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The Impact of Human Capital and Defense Expenditures on Economic Growth: Panel Analysis for Selected SSA Countries

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Abstract

The purpose of this study is to investigate the existence of heterogeneity in the effect of human capital and defense expenditures on the economic growth of sub-Saharan African countries based on evidence from eight of these countries for the period 2014-2017. The panel fixed effect and the Least Square Dummy Variable (LSDV) version of the fixed effect models are employed. The findings reveal that, while education and defense expenditures have positive and statistically significant impact on the economic growth of the various countries, the effect of health expenditure on economic growth is positive and insignificant. Further, some significant level of heterogeneity is found in the manner human capital and defense expenditures impact economic growth in the various countries, and this is attributed to varying weights the different countries place on the need for their human capital development. Appropriate policy recommendations are made based on these findings.

***Keywords**: Human capital expenditure, Economic Growth, Panel analysis, Sub-Saharan African countries*

***JEL Classification**: E24, F43, C33*

Beşeri Sermaye ve Savunma Harcamalarının Ekonomik Büyüme Üzerindeki Etkisi: Seçilmiş SSA Ülkeleri için Panel Analizi

Özet

Bu çalışmanın amacı, beşeri sermaye ve savunma harcamalarının Sahraaltı Afrika ülkelerinin ekonomik büyümesi üzerindeki etkisindeki heterojenliği, 2014-2017 dönemi için bu ülkelerden sekizinin kanıtlarına dayanarak araştırmaktır. Çalışmada panel sabit etkiler ve En Küçük Kareler Kukla Değişkenli (LSDV) versiyonu olan sabit etkiler kullanılmıştır. Bulgular, eğitim ve savunma harcamalarının çeşitli ülkelerin ekonomik büyümesi üzerinde pozitif ve istatistiksel olarak anlamlı bir etkiye sahip olduğunu, fakat sağlık harcamalarının ekonomik büyüme üzerindeki etkisinin ise istatistiksel olarak anlamsız olduğunu göstermektedir. Buna ek olarak, beşeri sermaye ve savunma harcamalarının çeşitli ülkelerdeki ekonomik büyümeyi nasıl etkilediği konusunda önemli bir heterojenlik olduğu ve bunun farklı ülkelerin beşeri sermayeyi geliştirme ihtiyacına farklı ağırlıklar koymalarından kaynaklandığı düşünülmektedir. Çalışmada bu bulgulara dayanarak uygun politika önerileri yapılmıştır.

***Anahtar Kelimeler**: Beşeri sermaye harcamaları, Ekonomik büyüme, Panel analiz, Sahraltı Afrika ülkeleri*

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1. Introduction

The importance of human capital development for the growth of world economies cannot be over emphasized as human capital constitutes an integral part of every economy. So important is human capital for development that its elements occupy important positions in the Sustainable Development Goals (SDGs) of the United Nations and the Bretton Wood institutions. Indeed, the World Bank and the International Monetary Fund (IMF) have continuously drummed home the need for member countries most especially those in Sub-Saharan Africa to pay close attention to their human capital development in order to achieve a prosperous future (Karambakuwa et al., 2020).

Even at the times when these Bretton wood institutions are on the neck of Sub-Saharan African countries to maintain fiscal discipline in every respect, dispensation is usually given in the area of human capital development. Few examples abound in this regard. For instance, in 2015, When Ghana lost policy credibility and had to approach the IMF to restore the same, the IMF inter alia persuaded the Ghanaian government to maintain fiscal discipline in every regard save in the area of human capital development (education and health). Also, with the advent of the recent global health crises (COVID-19) a number of African countries including Ghana, Kenya, South Africa, among others approached the IMF for Rapid Credit Facility (RCF) to help manage the consequences of the fallout from the pandemic (IMF, 2019). Under this program, the condition precedent for the acquisition of the funds was for the African countries to commit to using these funds strictly for improving their health systems which is considered an important component of human capital.

What is obvious from the above discussions is that human capital expenditure forms a substantial component of the budget of African countries and according to Gandhi (2020)African governments spend in excess of 5% of their GDP on education alone which is the highest proportion of any region's GDP spent on a single component of human capital globally. Indeed, this high expenditure on education makes African countries meet the financing targets on education set by the United Nations (UN). Similarly, the expenditures on health have been on the rise for most African countries, the average growth rate of health expenditure over the past two decades is 6.7% for West Africa and 4.5% for Southern Africa (Micah et al., 2019).

Closely related to human capital in importance is the issue of security because peace and security are essential for the socio-economic development of economies. They are also essential for the attainment of fundamental human rights in society. Peace and security place 16th among the 17 sustainable goals of the United Nations which is indicative of the critical role security can play towards the achievement of sustainable society for all.

Against this backdrop, countries especially those with poor security potentials have been making frantic efforts to strengthen their security systems. The need to strengthen security systems is even reinvigorated by the widespread terrorist tendencies across the globe. The African continent is not safe from the dangers of

these insurgent groups and the situation in many African countries such as Nigeria, Chad, Somalia among others readily come to mind when the security of Africa is being discussed.

Mostly when these critical issues that have growth potential are being discussed in the African context, there exist the tendency to lump up the efforts of these countries in the way they pay attention to these issues. So, for instance, there is no difference between South Africa, Kenya and Ghana etc. in the way the governments of these countries place importance on health, education and security in terms of expenditure and how that eventually contributes to driving the growth of these countries. However, this study argues that to the extent that countries in the Sub-Saharan region face different economic circumstances and are at different levels in their development endeavors, there is bound to be heterogeneity in the way human capital and defense expenditures contribute to the growth of these countries.

It is important to note that very little attention has been paid to this subject matter in the SSA region with the only known studies being that of Karambakuwa et al. (2020) and Hakeem (2010). However, none of these studies analyzed the combined effects of both human capital and defense expenditures on economic growth. Further, the findings from these studies are not reinforcing. The current study argues that the governments of SSA countries are becoming increasingly concerned about security and therefore committing significant amount of resources to maintaining security just like education and healthcare. Therefore, the current study seeks to fill the gaps of the previous studies in this regard.

Against this background, the purpose of this paper is to answer the question: Is there any difference in contribution to growth among the countries made by human capital? This study is unique for adding to existing literature an up-to-date information on the nexus between growth and human capital development, for various countries at different stages of development in three different regions of Sub-Sahara Africa viz; East, West and South, thus providing a wider coverage. The rest of the paper is organized as follows: The second section is the literature review where associated theoretical and empirical review is analyzed. The third section presents the methods and sources of data while the estimation strategies are presented in the fourth section. The fifth section presents the conclusions and policy directions.

2. Literature Review

This section presents the theoretical foundations of this study and the empirical works done in the past in the realm of the nexus between governments' human capital (education and health) expenditure as well as defense expenditure and economic growth. In particular, the empirical review covers the research done on this subject matter in the context of Africa.

2.1.Theoretical Review

For many years, the study of the nature of the relationship between government expenditure and the impact it has on the growth rate of the economy has been

addressed by many economists. Various theories and laws have since been proposed to help in this explanation. Whereas the theories have been tested and found to be valid for some economies, for other economies, they are invalid or inconclusive.

Wagner's Law which posits that an increase in national income leads to an increase in public expenditure. Public expenditure in this case refers to expenditure on security and welfare activities. This implies the existence of a one-way causal relationship from national income to government expenditure. Public expenditure for emerging economies is not only endogenous but is also seen to be growing proportionately to the growth in income Wagner's law, however, has been criticized for failing to consider the unforeseen economic events like wars and pandemics which could lead to an abnormal level of public expenditure. It is also criticized on grounds that it overlooked the nature of relationships in the short-term. Although this law was born out of a study Wagner conducted for Germany, it has since been extended to other economies for instance Mustapha (2020)concluded that in SSA countries, increase in income led to an increase in productive public expenditure. Gatsi et al. (2019) and Kesavarajah (2012) on the other hand found no evidence of Wagner's Law for Ghana and Sri Lanka.

The interventionist theory of John Maynard Keynes (1936) in his book 'The General Theory of Employment, Interest and Money' where he advocated for government expenditure as a way out of economic recessions. According to Keynes, the multiplier effect of such expenditure is huge and could help revamp the economy in the event of recession. Explaining the multiplier effect, he contends that an increase in the public expenditure would contribute to income earnings by various workers who in turn will spend the income earned on goods and services, this process continues and creates a ripple effect thereby causing a multiple fold expansion in the economy. The main critics of this school of thought argue that it could render an economy debt saddled. It is also argued that it is not possible to point out the exact amount of government expenditure that would lead to growth and thus could be inflationary in the long run (Botha, 1963).

The Peacock-Wiseman Hypothesis focuses on the pattern of public expenditure growth. It states that expenditure grows irregularly and there are three possible causes for this;

First is the displacement effects which are unanticipated economic events like depression and war that have the potential to increase government expenditure which can be financed through various ways including higher taxes and debts.

Second, Inspection effects which occur when the tax levels are increased in a bid to raise more income in response to mechanisms of unforeseen events, such expenditures do not usually decline even after the unforeseen events have passed. The government only tends to expand its operations with the new tax base and as a result growth occurs.

Finally, concentration effects occur when physical and financial resources owned by the government are not equally distributed and they tend to be more concentrated

at the central government rather than at the local government. The expenditure by the central government is therefore observed to be contributing more to growth.

Some writers like Dada, Adesina and State (2013) tested the applicability of Peacock-Wiseman's hypothesis in Nigeria and found that it is valid. The critics of this hypothesis argue that during pandemics and economic recessions, it is harder for governments to resort to higher taxation as a means of obtaining more income and may resort to obtaining debts.

2.1.Empirical Review

Several empirical works abound as far as human capital development and economic growth nexus is concerned. For instance Karambakuwa et al. (2020) and Hakeem (2010) conducted a study on human capital and economic growth nexus in Sub Saharan African countries. Whereas the latter finds human capital to be important for growth, the former fails to establish a significant impact of human capital on growth for SSA. Bethencourt and Fernando (2020) however, finds that the impact of human capital on growth is different across various countries and is highly dependent on the institutional structures present in a country.

A current move by many of the countries is to make their military stronger through improved technology. A few studies that have been conducted to ascertain the impact of this move on growth include Phiri (2019) and Sirag et al. (2016) who analyze the effects of military and public expenditures on the economic growth of South Africa and 97 countries respectively. Both studies reveal the existence of a nonlinear effect of military and public expenditures on growth. However, whereas Phiri (2019) conducted a time series analysis on South Africa, that of Sirag et al. (2016) was a panel study involving 97 countries. Polat (2020) on the other hand, conducted a panel study for 15 developing and developed countries and finds a positive relationship between military expenditure and economic growth. Gokmenoglu et al. (2015) also establishes a long run relationship exists between economic growth and military expenditure in Turkey albeit the direction of relationship is unclear.

To investigate the relationship between government educational expenditure and economic growth, Mallick et al. (2016) and Gemmell et al. (2016) conducted studies for Asian and OECD countries respectively. They both find a positive impact of educational expenditure on economic growth. A similar result is arrived at by Ali et al. (2012) and Bakan and Gökmen (2015) for Pakistan and Turkey respectively. These studies stress on the importance of education in improving quality of life through the impart of new skills needed for growth. Owings et al. (2019) however, states that although education has a positive impact on growth in the long run, there is the need for improvement on teacher quality and equitable access to education in Turkey.

Basuki et al. (2019) and Mose et al. (2014) investigate the impact of government expenditure on economic growth for Indonesia and East Africa respectively. Basuki et al. (2019) finds no sufficient evidence to support the relationship between government expenditure and growth. On the other hand, Mose et al. (2014)

establishes that while investment expenditure positively impacts growth, consumption expenditure negatively impacts growth.

Dincer and Yüksel (2019) and Bedir (2016) analyzed the presence of a causal relationship between health expenditure and economic growth. The former study uses data for developed countries while the latter uses data for developing countries. Dincer and Yüksel (2019) fails to establish the existence of causal relationships between the health expenditure and economic growth in E7 countries. Bedir (2016) finds causal relationships in some countries and for other countries, no causal relationships was found.

Table 1 presents a summary of the empirical reviews on the subject matter.

Table 1: Summary of Empirical Reviews

Country	Author(s)	Period	Methodology	Findings
SSA	Karambakuwa et al. (2020)	1980-2016	Panel approach	Human capital does not have a significant impact on growth
SSA	Hakeem (2010)	1970-2000	MLE, Fixed effect	Human capital and physical capital are important for growth
South Africa	Phiri (2019)	1988-2014	Logistic Smooth transition model	A U-shaped relationship between military expenditure and growth
Asian countries	Mallick et al. (2016)	1973-2012	FMOLS	Education expenditure has a positive impact on growth
Provinces in Indonesia	Basuki et al. (2019)	2010-2015	Panel regression.	No relationship between government expenditure and growth
E7 countries	Dincer and Yüksel (2019)	1996-2016	Pedroni cointegration, Dumitrescu Hurlin causality	A long run relationship exists. No causality relationship
Turkey	Gokmenoglu et al. (2015)	1988-2013	Johansen cointegration and Granger causality	A long run relationship between military spending and growth. Unidirectional causal relationship from growth to military spending.

Country	Author(s)	Period	Methodology	Findings
Countries in Europe and Asia	Bedir (2016)	1995-2013	Granger causality	The relationship is different across countries
OECD	Gemmell et al. (2016)	1970-2007	ARDL	Expenditure on education and infrastructure have a positive impact on growth
97 countries	Sirag et al. (2016)	1981-2010	Dynamic panel threshold technique	Public expenditure has a nonlinear effect on growth.
East Africa	Mose et al. (2014)	1980-2010	Balanced Panel fixed effect model.	Investment expenditure positively impacts growth, consumption expenditure negatively impacts growth
Pakistan	Ali et al. (2012)	1972-2011	OLS	Investment in education, health and physical capital have a positive impact on growth in Pakistan.
Turkey	Bakan and Gökmen (2015)	1970-2013	OLS	Education has a positive and long run relationship with growth.
Turkey	Owings et al. (2019)	Literature review	Literature review	Education is an important factor for development and so teacher quality should be improved in Turkey
15 countries	Polat (2020)	1992-2017	Panel cointegration and PDOLS	A positive relationship is found to exist between military expenditure and economic growth. A one-way causal relationship from national income to defense expenditure exists in the long run.

Country	Author(s)	Period	Methodology	Findings
38 Developing and 51 developed countries	Bethencourt and Fernando (2020)	Data for 2009	OLS	Human capital and economic growth relationship is different across countries mainly because of differences in institutions.

Source: Authors' construct.

3. Methods and Sources of Data

The study employs panel data from 2004-2017 for eight Sub-Sahara African countries viz; Ghana, Senegal, Ivory coast, South Africa, Uganda, Tanzania, Rwanda, and Kenya selected based on the availability of data for the period under consideration. Data on growth, health, education and defense for all countries was obtained from World Development Indicators and knoema sites. To capture the heterogeneous effect of expenditures on education, defense and health on growth of the various countries, seven dummies were introduced each taking a value 1 for the presence of heterogeneity and 0 for absence of heterogeneity.

4. Estimation Strategy

To analyze how the growth rate of the various countries is influenced by their respective expenditures in health, education and defense, the panel estimation method was adapted. The restrictive form of the fixed-effects panel proposed by Giesselman and Catran (2018) employed for this purpose is as follows:

$$Y_{it} = \alpha_i + X_{it}'\beta + \varepsilon_{it} \quad (1)$$

Where β is a vector of panel parameters and X_{it} being a vector of panel independent variables with ε_{it} being the idiosyncratic error term. In this model, each individual has a separate intercept term but with the same slope parameter.

The individual heterogeneity in intercept terms of the cross-sectional units can be estimated from the restrictive panel model in (1) as follows;

$$\hat{\alpha}_i = \underline{y_i} - \underline{x_i}'\hat{\beta} \qquad \text{Since Cov } (\alpha_i, x_i) \neq 0 \quad (2)$$

From equation (2), the individual heterogeneity can therefore be seen as the residual variation in the regressand that is unaccounted for by the regressor variables.

The operational form of the restrictive fixed effect panel model specified in (1) is given below:

$$(GDP_{it} - \underline{GDP_i}) = \beta_1(Eexp_{it} - \underline{Eexp_i}) + \beta_2(Hexp_{it} - \underline{Hexp_i}) + \beta_3(Dexp_{it} - \underline{Dexp_i}) + (\mu_{it} - \underline{\mu_i}) \quad (3)$$

Where each variable in equation (3) is the difference between each panel variable and its time average. The time average for each variable is constructed as per the following formula;

$\underline{Z_i} = \frac{1}{T}\sum_{t=1}^{T} Z_{it}$ Where Z represents any of the panel variables including the idiosyncratic error term.

It is worth noting that time invariant variables such as the heterogeneity among cross-sectional units automatically drops from equation (3) following the transformation for fixed effects estimation. To take account of the heterogeneity, the Least Square Dummy Variable alternative to fixed effects estimation is necessary and the operational form of this model is specified in equation (4) below.

$$GDP_{\iota t} = \beta_0 + \beta_1 Eexp_{it} + \beta_2 Hexp_{it} + \beta_3 Dexp_{it} + D_i'\gamma + \mu_{it} \quad (4)$$

Where GDP_{it} is the growth rates of the various countries overtime, β_0 is the common intercept, $Edu_{it,}$ $Hexp_{it}$ and $Dexp_{it}$ are the cross-country expenditures overtime of the various countries in education, health and defense respectively measured as percent of gross domestic product (GDP) . β_1 - β_3 are the common slopes of the panel regressors with γ, the coefficients of the vector of dummies (D_i) capturing the cross-country heterogeneity for (N-1) countries.

Table 2: Results of the Hausman Test

Test Summary	Chi square stat
Cross-section random	24.9924 *** (0.000)

Source: Authors' calculation using EViews
Description: *** significant at 1%, ** significant at 5%, * significant at 10%

The results of the Hausman test is reported in Table 2. The null hypothesis underlying the test is that the random effects model is appropriate as against the fixed effect model. Based on the results in Table 2, the null hypothesis is rejected at even 1% level shown by the low probability values of the Chi-square statistic. This implies that the fixed effect model best fits the data under consideration. The fixed effect model is nothing but the OLS regression of the time-demeaned regressand on the time-demeaned regressor variables. For purposes of comparison among the countries in terms of how their expenditure in the various sectors affect growth, the Least Square Dummy Variable Approach (LSDV) to fixed effect estimation is fitted. For the eight countries selected for comparison in this study, (N-1) numbers of dummies were introduced to avert the danger of getting into the dummy variable trap (a case of perfect multicollinearity) Gujarati (2003). The results of the LSDV model are displayed in Table 3.

From Table 3, it can be seen that as a whole education and defense expenditure have significant positive effects on the growth of all the countries. Health expenditure on the other hand has a positive but insignificant effect on growth. The results from Table 3 further indicates that significant heterogeneous effects of human capital and defense expenditures on growth exist for four of these countries (Senegal, Ivory Coast, South Africa and Kenya). Whereas heterogeneity exists for the remaining countries (Ghana, Tanzania, Rwanda and Uganda), it is generally not statistically significant. The finding of significant heterogeneity is attributed to the fact that, based on the capacity of the individual countries, most Sub-Saharan

African countries have in recent years been paying varying levels of attention to the issues of human capital and defense. For instance, countries like Ghana, Kenya and South Africa have all recognized in tempo the importance of health and education for national development and are devoting large chunks of their budgets to making these services free for their citizens.

Table 3: Results of the Fixed Effects Model and LSDV Model.

	Fixed Effect Model	LSDV of Fixed Effect Model
Variable	Coefficient	Coefficient
Eexp.	1.0320*** (0.0035)	1.0320*** (0.0035)
Hexp.	0.0851 (0.6954)	0.0851 (0.6954)
Dexp.	1.5156** (0.0269)	1.5156** (0.0269)
Senegal		-2.8669** (0.0182)
Ivory Coast		-2.8330** (0.0219)
South Africa		-6.2348*** (0.0000)
Uganda		0.2334 (0.9044)
Tanzania		0.9224 (0.4288)
Rwanda		0.9023 (0.5462)
Kenya		-3.0256*** (0.0083)
Ghana		-0.0769 (0.9691)

Source: Authors' calculation using EViews
Description: *** significant at 1%, ** significant at 5%, * significant at 10%

The results of this research are in tandem with those obtained by Mallick et al. (2016) who found that education impacted growth in Asian countries positively and Bedir (2016) who established a positive relationship between health expenditure and economic growth for some selected developing countries. However, Mose et al. (2014) found that although human capital encouraged growth in East Africa, the values were not significant implying that the government should not prioritize investment in this sector as it contributes insignificantly to growth in the region.

The findings are also consistent with the views of Adam Smith (1776) of the classical economic thought who first brought out the role of talents acquired during apprenticeship as being significant to growth. The term however was later developed by Irving Fisher (1897) and has since been used extensively by different economists to stress that healthy and educated people are likely to contribute more

to the economic growth of an economy. Expenditure on defense, although not directly contributing to the economic activity, was found to have a positive impact on growth of the various economies by encouraging stability and peace thereby providing a safe environment for growth.

5. Conclusions and Policy Directions

This study investigates the existence of heterogeneity in the way human capital and defense expenditure impact economic growth in Sub Saharan African based on the analysis of the data for eight of these countries for the period 2004-2017. The key findings indicate that there is a positive combined impact on growth of expenditure in education, health and defense for all the countries under consideration albeit the effect of health expenditure is statistically insignificant. Four of the countries are further found to be significantly different in the way human capital expenditure and defense expenditure impact on their growth. With the findings showing a positive correlation between human capital expenditure and economic growth, this study recommends that Sub-Sahara African countries place extra importance on the issue of their human capital development as human capital has the potential of delivering a sustained level of growth in these countries. In this regard therefore human capital which is highly dependent on the health status and education levels of people Goldin, (2014) should not be taken lightly by these economies in their quest to realize higher levels of economic growth. This could be achieved by embarking on a policy of aggressive expansion in the educational and health infrastructure in these countries to cater for the educational and health care needs of the ever-increasing population. More attention should also be given to the quality of education and health care delivery which could be achieved by improving the standard of training of the personnel at the forefront of health and educational service delivery in these countries. These measures are critical for the general overhaul of the health and educational systems of countries in the SSA region which could help minimize the health and educational tourism among the citizens of these countries.

With the help of the LSDV alternative to fixed effects estimation, it was established that at least differences exist among some Sub-Sahara African countries in the way they pay attention to their human capital development due to the different stages these countries fall in their development endeavor.

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