
Schwarz criterion		20.34243		

From table 4, education expenditures is positively related to defence expenditure and the coefficient is significant at 5% level. The observed relationship is not surprising because after the Nigerian civil war in 1970, the Federal government rapidly increased expenditures on military emoluments, and through the multiplier effect, increased aggregate demand which lead to real growth and corresponding expansion in educational expenditures.

On the defence expenditure equation the relationship is also positive and significant at 5% level suggesting that both military expenditures and educational spending are mutually reinforcing which supports Arora and Bayoumi (1994) that argued that military spending could stimulate economic growth.

The equation on real income growth revealed that in the short run both education and military expenditures have negative relationship with growth whereas in the longer period the relationship is positive. In other words there is a time lag between education and military spending on the one hand and economic growth on the other.

5.4 Forecast Error Variance Decomposition

To further examine the short-run dynamics between military and defence expenditures we estimated forecast error variance decomposition derived from the VAR which we estimated earlier. The result is presented in table 5.

Table 5. Variance Decomposition

Variance Decomposition of DEDUEXPGDP:					
PERIOD	S.E	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	0.081027	100.0000	0.000000	0.000000	0.000000
2	0.086751	87.28662	0.180245	1.182391	11.35074
3	0.118295	48.41438	1.966544	7.817301	41.70181
4	0.133201	39.05469	5.470128	6.773369	48.70181
5	0.158529	30.76352	5.976813	12.26692	50.99275
6	0.178716	24.20771	8.090656	14.62589	53.07575
7	0.200055	19.38555	10.66254	17.04703	52.90489
8	0.210623	17.60044	12.84776	17.67747	51.87432
9	0.217474	16.64113	13.92497	19.06117	50.37273
10	0.220704	17.06905	14.68279	19.28450	48.96367
Variance Decomposition of RGDPG:					
PERIOD	S.E	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	0.201485	8.741200	91.25880	0.00000	0.000000

2	0.215505	7.661710	80.55770	10.31881	1.461780
3	0.235108	8.996358	77.95567	9.875286	3.172688
4	0.236994	9.402055	77.28969	10.15429	3.153967
5	0.237781	9.434906	76.98242	10.38502	3.197647
6	0.238389	9.705286	76.59659	10.33767	3.360455
7	0.238748	9.677076	76.43259	10.36476	3.525579
8	0.240623	9.891906	75.24913	10.47248	4.386478
9	0.242469	9.821658	74.27410	10.47909	5.425147
10	0.246032	9.707641	72.44148	10.75443	7.096450
Variance Decomposition of DDEFEXPGDP:					
PERIOD	S.E	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	0.046280	3.364292	0.020361	96.61535	0.000000
2	0.066619	24.17194	16.65244	59.00634	0.169283
3	0.076199	27.63024	19.78012	45.81465	6.774993
4	0.101429	20.31675	12.32572	32.57400	34.78354
5	0.126758	15.28111	12.38428	23.54172	48.79288
6	0.154040	12.66665	11.42814	21.08435	54.82085
7	0.180630	9.717364	11.60922	21.42734	57.24608
8	0.207014	7.537603	13.06986	22.36513	57.02740
9	0.225573	6.351013	15.02243	22.85237	55.77419
10	0.237233	5.840878	16.43865	23.68536	54.03511
Variance Decomposition of DFGEXPGDP:					
PERIOD	S.E	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	1.061372	34.95785	1.488011	6.859763	56.69437
2	1.223756	26.57268	2.169969	7.324579	63.93278
3	1.877519	22.31618	1.651027	15.37534	60.65745
4	2.258885	15.67138	5.098795	14.85868	64.37115
5	2.862258	11.40291	8.024737	18.32399	62.24836
6	3.198852	9.129603	11.00989	18.33155	61.52896
7	3.528908	7.570829	12.51804	20.66860	59.24253
8	3.702532	7.223319	14.34266	21.31511	57.11892
9	3.808786	7.113993	15.55717	22.29471	55.03412
10	3.857554	8.100423	16.09456	22.08918	53.71583
Cholesky Ordering: DEDUEXPGDP RGDPG DDEFEXPGDP DF GEXPGDP					

The variance decomposition shows the proportion of forecast error variance for each variable that is attributable to its own innovation and to innovation in the other endogenous variables in the model. From table 5, the predominant sources of variation in all the variables are the "own" shock. Education expenditures "own" shock declined from 100% in the first period to 16% in the tenth period. Total Federal government expenditure as a ratio of GDP is an important source of the forecast error variance in education spending. Also military spending explains the variations in education expenditure substantially especially in the medium and long term. For example, in the medium term defence spending explains 14.6% of the variations in Education spending. In the long term, defence spending accounts for 19% of the variations in education expenditures.

5.5 Impulse Response Functions

The impulse response functions are reported in table 6.

Table 6 Impulse Response to Cholesky (d.f. adjusted) One S.D Innovations

Response of DEDUEXPGDP				
Period	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	0.081027	0.000000	0.000000	0.0000000
2	0.001882	-0.003683	-0.009433	0.029227
3	0.014350	0.016175	-0.031701	0.070678
4	0.012423	0.026369	-0.010385	0.052833
5	0.028320	0.023055	-0.043371	0.064609
6	0.000682	0.032894	-0.039857	0.064318
7	0.005170	0.041028	-0.046381	0.064974
8	-0.007030	0.037844	-0.031930	0.042882
9	-0.007904	0.029770	-0.034247	0.028481
10	-0.021071	0.023796	-0.019458	0.005167
Response of RGDPG:				
Period	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	0.059570	0.192477	0.000000	0.000000
2	0.003114	-0.019116	0.069226	-0.026055
3	-0.037610	-0.075351	0.025814	-0.032785
4	0.017549	-0.017888	-0.015641	-0.004211
5	0.007327	0.010717	0.012976	-0.006039
6	0.013453	-0.001939	0.001781	0.010089
7	0.000731	-0.006135	0.005757	0.009994
8	0.014539	0.001402	-0.012472	0.023025
9	0.006848	0.009886	-0.009862	0.025490
10	0.010097	0.013547	-0.018683	0.033258
Response of DDEFEXPGDP				
Period	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	-0.008489	0.000660	0.045490	0.000000
2	0.031634	-0.027177	0.023440	-0.002741
3	0.023055	-0.020235	-0.006432	0.019643
4	0.022042	0.010934	0.026287	0.056436
5	0.019109	0.026867	-0.020772	0.065279
6	0.023458	0.026867	-0.034934	0.071891
7	0.012841	0.032803	-0.044588	0.075297
8	0.007728	0.042583	-0.050925	0.075903
9	-0.001174	0.045198	-0.045205	0.062775
10	-0.007457	0.040096	-0.041255	0.045066
Response of DEGEXPGDP				
Period	DEDUEXPG	RGDPG	DDEFEXPG	DFGEXPGD
1	0.627538	0.129470	-0.277985	0.799167
2	0.064367	0.125437	0.180043	0.564602
3	0.623471	0.160321	-0.657496	1.086636
4	0.113927	0.449410	-0.464953	1.070680
5	0.366803	0.630285	-0.861988	1.347269
6	0.003854	0.684964	-0.612051	1.093772
7	0.092784	0.657488	-0.835522	1.039971
8	-0.217753	0.638203	-0.590028	0.672830
9	-0.204426	0.539127	-0.558773	0.391702
10	-0.416396	0.371661	-0.229717	-0.097914
Cholesky Ordering: DEDUEXPGDP RGDPG DDEFEXPGDP				

Table 6 reveals that past public education spending shocks has a positive relationship with current expenditures on education in the first seven years and thereafter turns negative. Table 6 also revealed that defence spending shocks marginally increased expenditures on education, especially in the medium term. This result is in agreement with other studies such Verner (1983), Adebiyi and Oladele (2005).

6. Conclusion

In this study, we set out to empirically examine the notion that defence spending "crowd-out" expenditures on education. In recent times, defence expenditures rose to as much as 32% of total Federal government expenditures in the 2011 budget estimates alone, giving rise to concerns over possible decline, in expenditures on the social good. The literature is largely inconclusive over the trade-off between defence spending, human capital formation and growth. While some studies reported that the military burden negatively affect growth (Abu-Badar and Abu Qarn (2003), Landau (1993), found evidence of positive relationship between defence expenditures and economic growth (Benoit, 1973; Verner, 1983).

We tried to verify these claims by specifying a VAR model to test whether military spending "crowd-out" spending on education. Evidence from the ADF and PP unit root tests revealed the variables are 1(1) except RGDPG which is 1(0). The cointegration test shows that the variables are cointegrated as the trace test statistic revealed 4 cointegrating equations. The results of the VAR model revealed that there is significant positive relationship between defence spending and expenditures on education. Also the VAR revealed a negative relationship between education expenditures, defence spending and economic growth. The result is not really surprising because the level of funding in the education sector has persistently fallen short of minimum world standards.

The variance decomposition results show that "own-shocks" significant account for variation in all the variables in the models. It is also found that military spending explains the variation in all the variables including education expenditures. Also the impulse response functions revealed defence spending shocks marginally increased expenditures on education especially in the medium term. Based on these findings, the paper makes the following recommendation. Since both defence and educational spending are mutually supportive, both items of expenditures should be raised side by side. Also, the negative relationship between defence spending and growth indicates the inadequate level of funding in that sector, in the same vein the level of funding in education should be enhanced.

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