# MILITARY EXPENDITURE AND ECONOMIC GROWTH IN AFRICA: A CROSS COUNTRY STUDY OF 48 STATES

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## Abstract

This study sought to explore the impact of military spending on Africa's economic growth through an investigation of the status quo across 48 African states. OLS estimation technique is used to analyze cross sectional data; with a view to the two scenarios: low military spending and high military spending contexts. In both cases it is consistently found that high military spending is counter economic growth in Africa, this implying that African countries have to minimize military spending for pro-growth sectors finance.

**Key Words:** Military expenditure, economic growth, sub-Saharan Africa, defence

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## 1.0 Introduction

In modern economics, supply side and demand side theories collectively affirm the influence of public spending on economic growth. However, emerging debate is on what kind of public spending and type of its impact that can be ascertained? In this perspective, military expenditure as one of important components of public spending comes into the scrutiny. On this subject, the debate on the poor countries has partially been stirred by the observed rising share of their military spending in the total global military expenditure from 8.3% in 1960 to 27.5%, in 2000; concurrently with diminishing share of their global GDP from 30.7% to 21.5%. More concern is focused on the tilting of expenditure composition to payments for the purchase of refined weapons of which, over 75% of global arms imports is made by developing nations[1]. This expenditure glitch has caused cries over the huge opportunity cost of the military outlays resulting from negligence of education, health and infrastructure spending whose addition to potential output is apparent (UNDP, 1991; UN, 2006; and Todaro and Smith, 2006).

African share in the global military expenditure has exhibited 70% increase in the period 1988-2008. Despite the fact that none of the African states prevails among the 15 major military spenders (globally at level quantity in US dollars), with the little financial resources in Africa, a substantial rise in military expenditure implies a big opportunity in terms of the foregone development expenditure (SIPRI, 2009)[2]. In this context, CIA ranking of military spending as a percentage of GDP around 2005-2006 made Eritrea, Burundi and Angola (the African countries) among the top spenders, ahead of China, India and USA. One of reasons for the increases in military expenditure has been given as the countries' endorsement of military oriented education,

[1]Unfortunately Africa as whole is not an excellent arms exporter unlike other developing countries such as India and Brazil which are greater arms exporter than Africa (Sandler and Hartley, 1995).

[2] First and foremost Africa suffers from the shortage of well trained manpower, social services provision and financial resources and therefore what happens when defense expenditure picks up?

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health, infrastructure and innovations including *inter alia*: nuclear and helicopter discoveries which benefit all civilians as they pull out the country‘s production possibility frontier (Benoit, 1978).[3] Despite the many arguments on the reasons for the mounting military expenditure, there is information gap on the economic impact of such expenditure in African countries. This study therefore seeks to explore the economic implication of military spending at different levels across 48 African states[4]. Intuitively, it attempts to solve questions on: (i) whether the two variables are compliments or substitutes; (ii) in what manner the rise/fall of one may decrease/increase the other; and (iii) what role does military expenditure play in growth economics and human development for Africa which ranked “the poorest” for a long time now.

The rest of this paper is organized as follows: Section 2 presents general perspectives of military expenditure. Methodology of the study is discussed in Section 3 while empirical analysis is in Section 4 and, a summary of the major findings and policy implications form Section 5.

## 2.0 Perspectives of Military Expenditure

From Public sector economics, defence is a public good. In economics context, markets either don’t produce public goods or produce inadequate quantities, and this is because of their non-excludability and non-rivalry status. Non-excludability means the consumption of the good by one individual doesn’t reduce the amount available for others while non-rival denotes difficulty of excluding someone from enjoying the benefits of public goods via the price system (Rosen, 1999). Intuitively, it becomes an automatic disincentive for private individuals to sufficiently provide public goods because suppliers find it tricky to reap the benefits of their investments.

[3] However, military discovery can have very little usefulness (notably the discovery of stealth) or may be slower and more indirect to reach civilians compared to civilian oriented innovations. This manifests yet the crowding out of private research and technology in favor of military (Sandler and Hartley, 1995).
[4] See appendix 1 for the names of 48 countries included in this cross sectional study.

Economics theories therefore justify government intervention in the economy as a provider of defense, which is financed by non voluntary taxes.

However, just like private goods the provision of defence is *externality* producing., the More armed the nation becomes, certainly the more negative externalities it poses to its adversaries and the more it sets up positive spillovers to its allies without market intermediation[5]. In the home country, military experiments (like testing nuclear weapons) energize pollution to the magnitude of being a negative externality to other sectors of the economy (Sadler and Hartley, 1995).

Across the African continent, the reduction of military expenditure encounters difficulties in the prevalence of civil wars, border conflicts, coup attempts and post election violence in which the army has remained instrumental. That is, higher military spending is uneconomic where present political misunderstandings can better be mediated in "a round table talk" than deployment of gunfire and heavy artilleries. In this direction of thinking, lower military spending is theoretically backed by resources crowding out contention, where funding military by higher tax rates, Treasury bonds/bills or bank borrowing slash the available resources for private investments and growth[6].

Nonetheless, given the fact that a number of conflicts global-wise have ended by military victory, high military spending improves security which unleashes favourable climate for

[5] Positive externalities in home country can crop up if military operations in the distant or near failed states brings peace and order and therefore avert the negative spillovers of a fragile states in terms of the absence of health vaccination programs, arms trafficking and crimes (such as terrorism and banditry) (Collier, 2008).
[6] From supply side economics higher tax rates can discourage labour supply, saving and investments as economic activities contract with higher taxes (Samuelson and Nordhaus, 2001).

investment, trade and growth. Specifically, a country like Angola had to spend about 20% of its GDP to successful wipe out the UNITA rebels and restore peace and order (Collier, and Hoeffler, 2006). Even if a country like Tanzania, Ghana or Cape Verde is not at war, higher military expenditure (under the umbrella of Lucas critique) is still security enhancing, as it rises invasion costs to potential aggressors. Above all, the world wide experience of market failure credit high military spending as a countercyclical therapy by heightening aggregate demand (Military Keynesianism); and more controversy on policy fronts is likely to surface provided that the growing external threats dictate high military expenditure while the current inflationary pressure requires a decline in aggregate demand (Frank and Bernanke, 2001 and Wikipedia, 2010).

Still, disagreements on causality take roots as the rise in military outlays in fast growing / resource rich economies like China, India, Saudi Arabia and Algeria get connected to Wagner's theory. In view of this, defence spending steps up because at higher output growth these nations have more resources to spend and more resources to be protected, which means higher economic growth ignites higher military expenditure (Albatel, 2002, Global analysis, 2009).

As views on impacts and causality of military spending keep on dissenting, Africa's growth rates have been low and unsustainable. In this fashion, Africa has even failed to rise and conserve its share in global GDP above 5%. By 2008 African share in global GDP was 2.5% accompanied by an average of 4.1% growth during 1997-2006 (UN, 2010). This kind of trend rationalizes a search for the variables promoting/demoting growth in Africa.

In the growth literature military spending has been given a relatively lesser attention as a key determinant of economic growth. However, theoretical discussion of military expenditure just like any other fiscal component plus its security implication articulates a possible link between military outlays and economic growth. The past empirical findings have shown both positive and negative relationships or in some case no relationship at all between military expenditure and economic growth. The studies have repeatedly been held in either time-series data for a single nation, cross-section of groups of countries or panel data as are for example, briefly summarized below (Table 1):

**Table 1: Some Findings of Studies on Military Expenditure and Growth**

| **Author** | **Area of study** | **The major findings** |
|---|---|---|
| Benoit (1973, 1978) | LDCs | Positive impact of military expenditure on GDP growth |
| Deger and Smith (1983) | LDCs | Negative impact of military spending on GDP growth |
| Looney (1988) | Africa | Positive impact of military spending on Social-Economic expenditure for non conflict states and negative effects for the conflict ones. |
| Landau (1993) | LDCs | Military burden produces positive effect on economic growth at low levels but negative at higher levels. |
| Mohamed (1993) | 13 Sub-Saharan states | Military spending is exogenous determinant of economic growth |
| Birdi and Dunne (2001) | South Africa | Insignificant impact of military spending on economic growth |
| Yabu (2003) | Tanzania | Insignificant effect of defence spending on GDP growth |
| Wilkins (2004) | A panel of 85 states | Many countries showed a positive impact of military spending on economic growth |
| Dailey (2008) | 24 countries willing to participate the Iraq war | Insignificant relationship between military spending and GDP growth |
| Francisco and Shikida (2008) | Brazil | Negative impact of military expenditure on economic growth |

The reviewed studies either assumed a linear relationship between military expenditure and economic growth or did not focus on possible simultaneity between military spending and

economic growth. And equivalently, all of them did not discuss the implication of military spending on human development index. This can mark deviations in results since non-linearity; human development; and simultaneity issues are factored in this study.

## 3.0 Methodology

Theoretical framework of the model stems from non-linear relationship between military expenditure and economic growth as explained by Landau in 1993. If the level of military expenditure as a share of GDP (denoted *M*) is low, additional spending on military will contribute positively to economic growth through the national security avenue. Nevertheless, at higher levels of military burden (like *M* power 2, i.e. *M ^2*) or "an overkill stage", resources use (crowding out effect) tends to cause a net negative impact on growth (which overrules positive security effects). An overkill stage encapsulates the state of affairs where an additional unit of defense spending generates zero security (Carson, 1987).

The argument is strengthened by assuming a concave production possibility frontier. In this fashion, the frontier models the economy into production of defence goods (highly security) and non-defence goods only, in company with full employment, heterogeneous inputs and increasing opportunity costs assumptions. In economics sense, concavity means the opportunity cost (in terms of foregoing the production of non-defence goods) gets larger and larger as more and more units of defence goods are produced. At first the swelling military expenditure picks relevant inputs into defence goods production (irrelevant inputs in non-defence sector), resulting into positive security production. Then, further explosion of military expenditure forces the inclusion of irrelevant inputs into military production (which are relevant in non-defence sector). Eventually, it leads to negligible/lesser addition of security production and more crowding out of

non-defence sector by means of grabbing technological development and social overhead capital; poaching the best workforce and difficult access to investment funds. The net outcome to an economy is equivalent to inward shift of the production possibility frontier overtime as productive capacity of non-defence goods slackens, which is economic contraction (Garfinkel, 1990).

According to many growth economists, economic growth is mainly a function of four variables (the four wheels of growth). These are: human resources (labour supply, education, discipline, and motivation); natural resources (land, minerals, fuels, and environment quality); capital formation (machines, factories, roads) and technology (science, engineering, management, entrepreneurship) (Samuelson and Nordhaus, 2001).

Mathematically: $Q = AF(K, L, R)$ where $Q$ is output, $K$ is productive services of capital, $L$ is labour inputs, $A$ is technology, and $R$ is natural resources. Given the theory, let the population growth (denoted *POP*) and annual growth rate in agriculture, hunting, forestry and fishing be proxies for labour growth rate and Natural resources, respectively. Because the higher the per capita income the lower the technological gap, per capita income becomes a proxy for technology status quo (Deger and Smith, 1983). Africa is also a good recipient of foreign aids for the purpose of stimulating higher output, which makes aid one of determinants of economic growth. Combining the influence of military spending into growth, the model is transformed into:

$G = f(M, M2, C, POP, P, K, F)$……. ……*(1).*

Where *G* is annual GDP growth rate (representing economic growth), *M* is military expenditure as a share of GDP (the military burden) – captures positive security effect, *M2* is *M* power 2 – captures resource use impact of military expenditure when military burden becomes huge (an overkill stage). *C* is growth in gross capital formation, *POP* is annual population growth rate, *P* is per capita income, *K* is annual growth rate in agriculture, hunting, forestry and fishing (grouped together) and *F* is foreign aids as a share of GDP. Because economic theories advocate possible simultaneity between military expenditure and economic growth, another equation is modeled as:

$$M = f(G, GC, POP, F, D) \ldots\ldots (2).$$

Where *D* is the dummy variable to capture the influence of internal/external threat for countries which faced civil wars, inter-country wars, secessionist threats or border conflicts during 2001-2005. *GC* is general government final consumption expenditure as a percentage of GDP whose expansion may incorporate the increase in the military expenditure as well. In addition, the Wagner's theory states that, higher GDP fuels military expenditure as the nation tends to have more resources to spend and more resources to be protected. This law therefore rationalizes the inclusion of *G* (GDP growth) in equation 2.

This model can be specified as a simultaneous system of equations:

$$G = \alpha_0 + \alpha_1 M + \alpha_2 M2 + \alpha_3 C + \alpha_4 POP + \alpha_5 P + \alpha_6 K + \alpha_7 F + \varepsilon_1 \ldots\ldots (3)$$

$$M = \beta_0 + \beta_1 G + \beta_2 GC + \beta_3 POP + \beta_4 F + \beta_5 D + \varepsilon_2 \ldots\ldots (4).$$

With expected signs of the parameters as:

$\alpha_1>0, \alpha_2<0, \alpha_3>0, \alpha_4>0, \alpha_5<0, \alpha_6>0, \alpha_7>0$; and $\beta_1>0, \beta 2>0, \beta_3>0, \beta_4>0, \beta_5>0$.

The study employs an average of secondary cross-section data in the period 2001-2005 for 48 states. The data on military expenditure was collected from Stockholm International Institute of Peace Research (SIPRI). According to SIPRI, the definition of military expenditure encircles "current and capital spending on the armed forces, including peace keeping forces; defence ministries and other government agencies engaged in defence project and paramilitary forces when judged to be trained, equipped and available for military space activities."

In a similar move, the data on foreign aids and human development index were obtained from Human Development Report (HDR) for the relevant years while per capita income, growth rates in GDP, population, general government final consumption, capital formation, agriculture, hunting, forestry and fishing were assembled from UN statistics division.

Based on econometrics theory, the over identified model was to be estimated by two stage least squares (2SLS) to ensure unique estimates of parameters in case the Hausman Specification Test confirmed the presence of simultaneity. Otherwise, other estimation techniques like OLS could be deployed (in this case relatively better) to achieve consistent and asymptotically normal estimates (Gujarati, 2003). Such estimation is done at two levels: for the continent as a whole; and for Sub-Saharan Africa in particular.

## 4.0 Empirical Findings and their Interpretations

### 4.1.1 Relationship between Military Expenditure and Economic Growth in Africa

### (a) Emerging Estimation Problems and their Solutions

As the military burden (*M*) and the squared military burden (*M2*) appeared to be collinear, the two were therefore alternated in the same equation (but not both of them) at a time[7]. To minimize such problems for other variables, the study dropped the growth rate in gross capital formation *(C)* and the population growth (*POP*), while adding the combined growth in mining, manufacturing and utilities (*MFU*) into estimation. To crack the heteroscedasticity problem, an option robust was added in the regression command to take care of it in each equation[8]. Because of huge standard errors and to intentionally capture the theoretical implication, per capita income was divided by 1000 and squared. Then, the reciprocal of the square was now made an explanatory variable of GDP growth rate in the first equation.

### (c) Estimation Results

The Hausman Specification Test confirmed the absence of simultaneity, and thus legitimizing the use OLS instead of the 2SLS to produce both consistent and efficient estimators (Table 2).

**Table 2: Results from Hausman Specification Test**

| | | | | |
|---|---|---|---|---|
| | | | | Number of obs = 48<br>F( 6, 41) = 33.70<br>Prob > F = 0.0000<br>R-squared = 0.7749 |
| GDP growth (g) | ***Coef.*** | ***Robust Std. Err.*** | ***t*** | ***P>\|t\|*** |
| Military burden (m) | -.2341552 | 1285241 | -1.82 | 0.076 |
| Agriculture, hunting, forestry and fishing growth rate (k) | 3967347 | .0535737 | 7.41 | 000.0 |
| The reciprocal of squared income per capita (1/p2) | -.0227736 | .0188086 | -1.21 | 0.233 |
| Mining, manufacturing and utilities growth rate (mfu) | .2508025 | .0311167 | 8.06 | 0.000 |
| Foreign aids as share of GDP (f) | .0605166 | .0587913 | 1.03 | 0.309 |
| Error term (w) | -.0622572 | .1970987 | -0.32 | 0.754 |
| _Cons | 2.068702 | .4268026 | 4.85 | 0.000 |

[7] This was evidenced by high Variance Inflation Factor (VIF)
[8] Heteroscedasticity problem causes inefficient estimators.

In the case of military expenditure-economic growth nexus, the estimation was done at two levels, for the continent as a whole and sub-Saharan Africa. For equation 1 the estimation was further categorized into two cases: At low military burden and at higher military burden (Tables 3 & 4).

**Table 3: Estimation of the Influence of Military Spending on GDP (*low military burden*)**

| | | | Number of obs = 48<br>F(5, 42) = 39.89<br>Prob > F = 0.0000<br>R-squared = 0.7743 | |
|---|---|---|---|---|
| GDP growth rate | ***Coef*** | ***Robust Std. Err*** | ***t*** | ***P>\|t*** |
| Military burden | -.2634808 | .1138867 | -2.31 | 0.026 |
| Agriculture, hunting, forestry and fishing growth rate | .4033959 | .051652 | 7.81 | 0.000 |
| The reciprocal of squared per capita income | -.0229823 | .0189717 | -1.21 | 0.233 |
| Mining, manufacturing and utilities growth rate | .24869 | .0319224 | 7.79 | 0.000 |
| Foreign aids as share of GDP | .0632546 | .060142 | 1.05 | 0.299 |
| _cons | 2.103946 | .3951104 | 5.32 | 0.000 |

**Table 4: Estimation of the Influence of Military Spending on GDP (*high military burden*)**

| | | | Number of obs = 48<br>F(5, 42) = 63.33<br>Prob > F = 0.0000<br>R-squared = 0.7957 | |
|---|---|---|---|---|
| GDP growth rate | ***Coef*** | ***Robust Std. Err*** | ***t*** | ***P>\|t*** |
| The squared military burden | -.0155888 | .0043965 | -3.55 | 0.001 |
| Agriculture, hunting, forestry and fishing growth rate | .4227227 | .048153 | 8.78 | 0.000 |
| The reciprocal of squared per capita income | -.0294649 | .0178984 | -1.65 | 0.107 |
| Mining, manufacturing and utilities growth rate | .2430636 | .0266956 | 9.11 | 0.000 |
| Foreign aids as share of GDP | .0777823 | .0582946 | 1.33 | 0.189 |
| _cons | 1.549414 | .4342022 | 3.57 | 0.001 |

In both cases, the coefficient of determination was very high and the military burden became statistically significant with a negative coefficient in each case. On the other hand, the growth rate in agriculture, hunting, forestry and fishing; and the growth rate in mining, manufacturing and utilities were significant while foreign aids as share of GDP and the reciprocal of squared per capita income were found to be insignificant.

Under this, the Shapiro-Wilk normality test confirmed the absence of spurious regression while the Ramsey's RESET test found that no relevant variable had been omitted[9]. When the same estimation was repeated for sub-Saharan countries, excluding South Africa, similar results were obtained.

### 4.1.2 Relationship between Military Expenditure and Human Development in Africa

Again, the hausman specification test found no simultaneity between military expenditure and Human Development Index (HDI) in Africa. This was after replacing GDP growth with HDI while substituting the level value of per capita income for the reciprocal of squared per capita income. This is because the role of per capita income was now to capture the improvement in living standards instead of the room for technological expansion.

The outcomes legitimized the use of OLS to estimate each equation separately. To fulfill the new mission the following specification changes were made. Value added in transport, storage and communication; and value added in construction as a percentage of GDP (at 2008 prices) was added in equation 1. Then per capita income, the reciprocal of combined mining, manufacturing and utilities growth rates; and the growth rate in foreign aids as a share of GDP were included among the explanatory variables. The pointed variables were assumed to have positive influence on human development except the reciprocal of mining, manufacturing and utilities growth rate. In a similar undertaking, the reciprocal of population growth was generated to take into account the influence of population dynamics on human progress. All the cited variables teamed up with the military burden to explain variations in human development (Tables 5 & 6).

[9] Spurious regression is considered absent if the error term is normally distributed. It must also be noted that, the exclusion of any relevant predictor variable can bring about biased and inconsistent estimators.

**Table 5: Estimation on the Influence of Military Spending on HDI (*low military burden*)**

| | | | | |
|---|---|---|---|---|
| | | | | Number of obs = 48<br>F( 7, 40) = 86.73<br>Prob > F = 0.0000<br>R-squared = 0.8538 |
| Human development index | ***Coef.*** | ***Robust Std. Err.*** | ***t*** | ***P>\|t\|*** |
| Military burden | -.0025954 | .0020766 | -1.25 | 0.219 |
| The reciprocal of population growth | .0633984 | .0231313 | 2.74 | 0.009 |
| Per capita income | .0000291 | 5.21$^{e}$-06 | 5.58 | 0.000 |
| The reciprocal of mining, manufacturing and utilities growth | .0022563 | .000688 | 3.28 | 0.002 |
| Value added in construction | .0126683 | .0032568 | 3.89 | 0.000 |
| Value added in transport, storage and communication | .006601 | .0032894 | 2.01 | 0.052 |
| The growth rate in foreign aids | -.0454742 | .0068467 | -6.64 | 0.000 |
| _cons | .4047333 | .0298866 | 13.54 | 0.000 |

**Table 6: Estimation on the Influence of Military Spending on HDI (*high military burden*)**

| | | | | |
|---|---|---|---|---|
| | | | | Number of obs = 48<br>F( 7, 40) = 82.97<br>Prob > F = 0.0000<br>R-squared = 0.8524 |
| Human development index | ***Coef.*** | ***Robust Std. Err.*** | ***t*** | ***P>\|t\|*** |
| The squared military burden | -.0000881 | .0000754 | -1.17 | 0.250 |
| The reciprocal of population growth | .0624677 | .0234511 | 2.66 | 0.011 |
| Per capita income | .0000292 | 5.20e-06 | 5.62 | 0.000 |
| The reciprocal of mining, manufacturing and utilities growth | .0022466 | .0006854 | 3.28 | 0.002 |
| Value added in construction | .0123842 | .0032372 | 3.83 | 0.000 |
| Value added in transport, storage and communication | .0065891 | .0034553 | 1.91 | 0.064 |
| The growth rate in foreign aids | -.045589 | .0067043 | -6.80 | 0.000 |
| _cons | .4014945 | .0317677 | 12.64 | 0.000 |

In both cases (of low and high military burden), only the military burden was statistically insignificant. Although the growth rate in foreign aid and the reciprocal of mining, manufacturing and utilities growth rates exhibited parameters with non-hypothesized signs, still they preserved their statistical significance.

Under these circumstances, the reciprocal of population growth, the reciprocal of combined mining, manufacturing and utilities growth, per capita income, the growth rate in foreign aid, the value added in construction, and the value added in transport, storage and communication were all statistically significant.

At the same time, the Shapiro-Wilk normality test and, the Ramsey's RESET test error confirmed the absence of spurious regression and omitted variable bias, respectively. When the same exercise was repeated for sub-Saharan countries, excluding South Africa, the same results were reconfirmed.

### 4.1.3 The Major Determinants of Military Expenditure in Africa.

The estimation of the second equation by OLS to assess the direct impact of either GDP growth or human development index on military burden proved fruitless. This is because computed results were prone to specification problems as evidenced by very low R-squared, insignificant parameters and non-normality of the error term.

To solve the problem, the growth rate in military burden was used by taking logarithm and more exogenous variables were either changed or added. Therefore, the reciprocal of population growth and the squared foreign aids (as percentage of GDP) were employed instead of the prior values. Furthermore, the growth rate in mining, manufacturing and utilities; and the reciprocal of net exports as a share of GDP were applied to capture the influence of the fast economic growth.

In an equivalent procedure, the squared per capita income (*(p/1000)^2*) and the value added by wholesale, retail trade, restaurants and hotels were proxied for better living standards and wealth effects, respectively. Since, "the more income and wealth shoot up, the more the demand for protection (defence)".

In both Africa and sub-Saharan Africa (excluding South Africa), each stimulus variable was statistically significant, except the value added in wholesale, retail trade, restaurants and hotels. Exceptionally, the joint growth in mining, manufacturing and utilities; the reciprocal of population growth and the squared per capita income were the only significant variables whose coefficients defied the hypothesized signs (Table 7).

**Table 7: Estimation of the Major Determinants of Military Expenditure**

| | | | | |
|---|---|---|---|---|
| | | | | Number of obs = 48<br>F( 8, 39) = 11.30<br>Prob > F = 0.0000<br>R-squared = 0.6306 |
| The growth rate in military burden | ***Coef.*** | ***Robust Std. Err*** | ***t*** | ***P>\|t\|*** |
| General government final consumption expenditure (% of GDP) | .0571393 | .0101003 | 5.66 | 0.000 |
| The squared per capita income | -.0098137 | .0037695 | -2.60 | 0.013 |
| The reciprocal of population growth | .5131503 | .2568455 | 2.00 | 0.053 |
| Mining, manufacturing and utilities growth rate | -.0175599 | .0085157 | -2.06 | 0.046 |
| The reciprocal of net exports (% of GDP) | -.6107506 | .1875784 | -3.26 | 0.002 |
| The squared foreign aids (% of GDP) | .0005302 | .0001217 | 4.36 | 0.000 |
| Value added in whole sale, retail trade, restaurants and hotels ( % of GDP) | -.0220308 | .0188095 | -1.17 | 0.249 |
| Threats | .4148778 | .1526929 | 2.72 | 0.010 |
| _cons | -.4838232 | .38737 | -1.25 | 0.219 |

The estimation remained exempted from omitted variables bias and spurious regression, as fortified by Ramsey's RESET test and the Shapiro-Wilk normality test showed, respectively.

## 5. Summary of the Findings and the Major Policy Implication

In a nutshell, the findings tell us that there is no simultaneous relationship (bidirectional/feedback effect) between military expenditure and economic growth in Africa. The relationship between the two is extremely unidirectional, whereas the addition of military spending at both low and high levels of military burden generates negative impact on GDP

growth. The implication is, negative crowding out effect of increased military expenditure dominates in all the two cases (at low and high levels of the military burden), while the positive security effect appears to be very weak.

Furthermore, the findings identify the joint growth in agriculture, forestry, hunting and fishing; and the combined growth in mining, manufacturing and utilities as the major drivers of GDP growth in Africa. Though population growth and the growth rate of gross capital formation were excluded in the final estimation because of multicollinearity, they also revealed positive and significant impact on economic growth in the pre-exclusion regressions.

In the case of human development-military burden nexus, no significant relationship between the two was detected (neither unidirectional nor bidirectional). However, the positive source of human development came from per capita income, value added in construction and value added in transport, storage and communication. Similarly, the drawback in human development was triggered by population growth, the joint growth rate in mining, manufacturing and utilities, and the growth rate in foreign aid.

On the other hand, the positive determinants of the growth rate in military burden were high levels of foreign aid, general government final consumption expenditure, the net exports and security threats. At this point, population growth, high per capita income and the combined growth in mining, manufacturing and utilities demonstrated negative effect on the growth in military burden.

Note on the policy front that, the findings show less importance of military expenditure as a means of attaining high economic growth consistently with improved living standards. Furthermore, the colinearity of the growth rate in agriculture, forestry, fishing and hunting; and population growth pictures the prevailing status in African states (where a rise in population is positively associated with involvement in these sectors). These findings implicate engagement in these sectors as a question of paramount importance in Africa's economic policy. Since the enlargement of military expenditure burden has displayed a negative impact on economic progress, it is more economic to settle the political disputes in "a round table talks" than in "deployment of gunfire and heavy artilleries" ending to increased military outlays.

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**Appendix 1: Countries Included in this Study**

| | **Country** |
|---|---|
| 1 | Algeria |
| 2 | Angola |
| 3 | Benin |
| 4 | Botswana |
| 5 | Burkina Faso |
| 6 | Burundi |
| 7 | Cameroon |
| 8 | Cape Verde |
| 9 | Central African Republic |
| 10 | Chad |
| 11 | Congo |
| 12 | Cote d' ivoire |
| 13 | D.R.C |
| 14 | Djibouti |
| 15 | Egypt |
| 16 | Eritrea |
| 17 | Ethiopia |
| 18 | Gabon |
| 19 | Gambia |
| 20 | Ghana |
| 21 | Guinea |
| 22 | Guinea-Bissau |
| 23 | Kenya |
| 24 | Lesotho |
| 25 | Libya |
| 26 | Madagascar |
| 27 | Malawi |
| 28 | Mali |
| 29 | Mauritania |
| 30 | Mauritius |
| 31 | Morocco |
| 32 | Mozambique |
| 33 | Namibia |
| 34 | Niger |
| 35 | Nigeria |
| 36 | Rwanda |
| 37 | Senegal |
| 38 | Seychelles |
| 39 | Sierra Leone |
| 40 | South Africa |
| 41 | Sudan |
| 42 | Swaziland |
| 43 | Tanzania |
| 44 | Togo |
| 45 | Tunisia |
| 46 | Uganda |
| 47 | Zambia |
| 48 | Zimbabwe |