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 – Peck, (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), Botswana 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 downturn 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 additional 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 multivariate 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>
<thead>
<tr>
<th></th>
<th>Military</th>
<th>Education</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nigeria</td>
<td>1.1</td>
<td>0.8</td>
</tr>
<tr>
<td>Mozambique</td>
<td>2.4</td>
<td>4.0</td>
</tr>
<tr>
<td>Niger</td>
<td>2.3</td>
<td>1.4</td>
</tr>
<tr>
<td>Rwanda</td>
<td>3.9</td>
<td>3.1</td>
</tr>
<tr>
<td>Sierra Leone</td>
<td>2.2</td>
<td>2.6</td>
</tr>
<tr>
<td>Senegal</td>
<td>1.5</td>
<td>2.8</td>
</tr>
<tr>
<td>South Africa</td>
<td>1.6</td>
<td>3.6</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>3.2</td>
<td>2.8</td>
</tr>
</tbody>
</table>

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 1981 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

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>EDUEXP GDP</td>
<td>Public Education Expenditures as a ratio of gross domestic product (GDP)</td>
</tr>
<tr>
<td>DEFEXP GDP</td>
<td>Military Expenditure as a ratio of gross domestic product</td>
</tr>
<tr>
<td>RGDPG</td>
<td>Real Income (GDP) growth rate</td>
</tr>
<tr>
<td>FGEXP GDP</td>
<td>Total Federal Government Expenditure as a ratio of GDP</td>
</tr>
</tbody>
</table>

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

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

The structural VARs may be written as
\[
a_t = x_{10} - x_{11} b_t + x_{12} a_{t-1} + x_{13} b_{t-1} + U_{at} - - - (2)
b_t = x_{20} - x_{21} a_t + x_{22} a_{t-1} + x_{23} b_{t-1} + U_{bt} - - - (3)
\]
re-writing (2) and (3) we have
\[
a_t + x_{12} b_t = x_{10} + x_{11} a_{t-1} + x_{13} b_{t-1} + U_{at} - - - - - (4)
b_t + x_{21} a_t = x_{20} + x_{22} a_{t-1} + x_{23} b_{t-1} + U_{bt} - - - - - (5)
\]
Equation (4) and (5) can be written in matrix notation as follows
\[
\begin{pmatrix}
  1 & X_{12} \\
  X_{21} & 1
\end{pmatrix}
\begin{pmatrix}
  a_t \\
  b_t
\end{pmatrix} =
\begin{pmatrix}
  X_{10} & X_{11} & X_{13} \\
  X_{20} & X_{22} & X_{23}
\end{pmatrix}
\begin{pmatrix}
  a_{t-1} \\
  b_{t-1}
\end{pmatrix} +
\begin{pmatrix}
  U_{at} \\
  U_{bt}
\end{pmatrix}
\] (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:

$$NP_t = Q_0 + Q_1 p_{t-1} + U_t - - - - (7)$$

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

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

Where

$$Y_0 = N^{-1}Q_0$$
$$Y_1 = N^{-1}Q_1$$
And

$$\sum_i t = N^{-1}U_t$$

Given that the $a_{ij}$ is the element of the $i$th row and $j$th column, then the VAR in standard form becomes.

$$a_t = X_{10} + X_{11} a_{t-1} + X_{12} b_{t-1} + \sum a_t - - - - - (8)$$
$$b_t = X_{20} + X_{21} a_{t-1} + X_{22} b_{t-1} + \sum b_t - - - - - (9)$$

And in matrix notation we have

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

Equation (10) can be written as

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

So that

$$\sum a_t = \frac{U_{a_t} - X_{12} U_{b_t}}{1 - X_{12} X_{21}} - - - - - (12)$$
$$\sum b_t = \frac{U_{b_t} - X_{21} U_{a_t}}{1 - X_{12} X_{21}} - - - - - (13)$$

Note that $U_{a_t}$ and $\sum b_t$ 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 $\beta_u$ be a 2 x 2 variance – covariance matrix of $U_{a_t}$ and $\beta_{\sum}$ be that of $\sum b_t$, then $\beta_{\sum} = N \beta N^{-1}$. If $X_{21} = 0$, then $\sum b_t$ is not equal to $U_{b_t}$ 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 $\beta_u$ 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

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF</th>
<th>PP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At Level</td>
<td>Order of</td>
</tr>
<tr>
<td>Rgdpg</td>
<td>-5.9108</td>
<td>1(0)</td>
</tr>
<tr>
<td>FgExpgdp</td>
<td>-3.8317</td>
<td>1(0)</td>
</tr>
<tr>
<td>Eduexpgdp</td>
<td>-2.3129</td>
<td>1(1)</td>
</tr>
<tr>
<td>Defexpgdp</td>
<td>-0.8182</td>
<td>1(1)</td>
</tr>
</tbody>
</table>

5.2 Cointegration Test

Following Johansen and Juselius (1990) two likelihood ratio test statistics, the trace statistic and the maximal eigenvalue 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

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

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

<table>
<thead>
<tr>
<th></th>
<th>DEDUEXPGD</th>
<th>RGDP</th>
<th>DDEFEXPGD</th>
<th>DFGEXPDPGDP</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEDUEXPGDP (-1)</td>
<td>0.006632</td>
<td>113505.2</td>
<td>0.693698</td>
<td>-3.625057</td>
</tr>
<tr>
<td></td>
<td>(0.20960)</td>
<td>(35221.2)</td>
<td>(0.16432)</td>
<td>(3.31930)</td>
</tr>
<tr>
<td></td>
<td>[0.03164]</td>
<td>[3.22264]</td>
<td>[4.22154]</td>
<td>[-1.09211]</td>
</tr>
<tr>
<td>DEDUEXPGDP(-2)</td>
<td>0.030291</td>
<td>7193.921</td>
<td>0.218445</td>
<td>-3.093016</td>
</tr>
<tr>
<td></td>
<td>(0.25938)</td>
<td>(43587.4)</td>
<td>(0.20336)</td>
<td>(4.10775)</td>
</tr>
<tr>
<td></td>
<td>[0.11678]</td>
<td>[0.16505]</td>
<td>[1.07420]</td>
<td>[-0.75297]</td>
</tr>
<tr>
<td>RGDGP(-1)</td>
<td>-4.74E-06</td>
<td>0.570422</td>
<td>-2.29E-06</td>
<td>-2.29E-05</td>
</tr>
<tr>
<td></td>
<td>(1.3E-06)</td>
<td>(0.22683)</td>
<td>(1.1E-06)</td>
<td>(2.1E-05)</td>
</tr>
<tr>
<td></td>
<td>[-3.51230]</td>
<td>[2.51474]</td>
<td>[-2.16592]</td>
<td>[-1.07084]</td>
</tr>
<tr>
<td>RGDGP(-2)</td>
<td>4.45E-06</td>
<td>0.404283</td>
<td>2.57E-06</td>
<td>1.78E-05</td>
</tr>
<tr>
<td></td>
<td>(1.4E-06)</td>
<td>(0.24345)</td>
<td>(1.1E-06)</td>
<td>(2.3E-05)</td>
</tr>
<tr>
<td></td>
<td>[3.07029]</td>
<td>[1.66067]</td>
<td>[2.26201]</td>
<td>[0.77382]</td>
</tr>
<tr>
<td>DDEFEXPGDP(-1)</td>
<td>0.123957</td>
<td>53936.32</td>
<td>0.662242</td>
<td>6.599714</td>
</tr>
<tr>
<td></td>
<td>(0.24059)</td>
<td>(40429.9)</td>
<td>(0.18862)</td>
<td>(3.81019)</td>
</tr>
<tr>
<td></td>
<td>[0.51521]</td>
<td>[1.33407]</td>
<td>[3.51089]</td>
<td>[1.73212]</td>
</tr>
<tr>
<td>DDEFEXPGDP(-2)</td>
<td>-0.195881</td>
<td>-1381.108</td>
<td>-0.111281</td>
<td>-13.62470</td>
</tr>
<tr>
<td></td>
<td>(0.18359)</td>
<td>(30850.6)</td>
<td>(0.14393)</td>
<td>(2.90741)</td>
</tr>
<tr>
<td></td>
<td>[-1.06695]</td>
<td>[-0.04477]</td>
<td>[-0.77315]</td>
<td>[-4.68620]</td>
</tr>
<tr>
<td>DFGEXPDPG(-1)</td>
<td>0.035523</td>
<td>-4657.529</td>
<td>-0.003131</td>
<td>0.698347</td>
</tr>
<tr>
<td></td>
<td>(0.01069)</td>
<td>(1796.21)</td>
<td>(0.00838)</td>
<td>(0.16928)</td>
</tr>
<tr>
<td></td>
<td>[3.32334]</td>
<td>[-2.59297]</td>
<td>[-0.37357]</td>
<td>[4.12545]</td>
</tr>
<tr>
<td>DFGEXPDPG(-2)</td>
<td>0.034384</td>
<td>-272.1554</td>
<td>-0.015553</td>
<td>0.974730</td>
</tr>
<tr>
<td></td>
<td>(0.02399)</td>
<td>(4031.36)</td>
<td>(0.01881)</td>
<td>(0.37992)</td>
</tr>
<tr>
<td></td>
<td>[1.43325]</td>
<td>[-0.06751]</td>
<td>[-0.82694]</td>
<td>[2.56661]</td>
</tr>
<tr>
<td>C</td>
<td>0.040954</td>
<td>816.5975</td>
<td>-0.007629</td>
<td>0.807446</td>
</tr>
<tr>
<td></td>
<td>(0.02047)</td>
<td>(3439.86)</td>
<td>(0.01605)</td>
<td>(0.32418)</td>
</tr>
<tr>
<td></td>
<td>[2.00065]</td>
<td>[0.23739]</td>
<td>[-0.74539]</td>
<td>[2.49075]</td>
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<tr>
<td>R-Squared</td>
<td>0.842562</td>
<td>0.980601</td>
<td>0.917473</td>
<td>0.860178</td>
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<tr>
<td>Adj. R. Squared</td>
<td>0.792182</td>
<td>0.974393</td>
<td>0.891064</td>
<td>0.815435</td>
</tr>
</tbody>
</table>
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

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>S.E</th>
<th>DEDUEXPG</th>
<th>RGDPG</th>
<th>DDEFEXPG</th>
<th>DFGEXPGD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.081027</td>
<td>100.0000</td>
<td>0.000000</td>
<td>0.000000</td>
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<tr>
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</tr>
<tr>
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<td>48.41438</td>
<td>1.966544</td>
<td>7.817301</td>
<td>41.70181</td>
</tr>
<tr>
<td>4</td>
<td>0.133201</td>
<td>39.05469</td>
<td>5.470128</td>
<td>6.773369</td>
<td>48.70181</td>
</tr>
<tr>
<td>5</td>
<td>0.158529</td>
<td>30.76352</td>
<td>5.978813</td>
<td>12.26692</td>
<td>50.99275</td>
</tr>
<tr>
<td>6</td>
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<td>24.20771</td>
<td>8.090656</td>
<td>14.62589</td>
<td>53.07575</td>
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<tr>
<td>7</td>
<td>0.200055</td>
<td>19.38555</td>
<td>10.66254</td>
<td>17.04703</td>
<td>52.90489</td>
</tr>
<tr>
<td>8</td>
<td>0.210623</td>
<td>17.60044</td>
<td>12.84776</td>
<td>17.67747</td>
<td>51.87432</td>
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<tr>
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<td>16.64113</td>
<td>13.92497</td>
<td>19.06117</td>
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<tr>
<td>10</td>
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<td>17.06905</td>
<td>14.68279</td>
<td>19.28450</td>
<td>48.96367</td>
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</table>

<table>
<thead>
<tr>
<th>PERIOD</th>
<th>S.E</th>
<th>DEDUEXPG</th>
<th>RGDPG</th>
<th>DDEFEXPG</th>
<th>DFGEXPGD</th>
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<td>8.741200</td>
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</table>
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

<table>
<thead>
<tr>
<th>Period</th>
<th>Response of DEDUEXPGD</th>
<th>RGDPG</th>
<th>DDEFEXPG</th>
<th>DFGEXPGD</th>
</tr>
</thead>
<tbody>
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<td>1</td>
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<tr>
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<td>0.001882</td>
<td>-0.003683</td>
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<tr>
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<tr>
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<th>RGDPG</th>
<th>DDEFEXPG</th>
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<table>
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<th>DDEFEXPG</th>
<th>DFGEXPGD</th>
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<td>-0.229717</td>
<td>-0.097914</td>
</tr>
</tbody>
</table>

Cholesky Ordering: DEDUEXPGD RGDPG DDEFEXPGD
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.

References


