Economic Growth, Defence Expenditure and Threats in Nigeria 1980-2013: Bound Co-Integration Analysis

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Abstract: The research of Benoit (1973, 1978) has triggered a great deal of research interest on the defense expenditure and growth relationship, however, the findings still remain inconclusive. The variations are attributed largely to the distinctive socioeconomic factors associated with different countries; availability of data, methodological differences, models and diverse econometric techniques employed. Furthermore, studies conducted on this aspect in Nigerian context, concentrate in examining the causal relationship between economic growth and defence expenditure. Recently, the activities of deadly "Boko Haram" and Niger Delta Militant have threatened the country. This research aims at testing the impacts of defense expenditure and threats on economic growth in Nigeria, between 1980 and 2013 on the basis of Aizeman and Glick arguing that defense expenditure in the presence of threats can stimulate economic growth. The study adopts the robust ARDL Model to solve most of the problems associated with Cointegration analysis in the presence of small sample size and mix integration order. The ARDL results revealed that there is significant long run relationship between defence expenditure and threat on economic growth in Nigeria both in the short and long run conditions. The result further indicates bidirectional positive relationship between defence expenditure and economic growth in Nigeria while threat has unidirectional negative impact running from threat to economic growth. One of the policy implication of the study is that the policy makers should revisit the funding of defence sector as the current 0.5% budget is seen as grossly inadequate for the defence sector while considering the internal threats and the global military expenditure trend.

Key words: Defence expenditure, threats, Economic Growth and Autoregressive Distributed Lag Model ARDL, Boko Haram, Niger delta militants

INTRODUCTION

After the seminal researches of Benoit 1973 and 1978 there have been interests on defence expenditure and the economic growth relationship. Benoit results observed positive relationship between defence expenditure and economic growth on the basis that defence spending stimulate economic activities. Such findings motivated a lot of researchers. Despite all the motivations, there is still no consensus on the defence expenditure-growth relationship. It makes sense to say that the contradictory findings are as a result of the estimation biases, model specification errors, difference in the underpinning theories and largely the uniqueness of countries. The disparity led to the continuous development and application of varied econometric techniques which appear to provide more robust results when compared with the previous results (Dunne, 2011).

After the World War II, reduction in defence spending was termed as "peace dividend" then countries were encouraged to cut defence expenditure. However recently, countries like Nigeria have been facing serious internal conflict such as Boko Haram terrorist and Niger Delta militant among others. Consequently, the zeal to tackle defence problem from the economic point of view has been increasingly attracting attentions. Defence economic as a field of study has been given much attention in European countries, with little attention in the developing countries, especially African countries like Nigeria. Defence economics as a field of study employs microeconomics analyses when dealing with only defence industry when it involves investigation on how defence expenditure affects a country's economic growth and development it then involves macroeconomics approach.

In the today's global village, the discussion on the link between the defence expenditure and economic growth has been widely researched. The relationship between these variables has witnessed a lot of research attention in the past three decades. Though, the positive

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interaction between these two variables has been observed after Benoit research, the subsequent finding does not always support this stereotyped. The existing views explained that defence expenditure has impact on economic growth through domestic production. According to the Keynesians economist, defence expenditure rises the aggregate demand by stimulating capacity utilisation which in turn stimulates employment opportunities in the country. Moreover, it has spin-off effects on human capital development, i.e., the defence activities on education, research and development improvement (Barro, 1991). Furthermore, it has been argued that defence expenditure stimulates investment climate and international businesses (Heo, 2010). On the other hand, the oppositions to defence expenditure, i.e., neo-classical explains that defence expenditure has crowd-out effect on private and public investment. In general, the public sector has no consciousness in the budget of production compared to the private sector. The studied the relationship between defence expenditure and economic growth in Nigeria purposely to assess the other different characteristics such as the defence budget with the exitance of threats.

The study uses a framework that recognises the adverse impacts of hostile internal threats and its impacts on Nigerian economy. Unlike previous studies that examine to a greater extend the causality between defence expenditure and economic growth in Nigeria. Recently, Nigeria like some part of the world is faced with unconventional conflict such as Boko Haram and Niger Delta militant activities, it is therefore, important to assess the economic growth defence relationship in the existence of threat in Nigeria.

Review of the related theories: The search on the economic effect of defence expenditure has been a complicating task due to the fact that economic theories do not provide an explicit economic role to defence sector as a distinctive economic agent (Sarah *et al.*, 2013). However, analysis on the relationship between defence expenditure and economic growth is in grained in the theoretical understanding of the role of the state. Defencehas been classified as purely public good, non-exclusive and solely provided by government through budget. On this background, therefore, this study will use an economic and political science theories in analysing the relationship between defence expenditure, threats and economic growths.

Demand theory for defence expenditure: This study will employ the demand theory of military/defence expenditure and realists theory of Political Science to assess the effect of defence expenditure and threats on Nigeria's economic growth properly.

The main stream economic theory of demand for defence expenditure is an extension of the basic demand theory of an economic product in a neoclassical microeconomics. In the economic theory of the demand for a product which is derived from the utility maximization theory of a rational consumer with budget constraints. Demand function of a product is drive from the first order maximization condition and is function of product price and income. Here defence is treated as a normal good. The fact that defence is purely public and allowing the contribution of Allies as a determinant of demand for defence expenditure, price and state income (GDP). The economic theory of demand for defence, therefore, assumes security asa function for the society. Where security is assumed to be a function of a defence expenditure, allies and enemy. This assumption leads to defence expenditure demand function where defence expenditure is a function of state income, price and defence expenditure function by allies and adversaries. Therefore, an increase in income leads to an expansion of budget constraints. This allows the increase of demand for goods both private and public. It therefore, implies that defence expenditure implies that growth can be achieved through defence expenditure (Atesoglu, 2013). Subsequently in order to assess the influence of threats in the defence expenditure and growth relationship the study equally incorporate the realist theory of the international politics. The theory came up with six basic assumptions regarding the international political system as follows:

- The international system is anarchical in nature. It is aself-help system where there is no supreme authority in charge of administering the system
- States have some offensive military capabilities
- States do not know each other's intentions
- Survival is the main goal of states
- States are rational actors

The six assumptions above can be explicitly interpreted to mean that for a state survival, it needs to maximise its power, particularly defence power. The theory clearly explains that by increasing in countries' wealth, economic growth results by increasing in defence/military spending, though there are many theories that do not support the realistic theory but at the same time the theory can be suitable in explaining defence expenditure with respect USA and China.

Literature review: The findings in respect of the relationship between defence spending and economic growth have been contradicting. In Nigeria for instance

Oriavwote and Eshenake (2013), Anyanwu and Aiyedogbon (2011), Sarah *et al.* (2013) and Blessing (2008) examine the relationship between defence spending and economic growth using different methods, their results establish a contradictory relationship between defence outlay and economic growth in Nigeria. However, Oriavwote and Eshenake (2013) used Vector error correction modelling to assess the influence of security spending on the level of economic growth in Nigeria from 1980-2010. The study reveals that the expenditure on defence did not explain any meaningful changes on economic growth. Therefore, the contribution of the military for the security purpose have no any appreciable impact on the real GDP in Nigeria. Thereafter, the study recommends that the Nigerian government should reassess the activities of its defence expenditure to make it more growth oriented and transparent. Sarah *et al.* (2013) in their study comparative analysis of the trend and structure of military expenditure in Nigeria, 1980-2010. Using Vector Error Correction Model. The results reveal that defence allocations have been very minimal in Nigeria. Moreover, defence spending was found grossly inadequate both during civilian and military regimes. It recommended that the defence allocation should be enhanced in Nigeria. This is to ensure that defence could be able to contain all the sort of threats and ready to forest all not only the internal and external threats but also ensure unity and mutual coexistence among Nigerians.

Sarah *et al.* (2013) study defence expenditure and economic growth in Nigeria. The finding reveals that there exist apositive relationship between defence expenditure economic growths both in the short and long run. Olowononi and Aiyedogbon study the trends of defence expenditure in Nigeria from the 1986-2006. The finding revealsthat the defence recurrent expenditure is higher and greater than defence capital expenditure. In a separate study by Blessing (2008) using OLS in analysing defence expenditure and economic growth in Nigeria. The result confirmed that defence expenditure in Nigeria does not retards economic growth and similarly; there was no trade-off observe in the relationship. Aizenman and Glick (2006), conjectured the impact of military expenditure on growth and added that military spending in the presence of threats stimulates economic growth. The study revealed that countries spend a large portion of their GDP on defence and the military. This study differs from the previous researches conducted on Nigeria by relating defence expenditure and threats to economic growth using arobust ARDL modelling due to the mutually exlusive order of integration and small sample size.

Previous researches that investigate defence expenditure, threats and growth relationship include:

Aizeman and Glick (2006), Lin and Lee (2006) and Francisco and Shikida (2008). However, Lin and Lee (2006) study military spending, threats and stochastic growth. Using a stochastic endogenous growth model involving supply and demand side effects produced by the military expenditure. The study finds that there exist an optimal defence burden that maximises the economic growth rate. Moreover, Aizeman and Glick (2006), conjectured non-linear relationship between defence expenditure, threats and economic growth. Using Penn world data, it was inferred that military expenditure caused by threats should increase growth. Furthermore, Francisco and Shikida (2008) explore the causal relationship between defence expenditure, threat and economic growth. Reinvestigating the study conducted by Aizeman, the study confirms the interaction effect between defence spending and threats but nonetheless defence expenditure with threats has anegative impact on growth.

Threats in Nigeria: Nigeria is prone to internal threats than external crises. The prominent among these threats include actions of the notorious Boko Haram insurgent, Niger Delta militant and ethnic/religious crises. Which led to: the Jos crises, the bomb blast in the Federal capital territory Abuja, Kaduna and other part of Nigeria. Nigeria has witnessed more internal crises than Darfur in Sudan, security of life and properties have been on a serious and continuous threats which hamper investment and growth. Until recently Nigeria was the fourth largest supplier of Crude oil in the world, supplying approximately, million barrels of Crude oil per day. It production has fallen seriously, due to the activities of Niger delta militant which involved whole sale of theft oil and kidnap of the oil workers. In security, within the Niger delta is just not only a problem to Nigeria but also to USA as a major trading partner and the wider world. Presently Nigeria produces very low below it capacity. Nigeria`s oil producing capacity is about 3.2 million barrels per day but it could supply only a million or little above million daily. The loss of US $100 billion due to the illegal oil bunkering was recorded in Nigeria from 2003-2008 due to the illegal oil bunkering Asuni (2009). Nigeria was reported to have lost ₦1.292 trillion in 1 year as the crude earnings fell by 15.92% of ₦6.825 trillion in 2013. It was reported that in the first quarter of 2013, the earnings stood at ₦1.849 trillion later fell to ₦1.813 in the second quarter. Subsequently, it further dropped to ₦1.623 and ₦1.538 trillion in the third and fourth quarters, respectively. This scenario was attributed to the dropping of the crude export earnings and to the rising cases of the crude oil theft, pipeline vandalisation and sabotage among other Michael (2014).

Nigeria has been described as one of the best destination in the developing economies for the Foreign investment in recent years. World big companies as well as investors are attracted to Nigeria due to its booming economy, rapidly expanding middle class and vast natural resources (Michael, 2014). Each region in Nigeria has it's certain economic advantages. While, the Southern part of Nigeria has access to sea, the Northern part of Nigeria covered 78% of the Nigeria's land. It mainly support agricultural activities (food, cash crops, livestock and vast mineral resources). Nigeria attracted >$21 billion FDI in 2013 and it attracted the most FDI in the Sub Saharan African countries since 2007. The activities of Boko Haram in Nigeria posed serious security problem. Business were closed down, some of them had reduced the size of the workers as well as the number of research hours. The insurgency has led to drastic reduction in the government derivation from the affected or troubled areas (Olaide Ismail Aro, 2013).

Defence expenditure in Nigeria: The defence share to the federal government expenditure has been changing over time. Within the period covered by this study, there have been considerable change in defence expenditure in Nigeria. As at 1986 defence as a percentage to GDP stood as 1.4%. After which it dropped to 0.7% in 1987 and 0.6% in 1990, it further dropped to 0.45 in 1992. With the inception of the democratic rule in 1999 defence spending increased to 1.8%. It thereafter maintained an average of 1.11, 1.35 and 1.32% in 2000, 2001 and 2002, respectively. Subsequently, it fell again to 0.73, 0.76, 0.64, 0.49, 0.52, 0.13 and 0.3%, respectively between 2003 and 2009. The defence expenditure as a percent to GDP can be said to have fluctuated between the years 1980-2013, the highest was 2.7% in 1980 and the lowest 0.3% in 2009, Blessing (2008).

MATERIALS AND METHODS

The study used annual data from 1980-2013, obtained from World Bank development indicators and Central Bank of Nigeria Statistical bulletin. The data on military expenditure, arms importation inflationare collected from the World Bank development indicators. While the data on GDP are collected from the CBN statistical bulletin. The data on threats are generated using the dummy variables.

Model specification: The study adopts demand theory for defence expenditure used in Atesoglu (2013). Which explains the relationship between defence expenditure, threats and economic growth. Therefore, the model can be specified as:

$$RG = f(ME, AI, TR) \qquad (1)$$

Where:
RG = Real Growth
ME = Military expenditure/Defence expenditure
AI = Arms Importation
TR = Threats

The study employed the ARDL bound testing by Pesaran *et al.* (2001). The model also takes into account the error correction term in the lagged period. The analysis of error corrections and autoregressive distributed lags fully covers both the long-run and short-run relationships of the variables. The model uses an Unrestricted Error Correction Model (ARDL-UECM). The UECM Model is specified below:

$$\Delta LRG_t + \alpha_0 + \alpha_1 LRG_{t-1} + \alpha_2 LME_{t-1} + \alpha_3 LAI_{t-1} +$$

$$\alpha_4 TR_{t-1} + \sum_{i=1}^{p} \beta_i \Delta LRG_{i=i} + \sum_{i=1}^{r} \beta_i \Delta LME_{i=i} + \qquad (2)$$

$$+ \sum_{j=1}^{q} \gamma_i \Delta LAI_{t=j} + +\varphi TR_t + \varepsilon_t$$

ε_t is an independent identical distribution of the white noise process and t is the time trend.

RESULTS AND DISCUSSION

Unit root test: The study begins the empirical analysis with the test of unit root. The study first performs tests to determine the data generating process of the series using Augmented Dickey-Fuller (ADF) and Philip and Perron (PP) tests. Table 1 reports the results of the unit-root tests. The study rejects the null hypothesis of non-stationarity for all the series at first difference, implying that these series are stationary at the first difference I (1) except the natural logarithm of arms importation which became stationary at level at 1 and 5% for both ADF and PP, respectively. The result of the test is presented in Table 1.

Table 1: Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests

| Variables | Level of | | First difference | |
	ADF	PP	ADF	PP
LDG	-3.516***	-3.457***	-5.797*	-12.433*
	(0.055)	(0.061)	(0.000)	(0.000)
LME	-1.912	-2.654	-7.524*	-7.380*
	(0.620)	(0.261)	(0.000)	(0.000)
LAI	-3.655*	-3.560**	_	_
	(0.009)	(0.012)		

*, ** and ***represent 1, 5 and 10%, respectively. ADF test is estimated based on Schwarz Information Criterion and PP on Spectral Estimation Method and Bartlett kernel Newey-West band selection. The figures in the parenthesis indicate the probability of the t-statistics

From Table 1, two out of the three variables are found to be stationary after taking the first difference while one of the variables is found stationary at level. The Autoregressive Distributed Lags (ARDL) Model appears to be the most appropriate technique since the series are mutually integrated.

Test for cointegration relationship: The study uses ARDL Model to investigate the existence of Long-run relationship between defence expenditure (LME), Tthreats (TR) and economic Growth (GDP) in Nigeria. The short run analysis is also determined using the Unrestricted Vector Error Correction Model based on the selected ARDL Model. The long run relationship result is shown in Table 2.

Table 2 shows the Long-run Co-integration test result. It testify the existence of long-run relationship among the variables. The computed F-statistics for the equations of real growth, arms importation threats are greater than the upper bound critical value given by Narayan (2005) and Pesaran *et al.* (2001) at 5, 10 and 1%, respectively. The result provides the evidence of the existence of long-run relationship between economic growth, defence expenditure and threats in Nigeria. Therefore, the result of the long-run equilibrium relationship between economic growth, defence expenditure and threat in Nigeria can be interpreted.

Long run model: The long run ARDL coefficients explain the nature of the relationship between the real economic growth and possible regressors employed in the model. The result is presented in Eq. 3 below:

$$LRGD = -0.037(2.958) + 1.041(0.0955)LRME_t^* + 0.355(0.108)LRA_t^* - 1.093(0.567)TR_t^{***} \quad (3)$$

The result from Eq. 3 depict a positive relationship between real economic growth and military expenditure as well as arms importation while threat is negatively related to real growth in the Nigerian context. The result shows that any 1% rise in the military expenditure and arms importation will result to 1.04 and 0.36%, respectively increase in the real economic growth. However, the Nigerian real economic growth often decreases by 1.09% in the presence of threat.

To ensure that the reported result is free from spurious inference, the adequacy of the model specified is further verified through diagnostic test. The test result indicated that the null hypothesis of no serial correlation, normality of the distribution of the residual, no functional form misspecification as well as homoscedasticity were not rejected as shown in Table 3. The validity of the result can

Table 2: Test for cointegration relationship; critical bounds of the F statistics for unrestricted intercept and trend

	1%		5%		10%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
K 4	5.205	6.640	3.715	4.878	3.097	4.118
Calculated F-statistics	--	--	--	--	--	--
LRG	4.984**	--	--	--	--	--
LME	1.611	--	--	--	--	--
LAI	4.246***	--	--	--	--	--
TR	9.085*	--	--	--	--	--

*, ** and ***represent significance at 1, 5 and 10%, respectively. The critical values are obtained from Table1: unrestricted intercept and trend reported in Narayan (2005)

Table 3: Diagnostic test of the long run equilibrium model

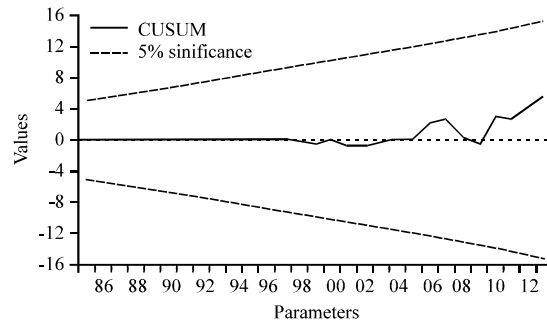| Test statistics	Values
X^2 autocorrelation	0.887
X^2 normality	0.210
X^2 functional form	0.106
X^2 heteroskedasticity	0.069

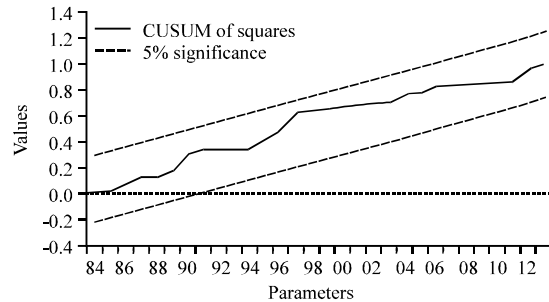Fig. 1: Plot of CUSUM statistics for stability test

Fig. 2: Plot of CUSUMQ statistics for stability test

be further verified by the use of the Cumulative Sum of recursive residuals (CUSUM) the CUSUMQ. Furthermore, the plots revealed that the series are within the critical bound at 5% significant level. Therefore, it confirms the stability of the model over time. The CUSUM and CUSUMQ graphical presentation are shown in Fig. 1 and 2.

In the long run, the Wald Granger Causality test result indicates that there exist a bidirectional causation among

Table 4: Long run Granger-Causality test
Wald test

Dependent variables	RGD_t	RME	RAI	Tr_t
RGD_t	-	118.794*	10.878*	3.708***
RME	227.972*	-	39.158*	16.220*
RAI	18.100*	35.857*	-	27.688*
TR_t	2.652	7.176*	11.928*	-

*, ** and ***represent significance of the variable at 1, 5 and 10%, respectively. The t-statistics determines the long-run causality and Wald X^2 statistics reports the individual variables' causation.

Table 5: Short run result

Dependent variable $\Delta lnRGD$	Coefficient	t-statistics
Constant	-0.022	-0.0125
ΔRME_t	0.623*	6.6680
ΔRAI_t	0.213*	3.6340
ΔTR_t	-0.654**	-2.1330
ΔECM_{t-1}	-0.598*	-5.8290

*, ** and ***represent significance at 1, 5 and 10%, respectively. The critical values are obtained from thetable: unrestricted intercept and trend

Table 6: Granger-Causality test basis on VECM

Wald test t-statistics dependent variable	ΔRGD_t	ΔRME	ΔRAI	ΔTR_t	ECM-1
ΔRGD_t	-	44.462*	13.207*	4.549*	-5.829*
ΔRME	227.972*	-	20.319*	16.220*	-
ΔRAI	18.190*	12.201*	-	27.688*	-
ΔTR_t	3.155	8.463*	12.830*	-	-4.425*

*, ** and ***represent significance of the variable at 1, 5 and 10%, respectively. The t-statistics determines the long-run causality and Wald X^2 statistics reports the individual variables' causation

real military expenditure, real arms importation and economic growth. Whereas, the result only establish a unidirectional causality running from threat to economic growth without any feedback from growth to threat. The result is in line with the findings of Aizeman and Glick (2006) in which they conjectured that defence expenditure in the presence of threat stimulates economic growth. Again similar to Sarah *et al.* (2013) defence expenditure and economic growth in Nigeria (Table 4).

Vector Error Correction Model (VECM): In Table 5, the short-run relationship between economic growth, defence expenditure and threats is examined through the use of UVECM. The Error Correction Term (ECT) represent the extent of the deviations of the explanatory variables away from the long-run alignment. The size of the ECM coefficient -0.598 indicates about 60% speed of adjustment towards the long run equilibrium within a year.

Table 5 above depicts that just like in the long run, the short run result also shows that both military expenditure and arms importation are positively related to economic growth in Nigeria while threat maintained the negative relationship even in the short run. During the

short run period, 1% increase in the military expenditure and arms importation will increase the economic growth by 62 and 21%, respectively. On the other hand, the activities of Boko Haram, Niger Delta ethnic and religious crises have a negative impact of the Nigeria's economic growth. When these crises persist the economic growth goes down by 65% in the short run.

Table 6 reports both Wald test and t-test of the VECM, the t-value of the ECT coefficient is statistically significant at 1% level. The result confirms that the accumulative impact of defence expenditure and threats has a significant impact on economic growth in Nigeria. The result points that there exist a bidirectional causality among real economic growth and military expenditure as well as arms importation, whereas, only a unidirectional causation exist running from threat to real economic growth without any feedback from the economic growth. This means that threat can engineer economic growth but economic growth can not cause threat for the study period in the Nigerian context.

CONCLUSION

The study investigates the impact of defence expenditure and threats on the real Nigeria's economic growth. Thus, the long run and short run impacts of defence expenditure on the Nigeria's economic growth is examined using time series data from 1980-2013. The study revealed that there is significant bidirectional positive relationship between defence expenditure and economic growth both in the short and long run in Nigeria. This can be understood when defence was used to deter the activities of the deadly Boko Haram and Niger Delta militant in the Northern and Eastern parts of the country, respectively.

RECOMMENDATIONS

Since, the study established a positive and negative relationships between military expenditure, arms importation and threat, respectively with economic growth, therefore, the study recommends that the federal government of Nigeria should aim at equipping the defence sector to contain and deter the activities of the Niger Delta militants and the deadly Boko Haram insurgencies. The policy makers should revisit the funding of defence sector from the current 0.5% budget seen as grossly inadequate for the defence sector while considering the prevailing internal security threat and the global defence expenditure trend.

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