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Human Capital and Inclusive Growth in Sub-Saharan Africa: The Case for Education

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Abstract

The inclusivity of economic growth is crucial for enhancing socio-economic well-being. Despite various policy initiatives aimed at improving human capital in Sub-Saharan Africa (SSA), growth remains non-inclusive. This study investigates the impact of human capital development, particularly in education, on inclusive growth, measured through the Inclusive Growth Index (IGI) and GDP per person employed (GDPPPE) in SSA. To achieve this objective, panel data from 20 SSA countries spanning from 2000 to 2021 were utilized, employing cross-section dependence tests and the Feasible Generalized Least Squares estimation method. Results indicate that indicators of human capital development, such as secondary school enrolment (SSE) and public expenditure on education (PEE), positively and significantly influence IGI. However, while SSE positively impacts GDPPPE, PEE exhibits a negative and significant effect when considering corruption and the rule of law. In conclusion, the study emphasizes that human capital development is key in driving inclusive growth in SSA. It suggests that policy efforts to foster inclusive growth should prioritize expanding access to secondary school education and substantially increasing government spending on education, while ensuring that the process is free from corruption.

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1. Introduction

Increased economic growth is considered crucial for reducing poverty, but empirical evidence suggests that growth alone does not always translate into an increase in the standard of living. Growth is not inclusive if it only benefits a small portion of society (**Tirmazee and Haroon, 2015**). An inclusive growth refers to economic growth that benefits all segments of society, particularly vulnerable and marginalized groups, ensuring that the benefits are widely shared and opportunities are accessible to everyone not to just very few individuals.

Developing nations, characterized by unequal wealth distribution, exhibited less inclusivity in 1996 (**Hausman and Gavin, 2015**). The primary goal of all economic activity is to eradicate income inequality, which is caused by various socioeconomic factors (**Bigsten, 1983;**

Loranz, 1905). According to **Afzal (2007)** and **Felipe (2012)**, inclusive growth encourages benefit sharing among all societal members rather than accruing more benefits for each individual. While developed nations have achieved substantial economic development and wealth disparity reduction, developing nations continue to face challenges in achieving inclusive growth (**Todaro, 1994**).

Kuznets (1955) noted an association between wealth disparity and growth stages, particularly evident in middle-income nations. Although economic development initially increases income inequality, it tends to decrease as industrialization accelerates. Macroeconomic stability, as highlighted by **Dhonte & Kapur (1997)** and the **UN (2015)**, significantly influences the development trajectory of emerging nations. **Demery and Tony (1987)** observed that rising inflation, budget deficits, and balance of payments deficits lead to distributional problems. Government policies aimed at achieving macroeconomic stability play a crucial role in shaping income distribution trends. Research indicates that per capita income has a favorable effect on income distribution in developing nations (**Joseph & Obikaonu, 2021**). Despite significant economic expansion over the past few decades, developing nations continue to grapple with elevated rates of joblessness, inflation, and income disparity (**Ali, 2016**).

In Sub-Saharan Africa (SSA), challenges such as low-quality employment growth, inadequate human capital development, minimal agricultural growth, rural-urban divides, gender and social inequalities, regional disparities, and low GDP per person employed persist. This study examines the effect of human capital development (education dimension) on inclusive growth across 20 selected SSA countries. Panel data from 2000 to 2021 is utilized, with inclusive growth measured using the inclusive growth index and GDP per person employed.

The study investigates the impact of secondary school enrollment rates and public expenditure on education on inclusive growth, addressing existing gaps in the literature. Data is sourced from the World Development Indicators (2022) and the World Governance Indicators (2022), with variables of interest including the inclusive growth index, GDP per person employed, secondary school enrollment, public expenditure on education, gross capital formation, labor force participation rate, trade openness, control of corruption, and rule of law. Given the importance of inclusive growth in SSA, this study provides valuable insights for policymakers and administrators aiming to promote human capital development and sustainable inclusive economies in the region.

2. Literature Review

The factors influencing inclusive growth and income inequality have been the subject of several theoretical and empirical investigations. This literature review encompasses the most pertinent and current studies. According to **Torsten and Guido (1991)**, inequality hampers growth, as they construct a theoretical framework for inequality using both non-economic and economic variables that collectively constitute "politico-economic equilibrium." This study employs two sets of data for empirical analysis: one from the US and eight European countries in the 19th century, and the other from developing and less developed nations in the post-war era. Based on both data sets, the analysis concludes that there is a substantial and inverse relationship between inequality and economic growth.

Three closely connected viewpoints are presented regarding the creation of policies to attract investments in sustainable infrastructure in emerging Asia. The first emphasizes modernizing agriculture and accelerating the growth of rural economies, followed by assisting in the growth and smooth operation of markets, and finally, capitalizing on and profiting from the opportunities brought about by globalization. According to **Afzal and Jazhong (2007)**, Asia's vision of inclusive progress is collapsing due to growing disparities. Inclusive growth places a strong emphasis on giving everyone equitable access to opportunities, as outlined by the Asian Development Bank in its report on Asia's pursuit of inclusive growth.

Norman et al. (2007) theoretically demonstrate a connection between well-being and macroeconomic instability in less developed nations. The primary causes of macroeconomic instability in these nations include large external shocks, erratic economic policies, shoddy institutions, and macroeconomic rigidity, as outlined in the study. Welfare and growth in less developed nations

are directly impacted by macroeconomic volatility. **Afzal (2007)** outlines the development agenda of developing nations, which focuses on inclusive growth rather than poverty reduction. **Amparo (2007)** empirically examines the effect of human capital and income inequality on economic growth. Through the control of several nation variables, the study employs a dynamic panel data model, using the education distribution and Gini coefficient as measures of income inequality and inequality of human capital, respectively. The impacts of estimated income and human capital inequality on growth vary depending on the location and its level of development. These have favorable effects in industrialized nations and negative effects in less developed nations, although the favorable effects are not long-lasting.

In their 2008 study, Mutapha et al. examine how foreign direct investment affects the economic growth of the Middle East and North African (MENA) region. Inclusive growth implies growth with equity, poverty reduction, and inequality reduction, as emphasized by **Kanbur (2000)**, who highlights the need for active intervention to address distributional issues during growth processes.

Dagdeviren et al (2000) proposed the need for policy interventions to promote the benign combination of high growth and rapid poverty reduction by combining rapid growth in per capita income with relatively stable and low inequality. **Dollar and Kraay (2002)** observed that growth does not occur spontaneously or automatically; rather, it necessitates involvement in the implementation of effective policies. They found that redistributive growth is likely to be more effective for poverty reduction than distribution-neutral growth. **Habito (2009)** describes inclusive growth as GDP growth that significantly reduces poverty. If inclusiveness is characterized as being captured by poverty, then inclusive growth is indistinguishable from pro-poor growth, as defined by growth associated with poverty reduction.

Rauniyar and Kanbur (2010) defined inclusive growth based on a conceptualization of inclusiveness as increasing income distribution equity, which is equivalent to 'relative pro-poor growth'. They argued that inclusiveness in income inequality reduction can be more or less pro-poor depending on which income levels are more positively affected, and that the focus of poverty reduction policy should be on growth that increases the lowest incomes. **Klasen (2010)** distinguishes between pro-poor and inclusive growth based on who benefits from growth: "pro-poor growth focuses on people below the poverty line, while inclusive growth is arguably more general, wanting growth to benefit people from all walks of life, including the poor, near-poor, middle-income groups, and even the wealthy." This distinction revolves around the definition of inclusiveness in terms of the distribution of growth outcomes.

Habito (2009) defined inclusive growth as gross domestic product (GDP) growth that leads to significant poverty reduction, entailing both poverty and inequality reduction. Inclusive growth enhances the social opportunity function, which depends on two factors: (i) balancing opportunities available to the population, and (ii) how opportunities are allocated among the population.

Ianchovichina and Lundstrom (2009) describe inclusive growth as increasing the rate of growth and the size of the economy while leveling the playing field for investment and extending productive employment opportunities. **Rauniyar and Kanbur (2010)** refer to inclusive growth as growth with equal opportunities, which includes economic, social, and institutional dimensions. **Rauniyar (2010)** defined inclusive growth as growth that is accompanied by lower income inequality, so that the increase in income benefits those with lower incomes disproportionately. At the same time as average achievement improves, inclusive growth refers to the improvement of the distribution of wellbeing along dimensions other than income. **McKinley (2010)** posits that inclusive growth has two dimensions: (i) achieving long-term growth that creates and expands economic opportunities, and (ii) ensuring broader access to these opportunities so that all members of society can benefit from growth.

According to **Paramasivan (2014)**, several drivers of inclusive growth include human capital development through health and education. Gender equity is also a driver of inclusive growth, depicted by the ratio of female to male labor participation. Productive employment, poverty reduction, inequality reduction, socio-economic amenities, governance in terms of policy reforms, rule of law and institutions, economic growth, and production based on comparative advantage are other drivers of

inclusive growth. **Bhalla (2007)** emphasized the idea of productive employment as a key component of inclusive growth. **McKinley (2010)** posits that for growth to be inclusive, human capacities must be improved. If the working population lacks the human capabilities required to be engaged productively in order to take advantage of existing economic opportunities, the supply side of the inclusive growth dynamics needs to be addressed. According to **Anand et al. (2013)**, the three main factors that determine inclusive growth in developing nations are macroeconomic stability, human capital, and structural reforms.

3. Data and Methodology

3.1 Model Specification

The analysis of how human capital development, particularly in the education sector, influences inclusive growth is a relatively novel area lacking a comprehensive modeling framework. This study builds upon **Uzawa's (1965)** model, which integrates output growth performance, and **Lin's (2004)** inclusive growth theory, which considers not only economic growth but also its distributional aspects. The model is presented as follows:

$Y(t) = F(K(t), L(t), t)$ (3.1)

Equation (3.1) describes the determination of annual output Y(t) based on the existing capital stock K(t), the quantity of labor employed L(t), and time (t).

$Y(t) = Fj\ K(t), A(t)L_p(t))$ (3.2)

Equation (3.2) refines this model by representing the state of technological knowledge at time t with the efficiency of labor, A(t). It assumes that improvements in labor efficiency are independent of capital usage.

In equation (3.3), the model presents output growth as a function of capital, labor, and human capital development variables, symbolized as

Output = f(K, L, H) (3.3)

Output is measured using GDP. Capital is measured as the gross capital formation (GCF) and labour force is captured using the labour force participation rate (LFPR). The education indicators included in the model are secondary school enrolment (SSE) and public expenditure on education (PEE). The linear form of the model as derived from **Uzawa (1965)** modified by **Grossman (2017)** and given as:

$GDP_{it} = \alpha_0 + \beta_1 GCF_{it} + \beta_2 LFPR_{it} + \beta_3 SSE_{it} + \beta_4 PEE_{it} + e_{it}$ (3.4)

Lin (2004) emphasizes the role government in determine the type of development strategy that will help achieve inclusive growth. It explains that firms should produces using least cost technology by making use of factor endowments such as labour for which many developing countries have comparative advantage. It also promotes international trade that favours the export of labor-intensive goods and the import of capital inputs for production using over valued exchange rate. The role of quality institutions that help to provide an enabling environment for investment was also emphasized. The study therefore presents an inclusive growth model by expanding to capture international trade using trade openness and (TO) as well as Control of corruption (CC) and rule of law (RL) for institutional quality measures. Inclusive output growth is therefore measured using the GDP per person employed and the inclusive growth index.

The functional form of the model is given as:

$LIGI_{it} = \alpha_0 + \beta_1 GCF_{it} + \beta_2 LFPR_{it} + B_3 TO_{it} + \beta_4 CC_{it} + \beta_5 SSE_{it} + \beta_6 PEE_{it} + e_{it}$ ---------……..(3.5)

$LIGI_{it} = \alpha_0 + \beta_1 GCF_{it} + \beta_2 LFPR_{it} + B_3 TO_{it} + \beta_4 RL_{it} + \beta_5 SSE_{it} + \beta_6 PEE_{it} + e_{it}$ .....(3.6)

$LGDPPPE_{it} = \alpha_0 + \beta_1 GCF_{it} + \beta_2 LFPR_{it} + \beta_3 TO_{it} + \beta_4 CC_{it} + \beta_5 SSE_{it} + \beta_6 PEE_{it} + e_{it}$ ...…...(3.7)

$LGDPPPE_{it} = \alpha_0 + \beta_1 GCF_{it} + \beta_2 LFPR_{it} + \beta_3 TO_{it} + \beta_4 RL_{it} + \beta_5 SSE_{it} + \beta_6 PEE_{it} + e_{it}$ .....(3.8)

Where

IGI = Inclusive Growth Index GDPPPE = Gross Domestic Product Per Person Employed

GCF = Gross Capital Formation LFPR = Labour force Participation Rate

TO = Trade Openness CC = Control of Corruption

RL = Rule of Law SSE= Secondary School Enrolment

PEE = Public Expenditure on Education α_0 = intercept e_{it} = error term u_{it} = individual effect

$\beta_1, \beta_2, \beta_3$..... β_6= coefficient of independent variables.

3.2 Estimation Method

All the series were first subjected to a unit root test using the Levin-Lin-Chu (LLC) test and the Im-Pesaran-Shin (IPS) test. These tests help determine the order of integration of the variables in the panel dataset. The study then estimated the relationship using Feasible Generalized Least Squares Estimation (FGLS). The approach is often used in panel studies due to its ability to address issues of heteroscedasticity and autocorrelation commonly present in such data. By incorporating information about the structure of the errors, FGLS provides more efficient parameter estimates compared to ordinary least squares, leading to more reliable statistical inference.

All data were sourced from the World Development Indicators (2022) and World Governance Indicator (2022).

4. Data Analysis and Interpretation

4.1 Descriptive Statistics:

Table 4.1 presents the descriptive statistics findings including mean, standard deviation, minimum, maximum, skewness, and kurtosis for the variables. For instance, the mean of Gross Domestic Product Per Person Employed (GDPPPE) is 9896.23 with a standard deviation of 11209.4, ranging from 1398.61 to 51926.5. The skewness value of 2.258 indicates a right long tail, and the kurtosis value of 7.181 suggests leptokurtic distribution, suggesting possible outliers in the data. Similarly, the Inclusive Growth Index (IGI) has a mean of 28.373 with a standard deviation of 3.84, ranging from 18.808 to 41.713, showing a skewness value of 1.211 and a kurtosis value of 5.198, indicating a long-left tail and leptokurtic distribution, respectively.

Table 4.1: Descriptive Statistics

Variables	Mean	Std. Dev.	Min	Max	Skewness	Kurtosis	Obs
GDPPPE	9896.23	11209.4	1398.61	51926.5	2.258	7.181	440
IGI	28.372	3.84	18.808	41.713	1.211	5.198	440
PEE	17.079	1.072	15.09	18.772	-0.2	2.048	440
GCF	9.902	10.093	-3.632	49.345	2.54	10.906	440
SSE	43.165	8.544	29.422	58.815	-0.073	1.796	440
LFPR	70.147	10.079	45.49	88.35	-0.194	2.291	440
TO	62.918	4.446	53.983	71.467	0.056	2.501	440
CC	-0.684	0.523	-1.581	0.639	0.353	2.231	440
RL	-0.623	0.6	-1.918	1.023	0.413	3.219	440
GDPPC	1.694	3.887	-14.964	27.831	-0.07	9.44	440
GINI	43.379	5.831	32.3	63.5	1.325	5.97	440

Source: Author`s Computation (2024)

Secondary school enrolment rate (SSE) has a mean of 43.165. It connotes that the average secondary enrolment is about 43.165 for the selected sub-Saharan African countries. The standard deviation shows that dispersion from the mean is about 8.544. With the minimum and maximum values of 29.422 and 58.815, it implies that there are differences in secondary school enrolment. The skewness value of -0.073 connotes long left tail with lower values below the mean. The kurtosis value of 1.796 means that the distribution is platykurtic with thinner tails than normal distribution. Also, it indicates negative excess kurtosis.

Public expenditure on education (PEE) has a mean value of 17.079 with a standard deviation of 1.072. The range of the data is from 15.09 to 18.772 as reflected by the minimum and maximum values. The negative skewness of 0.20 implies a long-left tail. The Kurtosis value is 2.048.

The mean value of Gross capital formation (GFCF) is 9.902 percent. This suggests that the average value of

gross fixed capital formation of the selected sub-Saharan Africa countries is about 9.902 percent. The standard deviation of 10.093 connotes that close dispersion around the mean. The minimum and maximum values of -3.632 and 49.345 implies that selected sub-Saharan African countries have different values of gross fixed capital formation. The skewness value of 2.54 indicates that right long tail. With a kurtosis value of 10.906, the dataset distribution is leptokurtic indicating sharper tail.

4.1.2 Correlation Analysis

The level of correlation among the variables are presented in Table 4.2 The correlation of log of inclusive growth index with all explanatory variables ranges from -0.214 to 0.396. The log of inclusive growth index had the highest correlation with public expenditure on health. The level of correlation between control of corruption (CC) and rule of law (RL) is 0.88. The two variables are highly correlated i.e. element of multicollinearity, which implies that both variables cannot be in the same model. The study included both variables separately in the estimated regression models. The correlation values among other independent variables were below 0.8 hence, there is no correlation bias.

Figure 4.1 Correlation Matrix

LIGI

	LIGI	GFCF	LFPR	TO	RL	PEH	LEB	SSE	PEE	CC
LIGI	1.0000									
GFCF	0.0667	1.0000								
LFPR	-0.2143	0.0270	1.0000							
TO	-0.0374	0.0276	-0.0348	1.0000						
RL	0.2616	-0.0791	0.1725	0.0320	1.0000					
PEH	0.3961	-0.0877	-0.0869	-0.1776	0.0306	1.0000				
LEB	-0.2146	-0.0582	-0.1519	-0.0278	-0.1355	-0.0130	1.0000			
SSE	0.3773	-0.0602	-0.3725	-0.1926	-0.0031	0.3732	0.4321	1.0000		
PEE	0.1060	-0.0224	0.1776	-0.1287	-0.0272	0.2409	0.1276	0.1478	1.0000	
CC	0.1252	-0.0915	0.0404	0.0723	0.8830	-0.0239	-0.1570	-0.0313	-0.1354	1.0000

Figure 4.2 Correlation Matrix

LGDPPPE

	LGDPPPE	GFCF	LFPR	TO	RL	PEH	LEB	SSE	PEE	CC
LGDPPPE	1.0000									
GFCF	-0.0505	1.0000								
LFPR	-0.6821	0.0270	1.0000							
TO	-0.0765	0.0276	-0.0348	1.0000						
RL	0.0191	-0.0791	0.1725	0.0320	1.0000					
PEH	0.2322	-0.0877	-0.0869	-0.1776	0.0306	1.0000				
LEB	0.4213	-0.0582	-0.1519	-0.0278	-0.1355	-0.0130	1.0000			
SSE	0.6447	-0.0602	-0.3725	-0.1926	-0.0031	0.3732	0.4321	1.0000		
PEE	-0.0471	-0.0224	0.1776	-0.1287	-0.0272	0.2409	0.1276	0.1478	1.0000	
CC	0.0946	-0.0915	0.0404	0.0723	0.8830	-0.0239	-0.1570	-0.0313	-0.1354	1.0000

The log of GDP per person employed had the highest correlation with labour force participation rate. The correlation among the independent variables were all below 0.8 implies that there is the absence of any correlation bias.

4.1.3 Cross-Sectional Dependence Test

Cross sectional dependence which refers to the inter-dependence between observations of different groups at the same point in time is usually associated with panel data or where there are cross correlations of the errors. The existence of cross-sectional dependence may cause regression estimated coefficients to be inefficient. Therefore, it is imperative to conduct cross-sectional dependence test.

The cross-section dependence test was conducted using three methods which are the Breusch-Pagan LM test, Pesaran Scaled LM and Pesaran CD test. The results for the three methods used produced statistic that were significant at 1 percent which implies that we reject the null hypothesis of no cross-sectional dependence. The study controlled for the bias of cross-sectional dependence in all the regression models using the Feasible Generalised Least Square (FGLS) estimation method.

The results for the three methods used produced statistic that were significant at 1 percent which implies that we reject the null hypothesis of no cross-sectional dependence. Two out of the three methods employed also showed evidence of cross-section dependence bias for Models 11 and 12. Therefore the study controlled for the bias of cross-sectional dependence in all the regression models using the Feasible Generalised Least Square (FGLS) estimation method.

Table 4.2

Results of Residual Cross-Sectional Dependence Test

Models	**Breusch-Pagan LM Statistic (Prob)**	**Pesaran Scaled LM Statistic (Prob)**	**Pesaran CD Statistic (Prob)**
Model 1	604.759 (0.0000)*	21.277 (0.0000)*	12.182 (0.0000)*
Model 2	617.645 (0.0000)*	21.938 (0.0000)*	11.963 (0.0000)*
Model 3	1331.376 (0.0000)*	58.551 (0.0000)*	0.2898 (0.772)*
Model 4	1209.505 (0.0000)*	52.299 (0.0000)*	1.5832 (0.1134)*

*denote significance at 1%.

Source: Author's computation (2024)

Table 4.3

First Generation Unit Root Test

Levin, Lin & Chu (LLC)			**Im, Pesaran, Shin (IPS)**		
Variable	**Order of Integration**	**Statistic (Prob)**	**Variable**	**Order of Integration**	**Statistic (Prob)**
IGI	I (0)	3.2957 (0.0005) *	IGI	I (0)	4.523 (0.0000) *
SSE	I(0)	-2.876 (0.002) *	SSE	I(1)	7.510 (0.0000)*
PEE	I(0)	8.8621 (0.0000)*	PEE	I(1)	11.99 (0.0000) *
GCF	I(0)	5.8219 (0.000)*	GCF	I(0)	-7.0186 (0.0000) *
LFP	I (0)	3.4312 (0.0003)*	LFP	I (1)	-0.6286 (0.735)
TO	I(1)	1.2504 (0.1056)	TO	I(1)	-8.9572 (0.0000)*
RL	I(1))	-7.237 (0.000)*	RL	I(1))	-9.3755 (0.0000)*
CC	I(0)	2.094 (0.0181) **	CC	I(1)	-10.4446 (0.0000)*

* and **, denote significance at 1% and 5% respectively.

Source: Author's computation (2024)

Table 4.4:
Second Generation Unit Root Test with Cross-Sectional Dependence

Bai and Ng-PANIC Unit Root Test			
Variable	**Statistic**	**Prob**	**Order of Integration**
LIGI	2.123**	0.033	1 (0)
Δ LIGI	2.03**	0.042	1 (1)
LGDPPPE	6.862*	0.0000	1(0)
Δ LGDPPPE	6.973*	0.0000	1(1)
GCF	2.842*	0.0045	1(0)
Δ GCF	2.647*	0.0081	1(1)
LFPR	+/-inf*	0.0000	1(0)
Δ LFPR	+/-inf*	0.0000	1(1)
TO	+/-inf*	0.0000	1(0)
ΔTO	+/-inf*	0.0000	1(1)
CC	+/-inf*	0.0000	1(0)
ΔCC	+/-inf*	0.0000	1(1)
RL	2.922*	0.0035	1(0)
ΔRL	2.887*	0.0039	1(1)
SSE	+/-inf*	0.0000	1(0)
Δ SSE	+/-inf*	0.0000	1(1)
PEE	3.792*	0.0002	1(0)
Δ PEE	3.855*	0.0001	1(1)

*and ** denote the statistical significance at 1% and 5% respectively.
Source: Author's Computation (2024)

4.1.4 Unit Root Test
The study conducted the unit root test in order to test for the stationarity of the variables.
The first-generation unit root was conducted using both the Levin, Lin & Chu (LLC) and Im, Pesaran, Shin (IPS) methods. The results are presented Table 4.5. However, due to the presence of cross-sectional dependence bias, there is the need to conduct a second-generation unit root test in order to control for the bias.

4.1.5. Second Generation Unit Root Test with Cross-Sectional Dependence

The second-generation unit root test was conducted to test for the stationarity of the variables with the presence of cross-sectional dependence. The test was conducted using the Bai and Ng-PANIC unit root test method. The results are presented in Table 4.6. The results showed that all the variables were stationary at level. Therefore, the study employed the feasible generalized least square estimation method which controls for the established cross-sectional dependence problem. The feasible generalized least square estimator also controls for heteroskedasticity and autocorrelation issues.

4. Results and Discussion of finding

4.1. Effect of Human Capital Development on Inclusive Growth Index

This study examined the effect of human capital development (education dimension) on the log of Inclusive Growth Index. The results for model 1 showed that the two measures of education which are secondary school enrolment and public expenditure on education had a positive and significant effect on the log of inclusive growth index. Therefore, an increase in both

secondary school enrolment rate and public expenditure on education caused the log of inclusive growth index to increase by 0.18 and 3.34 percent respectively.

Gross capital formation had a positive and significant effect on the log of inclusive growth index. This implies that an increase in Gross capital formation by caused the log of inclusive growth index to increase by 0.03 percent. Labour force participation rate had a negative and significant effect on the log of inclusive growth index, this means that an increase in Labour force participation rate caused the log of inclusive growth index to decline by 0.15 percent. Trade openness had a positive and significant effect on the log of inclusive growth index, this implies an increase in trade openness caused the log of inclusive growth index to increase by 0.01 percent. Control of corruption had a positive and significant effect on the log of inclusive growth index, the implies an increase in control of corruption caused the log of inclusive growth index to increase by 3.82 percent.

The results for model 2 showed that secondary school enrolment had a positive and significant effect on the log of inclusive growth index. Therefore, an increase in secondary school enrolment rate caused the log of inclusive growth index to increase by 0.16 percent, also public expenditure on education had a positive and significant effect on the log of inclusive growth index. An increase in public expenditure on education caused the log of inclusive growth index to increase by 0.25 percent.

Gross capital formation had a positive and significant effect on the log of inclusive growth index. This implies that an increase in Gross capital formation caused the log of inclusive growth index to increase by 0.03 percent. Labour force participation rate had a negative and significant effect on the log of inclusive growth index, this means that an increase in Labour force participation rate caused the log of inclusive growth index to decline by 0.23 percent. Trade openness had a positive and significant effect on the log of inclusive growth index, this implies an increase in trade openness caused the log of inclusive growth index by 6.8 percent. Rule of law had a positive and significant effect on the log of inclusive growth index, the implies an increase in rule of law caused the log of inclusive growth index to increase by 6.4 percent.

Table 4.5

Estimates of Effect of Human Capital Development (Education Dimension) on Inclusive Growth Index

Variable	**Model 1**	**Model 2**
	Coefficient (t-Statistic)	**Coefficient (t-Statistic)**
GCF	0.0003 (12.164)*	0.0003 (12.742)*
LFPR	-0.0015 (-12.255)*	-0.0023 (-20.788)*
TO	0.0001 (3.0879)*	6.87 (1.99)**
CC	0.0382 (19.729)*	-
RL	-	0.064 (36.645)*
PEE	0.3348 (339.787)*	0.0025 (20.354)*
SSE	0.0018 (16.6097)*	0.0016 (24.148)*
Adjusted R-squared	0.849	0.9026
F-Statistic (Prob)	412.445 (0.0000)	669.061 (0.0000)

*and ** denote significance at 1% and 5% respectively.

Source: Author's Computation (2024)

Table 4.6

Estimates of Effect of Human Capital Development (Education Dimension) On GDP Per Person Employed

Variable	**Model 3**	**Model 4**
	Coefficient (t-Statistic)	**Coefficient (t-Statistic)**
GCF	0.0689 (4.623)*	1.43 (67.37)
LFPR	-0.0446 (-313.77)*	-0.045 (-335.699)*
TO	-0.006 (-17.175)*	-0.0005 (-10.823)*
CC	0.211 (79.884)*	-
RL	-	0.1628 (82.005)*
PEE	-0.001 (-9.049)*	-0.0029 (-17.33)*
SSE	0.0167 (259.04)* 0.0000	0.0165 (208.461)* 0.0000
Adjusted R-square	0.9988	0.9994
F-statistic (Prob)	60104.13* (0.0000)	126856.8* (0.0000)

*and **, denote significance at 1% and 5% respectively.
Source: Author's Computation (2024)

4.2. Effect of Human Capital Development Gross Domestic Product Per Person Employed

This study examined the effect of human capital development (education dimension) on the log of GDP per person employed. The results for model 3 showed that secondary school enrolment had a positive and significant effect on the log of gross domestic product per person employed. Therefore, an increase in secondary school enrolment rate caused the log of GDP per person employed to increase by 1.67 percent. Public expenditure on education had a negative and significant effect on the log of GDP per person employed. Therefore, an increase in public expenditure on education caused the log of GDP per person employed to decline by 0.1 percent. Therefore, despite the improvement in public expenditure on education the growth of output was not necessarily inclusive.

Gross capital formation had a positive and significant effect on the log of GDP per person employed. This implies that an increase in Gross capital formation caused the log of GDP per person employed to increase by 6.9 percent. Labour force participation rate had a negative and significant effect on the log of GDP per person employed, this means that an increase in Labour force participation rate caused the log of GDP per person employed to decline by 4.46 percent. Trade openness had a negative and significant effect on the log of GDP person employed. This implies that an increase in trade openness caused the log of GDP per person employed to decline by 0.06 percent. Control of corruption had a positive and significant effect on the log of gross domestic product per person employed, the implies that an increase in control of corruption caused the log of GDP per person employed to increase by 21.13 percent.

The results for model 4 showed that secondary school enrolment had a positive and significant effect on the log of gross domestic product per person employed. Therefore, an increase in secondary school enrolment rate caused the log of gross domestic product per person employed to increase by 1.65 percent. Public expenditure on education had a negative and significant effect on the log of gross domestic product per person employed. Therefore, an increase in public expenditure on education caused the log of gross domestic product per person employed to decline by 0.29 percent. Therefore, despite the improvement in public expenditure on education the growth of output was not necessarily inclusive.

Labour force participation rate had a negative and significant effect on the log of gross domestic product per person employed, this means that an increase in Labour force participation rate caused the log of gross domestic product per person employed to decline by 4.6 percent. Trade openness had a negative and significant effect on the log of gross domestic product per person employed, this implies an increase in trade openness caused the log of gross domestic product per person employed to decline by 0.046 percent. Rule of law had a positive and significant effect on the log of gross domestic product per person employed, the implies an increase in rule of law caused the log of inclusive growth index to increase by 16.28 percent.

4.3 Discussion of finding

Effect of Human Capital Development on Inclusive Growth Index

This study estimated the effect of human capital development (education dimension) on inclusive growth index. The findings showed that human capital development had a positive effect on inclusive growth index for the case of education when controlled for corruption as well as when controlled for the rule of law. Therefore, improving the enrolment rate in secondary schools such that the educational attainment of the SSA population is at least a secondary school education was important for increasing inclusive growth. The result is similar to **Neeliah (2015), Oluwadamilola (2018)** and **Hasyyati (2020)** which also found a positive significant effect of secondary school enrolment on inclusive growth.

In addition, increasing public expenditure on education significantly contributed to achieving inclusive growth. **Liao (2019), Rodionou (2018)** and **Oluseye (2017)** which also found a positive and significant effect of public expenditure on education.

The labour force participation rate had a negative and significant effect when control of corruption was controlled for, however, the effect was positive when the rule of law was rather controlled for. Therefore, there is the need to increase the opportunities for more of the working population to participate in the labour force in order to achieve inclusive growth provided corruption reduces. This is contrary to **Mujahid (2012)** and **Muhammad (2020)** that found a positive effect. Other variables such as gross fixed capital formation and control of corruption had a positive and significant effect on the inclusive growth index.

4.4 Effect of Human Capital Development on Gross Domestic Product Per Person

This study estimated the effect of human capital development (education dimension) on GDP per person employed. The finding showed that human capital development had a negative effect on GDP per person employed for the case of public expenditure on education when controlled for corruption as well as when controlled for the rule of law. An increase in public expenditure on education caused GDP per person to decline. The result was contrary to **Liao (2019)** and **Oluseye (2017)** which found a positive significant effect of secondary school enrolment rate on inclusive growth. Therefore, emphasis should be placed on reducing corruption and strengthening the rule of law in SSA in order to avert the negative of increased public expenditure on education on GDP per person employed. In order to achieve inclusive growth, there is the need to not only increase public expenditure on education but also reduce corruption levels and strengthen rule of law. In addition, improving the enrolment rate in secondary schools such that the educational attainment of the SSA population is at least a secondary school education was important for increasing inclusive growth.

The labour force participation rate had a negative and significant effect when control of corruption was controlled for, however, the effect was positive when the rule of law was rather controlled for. Therefore, there is the need to increase the opportunities for more of the

working population to participate in the labour force in order to achieve inclusive growth provided corruption reduces. This is contrary to **Mujahid (2012)** and **Muhammad (2020)** that found a positive effect. Other variables such as gross capital formation and control of corruption had a positive and significant effect on the GDP per person employed this is consistent with **Uzawa (1965)** and **Lin (2004)** growth theories.

In summary, the study showed that human capital development (education dimension) had a consistently positive effect on the log of inclusive growth index and log of GDP per person employed for the case of Secondary school enrolment rate, when corruption was controlled for, as well as when controlled for the rule of law. Public expenditure on education had a positive effect on both the log of inclusive growth index and when controlled for corruption and rule of law. However, the effect was negative on the log of GDP per person employed.

5. Summary and conclusion

The study investigated the impact of human capital development, specifically focusing on secondary school enrollment rate and public expenditure on education, on the inclusive growth index and GDP per person employed. Results indicated that both secondary school enrollment rate and public expenditure on education positively and significantly influenced the inclusive growth index, albeit with varying effects when controlling for corruption or the rule of law. Secondary education attainment was emphasized as crucial for achieving inclusive growth, alongside the importance of corruption-free government spending directed towards skill development and vocational training. Recommendations included improving secondary school enrollment through scholarship programs, fee waivers, and infrastructure development, especially in rural areas, to ensure equitable access to education and foster inclusive economic growth. These strategies aim to address the challenges faced by Sub-Saharan African countries in enhancing education access and promoting inclusive development.

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