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The Impact of Health Expenditure on the Economic Growth in Sub-Saharan Africa

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Abstract

This paper examined the nexus between health care expenditure and economic growth in Sub-Saharan Africa over the period 1995-2014. We use the system General Method of Moments (GMM) technique to estimate the results. The findings reveal the existence of a positive and a statistically significant relationship between the two variables, precisely; health expenditure has a significant impact on the economic growth of the region. Regarding the control variables, while the effect of official development assistance on economic growth is insignificant, foreign direct investment, the active population and gross domestic savings appear as key determinants of economic growth in the region. Additionally, the results show that health care is a necessity rather than a luxury in Sub-Saharan Africa. It is therefore necessary to develop effective and efficient health care programs, increase health expenditure, make an effective use of the young population and create better environment for foreign direct investment in order to foster economic growth in Sub-Saharan Africa.

Keywords

Health Expenditure, Economic Growth, GMM, Sub-Saharan Africa

1. Introduction

Economic growth and health expenditure in the Sub-Saharan Africa vary substantially over time and across countries. Many studies in the health economics literature identify health care expenditure as an important factor explaining differences in the level of economic growth that is economic development is to some extent attributed to better health outcomes which are partly a result of health expenditure. Adequate and efficient health related spending is widely considered as inevitable in the improvement of health status [1]. At the macro level, investment in health workforce and infrastructure is expected to improve

health conditions, hence better human capital of the population and evidently more productivity (output). However, in sub-Saharan Africa (SSA) and other developing regions where resources are relatively scarce, health expenditure has received less attention in government budgets [2]. Africa's 10% contribution to the world's population relates to 3% of the world's health spending [3].

Moreover, most of Sub-Saharan African countries still lag behind in terms of health care expenditure and outcomes due to a variety of reasons such as low household incomes, governments' allocations of insufficient shares of budgets to the health sector, mismanagement of resources allocated to the health sector, poor health care systems, among other things.

Previous theoretical and empirical works have shown the existence of a relationship between health expenditure and economic growth using various methodological approaches; see, inter alia, [4]-[15] and as well as [16]. Furthermore, studies on the nexus between health expenditure and economic growth in Sub-Saharan Africa precisely the impact of health care expenditure on economic growth are few; thus our justification for this work. The contribution of this paper is to extend the Sub-Saharan African health economics literature and to provide policy implications.

2. Methodology

2.1. Data

This study uses annual data on 36 (N = 36) Sub-Saharan African countries from 1995 to 2014 (T = 20) (see **Table A1** for the list of countries), sourced from the World Bank databank precisely the World Development Indicators. The sample size and time period are based on the availability of data. We gathered information on health expenditure per capita purchasing power parity (HEPC) and economic growth estimated in GDP per capita annual growth (GDPPCGR), and expressed in constant 2011 international Dollars. We also collected data for the following control variables that have been identified by the literature as playing a key role in determining economic growth: net official development assistance in constant 2013 US Dollars (ODA), foreign direct investment net inflows as percentage of GDP (FDI), gross domestic savings as percentage of GDP (GDS) and labor force proxied by the share of population with age between 15 and 64 years (POP). All the variables are expressed in natural logarithm.

2.2. Model and Theoretical Framework

This paper employs the two-step system Generalized Method of Moments (GMM) and the simple panel data models (fixed effect (FE) and random effect (RE)) to estimate the results. These two methods are used in order to compare the results as the GMM considers endogeneity while the simple panel data models do not.

The two-step system Generalized Method of Moments (GMM) [17] [18] [19] generates a robust estimator. The technique is based on the assumption that the error term is not serially correlated. Thus, disturbances and the instrumental va-

riables are uncorrelated in the equations, that are the lagged levels of the series after the equation has been first-differenced to eliminate country-specific effects. We choose two-step system GMM for various reasons: concerns about endogeneity as some regressors might not be fully exogenous and possibility of a bi-directional link (for example per capita health expenditure and official development assistance variables may be endogenous because some share of ODA may have been allocated to the health sector); the time periods (T) are fewer than the panels (N). The Arellano-Bond estimator was designed for small T and large N [20]. Following [21], we use the system GMM estimations techniques because according to [22] [23], it simultaneously controls for the unobserved country-level heterogeneity, autocorrelation and endogeneity. Following [24] [25], we use two-step efficient estimation to remove the time-invariant heterogeneity [22] [23] [26] [27]. System-GMM instruments the differenced lag dependent variable with lagged levels, and it instruments the levels with lagged differences. The instruments are validated using the Hansen-J test for exogenous instruments and the Arellano-Bond test for autocorrelation.

To build the models, we consider the following aggregate production function adapted from the work of [28]:

$$Y = AK^{\alpha}L^{\beta} \tag{1}$$

where Y is GDP per capita growth rate (GDPPCGR); A is total factor productivity, K is composite capital stock given as $K = gof$, where g is gross domestic savings as percentage of GDP (GDS), o is official development assistance (ODA) and f is foreign direct investment (FDI); and L is the labor composite determined by $L = hp$, where h is human capital proxied by health expenditure per capita (HEPC) and p is the labor force proxied by the share of population with age between 15 and 64 years (POP). By applying log to (1), we can get the following form:

$$\begin{aligned}\ln \mathrm{GDPPCGR} = {} & \theta + \alpha_1 \ln \mathrm{GDS} + \alpha_2 \ln \mathrm{ODA} + \alpha_3 \ln \mathrm{FDI} \\ & + \beta_1 \ln \mathrm{HEPC} + \beta_2 \ln \mathrm{POP} + \mu_t\end{aligned} \tag{2}$$

Equation (2) can be rewritten for country i at time t to get the simple panel model:

$$\begin{aligned}\ln \mathrm{GDPPCGR}_{it} = {} & \theta_i + \alpha_{1i} \ln \mathrm{GDS}_{it} + \alpha_{2i} \ln \mathrm{ODA}_{it} + \alpha_{3i} \ln \mathrm{FDI}_{it} \\ & + \beta_{1i} \ln \mathrm{HEPC}_{it} + \beta_{2i} \ln \mathrm{POP}_{it} + \mu_{it}\end{aligned} \tag{3}$$

And following [29], the GMM model is given as follows:

$$\ln(Y)_{it} = \sum_{f=1}^{h} \beta_1 \ln(Y)_{it-f} + \gamma_l \ln(X)_{it-l} + \delta_i + \varepsilon_{it} \tag{4}$$

$$E[\delta_i] = E[\varepsilon_{it}] = E[\delta_i \varepsilon_{it}] = 0 \tag{5}$$

where Y stands for the dependent variable which is GDPPCGR; X is for the vector of the main independent variable HEPC and control variables (ODA, FDI, POP and GDS); δ_i are the unobserved time-invariant country-specific effects while ε_{it} is the observations error term.

In line with economic theory, good health can contribute to economic growth

in many ways. For instance, health expenditure is expected to improve the health of the labor force and consequently increase their productivity. An increase in labor productivity will inevitably increase gross domestic output, hence contributes to economic growth. Healthier workers with higher productivity earn higher wages [30]. Higher wages in turn contribute to higher consumption and savings, which by virtue of improving the well being and happiness of people contribute to economic growth [28].

Other control variables used are population, saving, foreign direct investment and foreign aid. Population variable is used because of the great importance of age structure in determining the level of economic growth of a country. In between 15 and 64 years age structure is the physically active population who affects more productivity vis-a-vis growth. Gross domestic savings as percentage of GDP is the investment variable. It is included based on its importance in determining the aggregate income of a country referring to economic theory.

Theoretically, investment can contribute to economic growth by generating technological diffusion through foreign direct investment (see [31].

An inflow of foreign capital in form of aid could affect economic growth through the provision of the foreign exchange.

The estimations are done with the help of the statistical software STATA (version 14).

3. Empirical Results

3.1. Descriptive Statistics

Table 1 shows summary statistics of variables included in the study. The mean, standard deviation, minimum and the maximum values of the variables are reported. The statistics show that the average GDP per capita growth rate for the period is 2.67%, with a minimum of −37.92% and a maximum of 141.64%. Then, health expenditure per capita has a mean value $186.27; its minimum and maximum values are $5.94, $1768.67 respectively. Average foreign direct investment as percentage of GDP is 4.65% with minimum and maximum values of −8.58% and 161.82% respectively. The mean, minimum and maximum values of the official development assistance are 7.17E+08, −2E+07 and 1.27E+10 respectively. The share of population with age between 15 and 64 has mean, minimum and maximum values of 54.095, 47.018 and 71.024 respectively. Finally, GDS has

Table 1. Summary statistics.

Variable	Mean	Std. Dev.	Min.	Max.	Obs.
GDPPCGR	2.630	7.805	−37.925	141.641	720
HEPC	189.698	234.598	5.943	1768.676	720
FDI	4.734	9.749	−5.977	161.823	720
ODA	6.28E+08	8.6E+08	−2E+07	1.27E+10	720
POP	54.095	4.626	47.018	71.024	720
GDS	13.456	17.326	−125.681	83.287	720

Table 2. Two-step system GMM, Fixed effect and random effect models estimation.

Variables	Coefficients		
	GMM	Fixed Effect(FE)	Random Effect (RE)
lnGDPPCGR(−1)	0.417		
lnHEPC	0.157**	0.235*	0.252**
lnFDI	0.209***	0.347**	0.381**
lnODA	-0.892	0.168*	0.174*
lnPOP	0.221**	0.141***	0.143**
lnGDS	0.189***	0.308**	0.290**
Constant	2.805*	4.016***	4.136***
Countries	36	36	36
Diagnostic tests			
AR(2) [p-value]	0.208		
Hansen-J test [p-value]	0.169		
Hausman (Chi^2)		278.11***	278.11
Wald test(Chi^2)		1.20E+05**	

***significant at 1%; **significant at 5%; *significant at 10%.

a mean value of 13.456, a minimum value of −125.681 and a maximum value of 83.287.

3.2. Estimates of the Models

Table 2 provides the estimation results of the regression models. Based on the results of the Hansen-J test and the AR(2) test which have the null hypotheses of "the instruments as a group are exogenous" and "no autocorrelation" respectively and that are both accepted, we can conclude that the estimation results are all valid for GMM estimator. Also, the Hausman test as given in Table 2 failed to reject the FE estimation in favor of the RE. To test for heteroscedasticity, the modified Wald test for group wise heteroscedasticity is performed. The Wald test considers the null hypothesis that residuals are homoscedastic meaning that there is the presence of constant variance. The test confirmed the existence of heteroscedasticity by rejecting the null hypothesis. This implies that the use of ordinary least square estimation techniques would yield inconsistent and biased estimates, leading to unreliable results. The results reveal that the elasticities are higher using FE and RE to estimate the effect of health expenditure on economic growth compared to GMM.

The results also indicates that using FE, RE and GMM, HEPC is significant. But, since based on the modified Wald test, the residuals are heteroscedastic and hence the results of simple panel data models are unreliable, the GMM results are given consideration in remaining part of this study. According to the findings, GDPPCGR in SSA does not statistically and significantly depend on its lagged value, whose coefficient elasticity is 0.417. This indicates that if GDPPCGR

increases by 1 percentage point this year, ceteris paribus, it will not necessarily increase the next year. The coefficient of HEPC is positive and significant but with a weak magnitude (0.157). It implies that a 1% increase in HEPC, other things being constant, affects economic growth by 0.157%. While the coefficients of the control variables FDI, POP and GDS are positive and statistically significant, that of the ODA is negative and statistically insignificant. The magnitude of the coefficients of FDI, POP and GDS are 0.209, 0.221 and 0.189 respectively; suggesting that an increase of 1% in FDI, POP and GDS, ceteris paribus, tend to increase GDPPCGR by 0.209%, 0.221% and 0.189% respectively.

4. Summary and Conclusion

The paper has investigated the relationship between health expenditure and economic growth in Sub-Saharan Africa. The relationship between the two variables is found to be significant but weak in terms of magnitude. An important finding is that official development assistance does not improve economic growth of the region because the effect is not significant. A possible reason attributed to this may be the fact that most of the time donors allocate official development assistance under some conditions which may not be the priorities of the recipient countries. Further, foreign direct investment appears to be a significant determinant of economic growth in Sub-Saharan Africa, thus better policies for the attractiveness of FDI need to be developed and implemented in the region. Our findings show that health care is a necessity rather than a luxury in Sub-Saharan Africa, hence policy makers should consider this aspect as a way offostering economic growth in the region. Finally, another important policy implication of the results is the potential contribution of the young population to the improvement of the economic growth of the region if it is used in an efficient manner.

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Appendix

Table A1. List of countries.

Benin	South Africa	Kenya	Namibia
Burkina Faso	Guinea-Bissau	Madagascar	Swaziland
Central African Republic	Equatorial Guinea	Mauritius	Tanzania
Cote d'Ivoire	Mali	Rwanda	
Cameroon	Mauritania	Sudan	
The Republic of Congo	Niger	Seychelles	
The Democratic Republic of Congo	Nigeria	Uganda	
Gabon	Senegal	Angola	
Ghana	Sierra Leone	Botswana	
Guinea	Chad	Mozambique	
Comoros	Togo	Malawi	