

## ECONOMIC DETERMINANTS OF DEFENSE EXPENDITURE IN AFRICA: AN EMPIRICAL INVESTIGATION

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### ABSTRACT

Sub-Saharan Africa (SSA) countries when compared with other regions of the world, is the poorest region that is plagued with inequality, involuntary relocation and constant conflicts. Studies have shown that SSA has the lowest defense expenditure among all regions. This study investigated the impact of economic determinants on defense expenditure in Sub-Saharan Africa (SSA). Employing the Generalized method of moments, the study was done for the period 2004 to 2019. Variables used include previous defense spending, debt stock, FDI, and inflation. The findings showed that previous defense expenditure and all variables used influence current defense

expenditure in SSA countries and the impact on defense expenditure are statistically significant. To policy makers, the study suggests that previous defense expenditure should be examined thoroughly before spending on current defense and prices of military hardware should be considered as well. Also, current economic realities should be considered before public expenditure on the military is made

**Keywords:** Economic, determinants, defense expenditure, Sub-Saharan Africa

**JEL Classification:** H5, H56

## 1. INTRODUCTION

Sub-Saharan Africa (SSA) countries, when compared with other regions of the world, are the poorest regions that are plagued with inequality, involuntary relocation and constant conflicts (Stockholm International Peace Research Institute, [SIPRI], 2017). SIPRI (2017) concludes that SSA has the lowest defense expenditure among all regions. The body further opined that defense expenditure accounts for some percentages of government's expenditure and gross domestic product. Defense expenditure has been divided into three stages and cases. They are; phase one which occurred between 1966 and 1977 and military expenditures during this phase were traced to economic, political and security reasons. During this period military spending increased from \$3.7 billion to \$14.4 billion. The increase in defense spending within this period can be attributed to increase in oil price which favored Nigeria. The second phase which was between 1977 and 1996, there was a drastic reduction in military expenditure in SSA countries. Military spending within this period fell to \$7.4 billion. During this period, there was widespread democratic practice in SSA countries. There was also the adherence to the advice of the International Monetary Fund and the World Bank which advised

SSA countries to subscribe to the structural adjustment policies and liberalization of the economy. The third phase was between 1997 and 2014. This phase experienced a rapid increase in defense expenditure to \$22.8 billion. Economic growth was also achieved in the region (3.8 percent). Unfortunately it fell to 1.8% in 2014 (SIPRI, 2017). The link between economic factors and defense expenditure has not been established firmly with regards to all economic activities such as agriculture, manufacturing activities, services etc. scholars have had contrasting findings (Anwar, Rafique and Joiya (2012), Anfofum, Andow & Mohammed (2014), Azam, Khan, Zamani & Rasli (2015) ). Increase in economic activities has been found to be beneficial to the economy and the government. This is because government will have increased revenue to provide social services to its citizens. However, an increase in economic activity does not show that defense spending will increase. SSA in terms of economic growth has been staggering in recent years as opined by World Bank. This has led to increased borrowing to fund government spending. The implication is that the economy might be experiencing growth but the growth is dependent on debts. These borrowings are used to finance social services. Again, when the economy is

improving, every sector is growing and government will have more revenue in form of tax and royalties. Before public expenditure is made, certain conditions are considered. They include; the state of the economy, the views of the people and the various competing alternatives that are struggling for attention. America, Western Europe etc are examples. Their economy is large and well-structured and the government's participation in social services is also large. However, in SSA countries, the expenditure on defense is made without considering the views of the people and other competing factors. In fact, the economy of SSA is always staggering, but defense expenditure is constant. This further means that SSA governments do not really consider economic activities before spending. The problem with this public action is that since expenditure are made based on feelings, they might spend more or less and this will mean either a waste of scarce resources or underutilization of resources. In other words, maximization of defense services will not be achieved. This study therefore, investigates those economic factors that are responsible for defense expenditure in SSA countries. The study will inform policy makers in SSA countries to be watchful of those factors and make effective decisions on defense spending

based on economic factors. The rest of the study is structured as follows, sections 2 and 3 discuss the literature review and methodology. Sections 4 and 5 are analysis of findings and conclusion

## 2. LITERATURE REVIEW

### 2.1 Conceptual Literature

**Economic Factors:** Economic factors include GDP Per capita, agriculture, Fiscal pressure, public expenditure, social expenditure and income distribution (Molina-Morales, Amate-fortes and Guarnidi-Rueda, 2013). In explaining how economic determinants affects public expenditure, Connolly and Mason (2016) explains that the following economic activities influence public expenditure. These include; public safety, transportation, public works, utility, welfare, and economic development.

**Defense spending:** This concept is seen as expenses made to provide security for citizens and their properties, businesses, investment etc (Dunne, Smith and Willenbockel, 2005). In explaining further, Hamissa, Habibullah and Baharom (2009) described military expenditure as a section of country's budget reserved for development

security and welfare in the country. Defense spending can as well be referred to as military expenses made by the government. Furthermore, when a government tries to achieve protection for its people, they tend to allocate a huge sum of money for that purpose as well as other similar spending which includes maintaining law and order (Mohammed, 2019). He further noted that it can as well be noted that large amount of the budget in less developed countries are reserved for security. In a more elaborate form the United Nations' (UN) definition cited in Tekeoglu (2008) divided defense spending into operating cost, procurement and construction as well as Research and Development. Where operating cost includes personnel, recruitment, maintenance and operations, procurement or purchases as well as local construction of aircrafts, engines, missiles, nuclear weapons, ships and boats, armored tanks, ammunitions, communications, construction of both air and naval bases, depots and warehouses, command and administrative centres, research centres for fundamental and applied research testing sites and final evaluation. Based on UN's definition as cited in Tekeoglu (2008), any expenditure made in the listed forms above are referred to as military spending. In similar vein, Omojite

(2012) sees defense expenditure as military housing construction, salary increase for military men and women, expansion of officer corps and purchase of foreign arms. While Bohmelt and Bove (2014) sees defense spending as a yearly financial commitment made to sustain and maintain troops, arms and other various equipment used for operations.

## 2.2 Theoretical Literature

There are theories of public expenditure which include Adolf Wagner's Law of Increasing state Expenditure (1883), Samuelson's theory of public expenditure (1954), Musgrave theory of expenditure (1959) and so on. The Wagner's law (1883) suggests that all governments have a tendency to be involved heavily in spending for the economy. The author noted most of government owned firms are increasing their expenditure as fast as the economy is growing as well, thus a functional relationship is evident. Critics had noted that Wagner was so ambiguous with his conclusion on government spending. Therefore, it is observed that the specific sector government was spending on was not known. It can be noted that Wagner only had three reasons for public spending which include; i. Social activities of the country ii.

Administrative and protective spending. iii.  
Welfare of the state.

### 2.3 Empirical Literature

Anwar, Rafique and Joiya (2012) investigated defense spending and economic growth in Pakistan using the Johansen Cointegration and Granger Causality tests with data ranging from 1980 to 2010. The findings showed that there is a long run relationship between economic growth and military spending. Also, economic growth granger causes military spending. Wang (2013) examined the determinants of military spending in South East Asian Countries during the post- Cold war epoch. Using a dynamic panel model, the result showed that the determinants of military spending include GDP, Foreign Debt burden, Security spills, China's alleged threats, regional population and democracy within the region. The variables showed both long term and short term effects. It further suggests that economic, strategic and even sociopolitical factors affect Defense financing.

Seitz, Tarasov and Zakharenko (2013) formulated an economic model using commerce, military problems and defense expenditure. That bilateral trade reduces the likelihood of military conflict between the

two countries. This will then lead to reduction in military expenditure. Seitz et al (2013) called it a domino effect. The model was estimated by employing data from trade conflicts and defense expenses. In relation to trade and military spending between two countries and other countries of the world, as trade improves between countries, defense spending reduces compared to the gains made in commerce.

Filipe-Nunes (2013) did an empirical study on the determinants of military Spending in Portugal. Using an all-encompassing demand model that accommodates economic, political and strategic variables; Times series data from 1960 – 2010 was used. The Autoregressive distributed Lag technique was employed to estimate the model. The findings suggest that income is a positive determinant of defense spending. The paper observed that since income determines defense expenditure positively, the implication is that the ongoing economic downturn in Portugal might lead to a reduction in military spending. With respect to political and strategic variables, political factors have a positive impact on defense expenditure

In a different study, Anfofum, Andow & Mohammed (2014) studied military

expenditure and foreign debt burden in Nigeria. The Granger causality approach and data from 1986 – 2011 were also used. Their estimate showed that external debt does not granger causes military expenditure rather it is military expenditure that granger causes foreign debt. The study concluded that military expenditure on the other hand should be done in such a way that it will not trigger external borrowing.

Azam, Khan, Zamani&Rasli (2015) also investigated the determinants of defense expenditure in some selected South Asian Countries. Data obtained covered the period 1990 – 2013 using a multivariate framework. The study focused on how military expenditure is determined in these selected countries. In their second analysis, they discovered that consumption of energy and GDP per capita have a significant negative effect on military expenditure in South Asia. From the study, it is only population increase that causes positive change in defense spending within the region.

Huang, Wu & Liu (2016) examined the defense-growth causality using the panel vector autoregressive model. The findings report that the causality is bidirectional, non-linear and both time and country varying. It shows that growth of economic activities has

a negative influence on military expenditure and also military expenditure has a negative impact on economic growth. This means that as the economy grows, defense spending reduces and as economic growth falls defense spending rises.

Ambler and Neubauer (2017) also studied the Visegrad group comprising Czech Republic, Slovak Republic, Hungary and Poland. They did a research on the relationship between economic growth and defense spending using data from 1995 to 2015. In their study, they used the Random Effect Model and accommodated four exogenous variables. The Random Effects model showed that higher amounts of Balance of Payment and inflationary levels influence the level of military expenses positively. They also had a negative relationship between economic factors and military expenditures. Xu, Su and Tao (2018) estimated inflationary levels of defense spending. The study applied the wavelength analysis for the period 1960-2010. The results showed that the links between inflation and defense spending growth rate changes overtime and across frequencies. The results indicate that inflation reduces defense spending growth rate in the short and medium term in China. Since this holds, a little increase in defense spending will not cause inflation.



Hou (2018) estimated the determinants of military expenditure in Asia and Oceania using a dynamic panel analysis for the period 1992 to 2016. The results showed that countries sampled in Asia and Oceania do not respond to changes in China's military spending and then GDP, population and trade openness are seen as essential factors affecting defense spending. Anifowose, Adeleke and Mukorera (2019) investigated the determinants of Military expenditure in BRICS countries using panel data analysis technique for the period 1970-2017. The findings showed that military spending in BRICS countries is mainly determined by income, population, exchange rate, internal threats, inflation and political regime. To policy makers, the research suggested that for unemployment and poverty rate to decrease, focus should be on local production of arms and military hardware in BRICS countries.

Anifowose and Mabuyi (2019) examined the factors affecting military expenditure in South Africa using the Autoregressive Distributed Lag (ARDL) estimation approach for the period 1970-2017. The results showed that four variables out of nine variables were positive and significant. The variables include trade balance, democracy index, inflation and external threat. Anoruo, Nwala, Oriaku and Oriaku (2019)

investigated the nexus between inflation and defense expenditure in 11 African countries for the period 1977-2017. The paper used the unit root approach and the heterogeneous panel Granger causality tests to control for cross sectional dependence and heterogeneity. The results showed that both defense spending and inflation have causal influence on each other in these selected countries.

Odehnal, Ambler, Neubauer and Dyčka (2020) estimated the development of military spending determinants in Baltic countries. The research investigated three baltic countries which are Lithuania, Latvia and Estonia using the Autoregressive distributed Lag (ARDL) model for the period 2005-2015. The findings showed that for Estonia and Lithuania there is increased dependence of military expenditure on budget deficit. That is as budget deficit increases, military expenditure tends to decrease. Though, in Estonia as observed by Odehnal et al (2020) showed that as economic performance increases military expenditure increases as well.

Yalta and Tüzün (2020) investigated time varying determinants of US demand for defense spending in the post-cold war period. The paper adopted the maximum entropy

bootstrap methodology in a rolling window framework using time series data from 1967-2018. The results showed that demand for defense in the US is dependent on lagged military burden, economic growth, election cycle, relative costliness of defense, defense burden of Russia and China.

Summarily, having reviewed extant literature, it was discovered that there has been evidence of studies on economic determinants of defense expenditure from several authors with different results. Such authors include Anwar, Rafique and Joiya (2012), Wang (2013), Seitz, Tarasov and Zakharenko (2013), Odehnal, Ambler, Neubauer and Dyčka (2020) Yalta and Tüzün (2020) etc. These authors were focused with country-specific studies, Asia, America and Europe etc. studies for Sub-Saharan Africa has been limited and also the methodology employed has been either fixed effects, ARDL and so on. This study seeks to focus more on SSA and also use a dynamic panel model to obtain an unbiased result.

### **3. METHODOLOGY**

#### **3.1 Theoretical Framework**

The theoretical framework applied in this research is the Adolph Wagner theory of public expenditure which was propounded in 1883. Wagner (1883) in his theory

propounded that as a nation's public sector grows, her public spending will grow substantially. The public expenditure looks at the cost of providing goods and services through the public sector budget as well as policies that will lead to increase in private spending. Wagner (1883) introduced two methods to the question of growth in the size of public spending. They include the growth in absolute size of public spending and the growth in public sector vis-à-vis economic growth.

#### **3.2 Research design**

This research will adopt the cause and effect type of relationship which is called the Ex-post-factor research procedure. This approach employs secondary data where there is a reaction to a certain variable as well as its effects. Data from World Development Indicator (WDI 2020) will be used. The data will range from 2000 to 2019. The study also focuses on sub-Saharan African countries which includes every part of Africa except North Africa. Twenty Sub-Saharan African countries will be used as our sample size. The study will also employ the dynamic panel model by Arrelano and Bond (1991) and Arrelano and Bover (1995). This is preferable than pooled ordinary least square methods because of its ability to have a precise and



efficient estimate which is unbiased and consistent and Chu (2002) to ascertain if the series are stationary. The unit root test will also be carried out using the Levin Lin

### Model Specification

To determine the economic factors affecting defense expenditure, this research followed the model employed by Bel and Elias-Moreno (2009). We state the relationship below;

$$Defexp = f(Dbtstk, FDI, INFL, \dots) \dots 1$$

Where; Defexp = Defence Expenditure

Dbtstk = Debt stock

EXTDBT = Foreign Direct investment

INLF = Inflation

We state the dynamic panel model as follows;

$$\ln Defex_{it} = \delta_0 + \delta_1 \ln Defex_{it-1} + \delta_2 \ln Dbtstk_{it} + \delta_3 \ln FDI_{it} + \delta_4 \ln INFL_{it} + \mu_{it} \dots 2$$

DEFEX means defense expenditure which is same thing as military expenditure in our data; DBTSTK mean debt stock, FDI stands for Foreign direct investment and INFL means Inflation, The subscripts i and t shows the individual country and time respectively. While the ln shows the natural logarithm of a variable. Then again, the  $\mu_{it}$  is the error term which contains the unobserved country effect and all other variables.

## 4. PRESENTATION AND ANALYSIS OF RESULTS

### 4.1 Descriptive Statistics

The data were subjected to pre-estimation tests such as descriptive statistics and unit root tests to know the measures of central tendency and measures of dispersion.

**Table 1: Descriptive statistics**

	LNDEFEXP	LNDBTSK	LNFDI	LNINFL
Mean	0.15876	22.4788	19.9448	1.50222
Median	0.22577	22.4358	19.9905	1.7777
Maximum	1.54961	25.9456	23.0287	3.79304
Minimum	-1.647	19.7147	14.7605	-2.0009
Std. Dev.	0.54071	1.29078	1.44551	1.0604
Skewness	-0.3643	0.26511	-0.1959	-0.6546
Kurtosis	3.30655	2.95477	2.93375	2.86652
Jarque-Bera	7.96481	3.61049	2.01301	22.0822
Probability	0.01864	0.16443	0.36549	1.6E-05
Sum	48.5815	6878.52	6103.12	459.68
Sum Sq. Dev.	89.1708	508.167	637.296	342.956
Observations	306	306	306	306

Source: Authors' computation using Eviews 9

Table 1 shows a descriptive statistics of the variables used in this research for analysis for SSA countries. Looking at the result, defense expenditure showed a mean value of 0.15, with a standard deviation of 0.54. The minimum defense expenditure is -1.64% while the maximum defense expenditure is put at 1.54%. Also, the lndbtsk has a mean value of 22.49. The standard deviation is 1.29 with minimum value of 19.71 and a maximum value of 25.94. FDI has a mean of 19.94, with a standard deviation of 1.44, a minimum value of 14.76 and a maximum

value of 23.02. Inflation on the other hand has a mean value of 1.50%, a standard deviation of 1.06 and range from -2.00 to 3.79. Values of debt stock, FDI, defense expenditure and inflation are all in their natural logarithm. The skewness of defense expenditure, previous values of defense expenditure, FDI and inflation are in negative while debt stock is in the positive side. Kurtosis and Jarque-Bera test for normality are also reported. The JB-statistic signifies that the variables are normally distributed.

**Table 2: Panel unit root test using Levin, Lin and Chu (2002) procedure**

variables	t-statistic	p-value	1st difference t-statistic	p- value	order of integration
Lndefex	-2.96408	0.0015	-	-	I(0)
Indbtstk	-23.9810	0.0000	-	-	I(0)
lnfdi	-7.77325	0.0000	-	-	I(0)
lninfl	-8.32508	0.0000	-	-	I(0)

**Source: Authors' Computation using Eviews 9**

Table 2 above is a result of the unit root test carried out on all the variables under study. Variables such as defense expenditure, debt stock, foreign direct investment and inflation are stationary at level form. This suggests that the variables are stationary and no variable is integrated of order one. This means that the variables can be used for estimation since they are free from the presence of unit root.

**Table 3: Summarized result using GMM estimation Technique**

Variable	Coefficient	Standard error	t-statistic	p> t
Llndefexp	0.6185143	0.0412069	15.01	0.000
lndbtstock	-0.0423573	0.0170195	-2.49	0.006
lninfl	-0.0113448	0.0071352	-1.59	0.112
lnfdi	-0.0143092	0.0066082	2.17	0.030
Constant	1.337161	0.4770498	2.80	0.005
AR(2)			-0.59505	0.5518
Wald	898.16			0.000
Instruments	109			
Countries	20			
Observations	262			

Source: Authors' computation using Stata 15

Previous value of defense expenditure is presented in logarithmic form. From the result above in table 3 the result showed that past values of defense expenditure has about 61.8% impact in deciding the current year's defense expenditure and that its impact is statistically significant. This therefore means that for SSA; past amount of expenditure on defense contributes significantly to the current year's spending on defense. This finding supports the work of Bel and Elias-Moreno (2009) where they found out that previous military expenditure also have a significant impact on current defense expenditure. Similarly Wang (1998) estimated the impact of previous arms transfer on current expenditure on arms transfer, Wang (1998) discovered that previous arms transfer expenditure has a significant impact on current arms transfer expenditure. In other words, previous values of military expenditure have a significant impact on current defense expenditure in SSA countries.

The debt stock represented with the variable *dbtstk* in its natural logarithm is negative and statistically significant. Ordinarily, it shows that if debt stock increases by 1%, defense expenditure decreases by 0.6% as well. The impact it has on defense expenditure is statistically significant. This means that, in

deciding the factors that will contribute to the purchase of defense expenditure in SSA countries, when debt keeps increasing defense expenditure keeps decreasing. That effect is meaningful and significant. This result also does not support the findings of Aregbeyen & Akpan (2013) in studying Nigeria's public expenditure where it was shown that servicing of debt has positive impact on public expenditure but the impact is not statistically significant in the short-run. It further suggests that in SSA countries, the debt stock determines the extent of spending on any public expenditure.

FDI and military expenditure followed a priori expectations where in there exist a negative relationship between FDI and military expenditure. From the result, as FDI increases by 1%, military expenditure reduces by 0.01%. This shows that a country with less conflict will attract more FDI than a country with high conflict. This result is consistent with the findings of Aziz & Khalid (2019) where in the impact of FDI is negative and statistically significant.

The variable inflation as expected has a negative relationship with defense expenditure. It is also in logarithm form. This means that 1% increase in inflation rate leads to a decrease in defense spending by 0.01%.

The impact of this decrease is not statistically significant. It further means that in spending for the military, the inflation rate is not considered very much. This estimate is in contrast with the empirical results of Hussain, Hussain and Erum (2015) whereby the impact of inflation is negative but statistically significant.

From table 3 above, the AR (2) is a test for autocorrelation in a panel study. The result showed that since the p-value is greater than 5% level of significance, it suggests that we cannot reject the null hypothesis which says that there is no autocorrelation in the panel data. It further suggests that the result is unbiased and efficient and not spurious. The number of instrument used is 109.

## **5. CONCLUSION AND POLICY RECOMMENDATION**

This paper has been able to uncover some truths about how defense spending is determined in some selected Sub Saharan African countries. The study was influenced by other literature on what truly determines defense expenditure. The study then employed data with respect to economic factors. Econometric tools were used to ascertain the findings. Having studied the works of other scholars, the author concludes that there are actually economic factors that

influence defense expenditure and also that policy makers should as a matter of urgency review previous defense spending before embarking on any other defense expenditure to avoid waste of scarce resources. Based on this research, policy makers are encouraged to do the following; first, review previous defense expenditure. Second, resources should be committed to other sectors. So as to reduce waste in defense spending and other public expenditure. Third, defense expenditure should be determined based on economic realities such as inflation, level of debt stock. Finally, investment in other sectors by foreign firms should be allowed while government must curtail spending on defense to promote more foreign investments.

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