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Economic Freedom and Government Spending on Education in Sub-Saharan Africa (SSA) Countries

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Abstract

The extent to which countries are economically free varies across countries. The size of government spending on education in Sub-Saharan Africa is comparatively low when compared with developed economies. Evidence showed that SSA had the lowest efficiency rate of government spending on education. However, the effect of government spending on education has been economically unproductive. This study investigated the effect of economic freedom on government spending on education in SSA. In order to effectively establish the relationship which connects economic freedom and government spending on education in SSA, annual time series data which spanned the period 1995 – 2020 for twenty (20) selected countries in SSA was employed. For ease of analysis, Panel unit root test and Pedroni Co-integration tests were conducted to establish the order of integration and ascertain the long run movement of the variables in the model. The Pooled Mean Group (PMG) estimator was used to provide both the short-run and long-run estimates. Empirical findings revealed that in the long run using the Wald test indicated that trade freedom significantly explained changes in government spending on education in the long-run $F(7, 500) = 7.794$, $p < 0.05$). The study concluded that opening up the educational sector in SSA will boost private and public investment. Therefore, the government needs to promote healthy competition by increasing the efficiency rate of spending on education in order to improve human capital investment in SSA.

1. Introduction

Budgetary spending on education is considered a priority in most of the developed economies thereby, yielding tremendous breakthroughs in science, engineering, innovation and technology (Nezhnikova (2020); Eze, Asogwa, Obetta, Ojide and Okonkwo, 2020). The reverse is the case when compared with Sub-Saharan African (SSA) countries where the size of budgetary spending on education is comparatively low. Most of the governments in SSA spent less than the United Nation's recommendation of 26% of the national budget of various member countries (UNESCO, 2015). In 2020, governments in SSA spent 21% of their budgetary allocation to education on tertiary schools, compared to 27% spent on secondary schools and 43% on primary education. These narratives point to the fact that tertiary education (which ought to provide the solid foundation of the 'incubator' producing human capital needed to provide cutting edge transformational values to the domestic and international labour markets) was poorly funded (Ebi and Ubi, 2017). Hence, there was a wide gap between the 'town and the gown'. For example, the gross tertiary school enrolment rate in SSA in 1980 was estimated as 2.1% and this rate only grew slowly to 9.4% in 2019. Specifically, the gross female tertiary school enrolment rate rose from 1.5% in 1980 to 8.2% in 2019 while the gross male enrolment rate rose from 2.7% in 1980 to 10.6% in 2019 (UNESCO 2021). The pattern of government spending on education in sub-Saharan Africa is extremely low and inconsistent. For example, in 2000, the ratio of government spending on education to nominal GDP stood at 2.8% in SSA. It rose to 3.4% in 2001; fell to 3% in 2002; rose again to 3.5% in 2005. As a result of the global economic meltdown, it fell back to 3.2% in 2008. By 2010, after the global economic recovery, the rate of government spending on education in SSA averagely rose to 3.7% of the GDP; fell again in 2012, then rose to 4.1% in 2014 as a result of adoption of the United Nations Development Programme (UNDP)'s Sustainable Development Goals (SDGs). However, this average fell again to 3.5% in 2019 due to the outbreak and wide spread of the Corona virus epidemic, which affected the global economy, particularly the education sector, as sub – Saharan Africa region was not spared of the devastating effect of COVID 19 (UNESCO, 2020). Unfortunately, sub-Saharan African governments spent about 5% of their GDP on education (World Bank, 2020; Lewin (2020).

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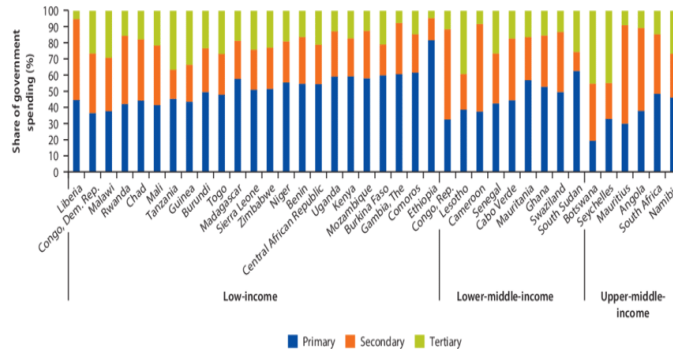
Figure 1: Share of government spending at different level of education in SSA

It is therefore a common knowledge that provision of educational services by the government has been constrained by the availability of budgetary funds. Many sub-Saharan African countries have weak internal resource collection mechanism to harness public funds to adequately finance education at all levels, particularly higher education. This is due to the unpredictable nature of macroeconomic growth performances, high debt levels, poor tax administration, and large informal sectors, several SSA countries found it extremely challenging to raise public revenue. SSA nations that were somewhat economically stable performed well in terms of revenue collection, although many of them had domestically generated income that was less than 20% of GDP (UNESCO, 2020).

While some African countries met at least one of the two education-financing targets, only 46 percent met both targets, 2010-2017 (ADB, 2020). The effect of government spending on education in sub-Saharan Africa was inconsistent over time. For example in 2010, the percentage of government expenditure per secondary school student to GDP in sub-Saharan Africa was estimated at 27.9%. In 2011, this rate rose to 3% approximately. In 2013, there was a drastic fall in this rate to 26.6% and marginally increased to 26.8% in 2014 (UNESCO, 2020).

Economic freedom, on the other hand is a means to end poverty, uncertainty and hardship across the world. It amounts to reduction in poverty and savings, business investment, job security, high level of literacy and life expectancy and other numerous essential functionalities that are made to affect the economy and the living standards of the general populace. Economic freedom is not only been freed in terms of internal performance of a state but the ability to see beyond, to have freedom on the major demonstrable aspects of the factors that make the society to have qualitative performance and enabling influence and results in the society, which can only be solved as a result of systematic, functional nation.

The objective of this study is to examine the effect of economic freedom on government spending on education amongst low-income, middle-income and high-income SSA countries. This objective will answer the question of whether the size of government spending on education is significantly explained by the level of economic freedom in SSA. Hence, the study is of great significance to governments in SSA and policy makers as it will re-direct the pattern of government spending on education in SSA. There were plethora of studies that investigated the relationship between economic freedom and economic growth in one or a few selected countries, while other researches focused on economic freedom and foreign direct investment; economic freedom and corruption; economic freedom and inequality; economic freedom and poverty, etc. However, to the knowledge of this study few studies have examined the effect of economic freedom on government spending on education (Feldmann, 2021; Hanushek and Woessmann, 2012; Woessmann, 2016).

The reminder of this study was organized as follows: section 2 discussed the review of empirical literature; section 3 presented the data and empirical model; section 4 discussed the findings of the study and section 5 provided the conclusion and recommendations.

2. Literature Review

The World Economic Forum started talking about economic freedom in an effort to achieve global economic

recovery from the destructive effects of economic shocks. As economic freedom indexes and data have been published by several research institutes, like the Frasier Institute, Heritage Foundation, and other research Bodies, discussions on economic freedom have experienced a significant transition (Gwartney, Lawson and Hall, 2012; Miller and Kim, 2015). As a result, the vast amount of data obtained on several nations on various continents has been of immense significance since it has given some foundation for addressing the central question posed by Adam Smith in the 17th century: Why are some nations more economically prosperous than others?

According to Amakom (2016), government spending on education strongly explains economic performance more in developed nations than in sub-Saharan African economies. Education is a long-term investment that needs consistent, adequate funding, as stated by Archer (2017). That is not an instantaneous, short-term victory. The largest gains from investing in education take ten or more years to materialize (when a child completes his or her education and contributes his or her knowledge, skills and abilities to the development of the society). It is important to highlight that the governments of many sub-Saharan African nations actually budget for and spend a sizable amount of money on education each year. But, nothing is known about how such expenditure affects schooling (Oseni, Akinbode, Adegboyega and Babalola, 2020).

Moreover, UNESCO (2011) stated that some SSA nations had had a greater increase in public education spending as a percentage of GDP than others. It was found that 18 of the twenty-eight Sub-Saharan African nations for which statistics were available increased the share of GDP devoted to public education spending. Burundi saw the biggest rise, going from 3.2% to 8.3% of GDP in public education spending. As a result, government spending on education increased at a quicker rate than GDP growth. With an increase of 11.4% to 12.4% during the same period, Lesotho continued to have the highest level of public educational spending relative to GDP, with real public education spending growing by 1.9% annually. In contrast, statistics from eleven of the twenty-eight SSA nations showed a decline in the percentage of their GDP that was allotted to education. The majority of the other Sub-Saharan African nations, however, frequently face financial challenges that make it difficult to expand infrastructure and offer free basic education. Thus, this study looked into how economic freedom affected government spending on education (GSON).

Kolawole (2016) investigated the nexus between government spending and inclusive growth relationship in Nigeria. He asserted that government spending on health, economic freedom, public resource use and real GDP growth rate had significant positive influence on inclusive growth in Nigeria while governments spending on education do not have significant positive effect on inclusive growth. However, Babalola, Isiaq, Salami and Saliu (2020) examined the relationship between government spending and school enrolment in SSA and they found that government spending on education had significant and positive effect on primary school enrolment in SSA

Zaman, Saleem, Ahmad, and Khan (2017) investigated the effects of some economic freedom indicators on higher education reforms in selected South Asian Association of Regional Cooperation (SAARC) countries. They asserted that 'freedom from corruption' increased government spending on higher education and literacy rate in Bangladesh while trade freedom, property rights, financial development and government spending increased tertiary school enrolment in India.

Feldmann (2021) further examined economic freedom and people's regard for education using data on 48 countries, found that people in economically freer countries care more about education than those in 'mostly unfree' and 'repressed' economies. The study suggested that inadequate education portends the most serious problem for 'mostly unfree' and 'repressed' countries, as parents worry about their inability to give their children quality education. Thus, Feldmann, (2021)concluded that human capital investment is enhanced when government spends on education at all levels. Hence, this paper examined the effect of economic freedom on government spending on education in SSA.

3. Methodology

The required data for the government spending on education were sourced from the World Development Indicators (WDI) while economic freedom measures are sourced from the Economic Freedom Index, published by the Heritage Foundation in 2021. Based on data availability, the study concentrated on twenty (20) SSA countries. These countries include: Namibia, Botswana, Gabon, Mauritius, Equatorial Guinea, South Africa, Nigeria, Ghana, Kenya, Senegal, Eswatini, Lesotho, Togo, Rwanda, Uganda, Tanzania, Ethiopia, Burkina Faso, and Benin. These

countries were also selected based on their living standards and cost of economic welfare. The study used data from 1995 to 2021.

This study adopted the endogenous growth theory on the basis of the claim that the strength of a country's human capital has a significant impact on its capacity for economic growth (and, by extension, economic freedom). Furthermore, the amount of money invested in education can have an impact on how economically free a nation is. As a result, investing in education is considered a key component of human capital. Although the endogenous growth theory can be considered a growth theory in general, the application of this theory also has relevance on the discussion of economic freedom and education. The endogenous growth theory is relevant to this study because it emphasizes the fact that economically free countries develop to the extent of their freedom from internal variables that strengthen their systems and processes rather than from external (exogenous) forces of economic development. These endogenous variables include the effectiveness of governmental programs that strengthen the capacity of the healthcare system, the educational system, the food standards, and domestically produced economic activities that support education.

The definitions of the variables used in this study are summarized in Table 1:

Table 1: Definitions and Sources of Variables

Variables	Notation	Description	Sources
Government Spending on Education	GSON	Government Spending on Education by the budgetary allocation to education in the various countries within the SSA.	World Development Indicators
Trade Freedom	TF	Trade freedom is a composite measure of the extent of tariff and nontariff barriers that affect imports and exports of goods and services. It is measured on a scale of 0 (lowest) to 100 (highest) based on two inputs as follows: the trade-weighted average tariff rate and nontariff barriers (NTBs)	The Heritage Foundation
Property Rights	PR	Property rights component assesses the extent to which a country's legal framework allows individuals to accumulate private property freely, secured by clear laws that the government enforces effectively. Relying on a mix of survey data and independent assessments, it provides a quantifiable measure of the degree to which a country's laws protect private property rights and the extent to which those laws are respected. It also assesses the likelihood that private property will be expropriated by the state. It is measured on a scale of 0 (lowest) to 100 (highest)	The Heritage Foundation
Tax Burden	TB	Tax burden is a composite measure that reflects marginal tax rates on both personal and corporate income and the overall level of taxation (including direct and indirect taxes imposed by all levels of government) as a percentage of gross domestic product (GDP). It is measured on a scale of 0 (lowest) to 100 (highest)	The Heritage Foundation
Investment Freedom	IF	The index evaluates a variety of regulatory restrictions that typically are imposed on investment. Points, as indicated below, are deducted from the ideal score of 100 for each of the restrictions found in a country's investment regime. It is not necessary for a government to impose all the listed restrictions at the maximum level to eliminate investment freedom. The few governments that impose so many restrictions that they total more than 100 points in deductions have had their scores set at zero	The Heritage Foundation

Variables	Notation	Description	Sources
Business Freedom	BF	The business freedom component measures the extent to which the regulatory and infrastructure environments constrain the efficient operation of businesses. The quantitative score is derived from an array of factors that affect the ease of starting, operating and closing a business. The business freedom score for each country is a number between 0 and 100, with 100 indicating the freest business environment	The Heritage Foundation
Government Integrity	GI	Corruption erodes economic freedom by introducing insecurity and coercion into economic relations. Of greatest concern is the systemic corruption of government institutions and decision-making by such practices as bribery, extortion, nepotism, cronyism, patronage, embezzlement and graft. The lack of government integrity caused by such practices reduces economic vitality by increasing costs and shifting resources into unproductive lobbying activities	The Heritage Foundation
Financial Freedom	FF	Financial freedom is an indicator of banking efficiency as well as a measure of independence from government control and interference in the financial sector. State ownership of banks and other financial institutions such as insurers and capital markets reduce competition and generally lower the level of access to credit	The Heritage Foundation

Hence, the model specified for this work can be stated as follows:

$$GSON_{it} = \alpha_0 + \alpha_1 TF_{it} + \alpha_2 PR_{it} + \alpha_3 TB_{it} + \alpha_4 IF_{it} + \alpha_5 BF_{it} + \alpha_6 GI_{it} + \alpha_7 FF_{it} + U_{it}.$$

Where GSON = Government Spending on Education, TF = Trade Freedom, PR = Property Rights, TB = Tax Burden, IF = Investment Freedom, BF = Business Freedom, GI = Government Integrity and FF = Financial Freedom $\alpha_0 - \alpha_7$ represents the estimates, U is the error term, and *it* is the cross section and the time series. To achieve this objective, the study examined the time series properties of the data using panel unit root test. The long-run co-integrating relationship was examined using the panel co-integration techniques and the dynamic heterogeneous panel.

The estimation process began with some pre–estimation tests, which were conducted in order to identify the type of estimation method to be used. For ease of analysis, Panel unit root test and Pedroni Co-integration tests were conducted to establish the order of integration and ascertain the long run movement of the variables in the model (Pedroni, 2004). The Pooled Mean Group (PMG) estimator was used to provide both the short-run and long-run estimates. Based on the pre-estimation test results, the panel Auto-Regressive Distributive Lag (ARDL) model of Pooled Mean Group (PMG) was employed. The cross-sectional lm, Pesaran and Shin (Pesaran, Shin and Smith (1999), a second-generation panel unit root test, was used for the unit root tests in our model to make sure these variables were stationary. Although being a first generation panel unit root test, the Levin, Lin, and Chu tests (Levin, Lin and Chu (2002) were also provided for comparison purposes.

The study examined the relationship between economic freedom and government spending on education in sub-Saharan Africa, hence the panel ARDL model was used. Panel ARDL was chosen for this study above other panel estimate approaches because it can be applied to variables with different orders of co-integration. In other words, whether the variables are all I(1), all I(0), or a combination of both, the panel ARDL can be used.

4. Results and Discussions

This section discussed the descriptive statistics, the unit root tests and the panel data regression results used to examine the effect of economic freedom on government spending on education in sub-Saharan African countries:

Table 1:   **Descriptive statistics of economic freedom and government spending on education**

Variables	Mean	Max	Min	Std. Dev.	Jarque-Bera	Prob	Obs.
GSON	4.86	13.22	1.44	2.12	127.08	0.00	520
PR	42.20	76.50	10.00	15.50	12.96	0.00	520
GI	32.65	70.00	7.00	13.78	10.99	0.00	520
TB	72.74	92.70	41.00	10.03	19.62	0.00	520
BF	57.86	85.00	26.80	11.40	8.91	0.01	520
TF	62.70	89.00	20.00	13.91	85.57	0.00	520
IF	50.25	90.00	10.00	15.00	6.37	0.04	520
FF	45.56	70.00	10.00	14.60	1.94	0.38	520

Source: Researcher`s computation

Notes: Table 1 showed the mean, maximum, minimum, standard deviation and Jarque-Bera statistic of the variables. The dependent variable is GSON – Government Spending on Education. The independent variables are Economic Freedom Index (EFI) which are proxied by the following: Trade Freedom (TF), Property Right (PR), Tax Burden (TB), Investment Freedom (IF), Business Freedom (BF), Government Integrity (GI), and Financial Freedom (FF). All the values were calculated from the 520 country-year observations for twenty sub-Saharan African countries. The estimation process was facilitated using E-Views 10.

From Table 1 above, the average amount spent by the government on education was 4.86 with a standard deviation of 2.12 of the selected sub-Saharan African countries, which indicated that it was poor. This indicated that there was less fluctuation in government spending on education over time. Different amounts of government spending on education may be seen in the sub-Saharan African nations that were chosen, with a minimum value of 1.44 and a maximum value of 13.22.

These samples showed further that while some sub-Saharan African countries have high government spending on education, others have low government spending on education. The Jarque-Bera statistic of government spending on education was 127.08 while its probability was 0.00. This implied that the data for government spending on education in SSA was not normally distributed.

PR: The mean value of property right is 42.20, and the standard deviation is 15.50. The selected sub-Saharan African countries' property rights appear to be below average, as indicated by the mean value of 42.20. The 15.50 standard deviation indicates that the property was dispersed from the mean to approximately 15.50. Because the standard deviation value deviated greatly from the mean, it was possible that the property right could alter over time. The selected sub-Saharan African countries have varying degrees of property rights, as seen by the minimum value of 10.00 and the greatest value of 76.50. It was also inferred that while some of the sub-Saharan African countries in the sample had strong property rights, others had lower property rights. The Jarque-Bera statistic of Property right was 12.96, but its probability was 0.00. This suggested that the distribution of the data for property rights in the SSA was not random.

GI: With a mean of 32.65 and a standard deviation of 13.78, government integrity was measured. The level of transparency and good governance of the selected sub-Saharan African countries appeared to be less on the average, according to the mean value of 32.65. The government integrity dispersed from the mean to around 13.78, according to the standard deviation of 13.78. As a result, the standard deviation number was significantly above the mean, indicating that the government's integrity may change over time. The minimum and maximum values of the selected sub-Saharan African countries showed that there are wide variations in the level of government integrity amongst the selected SSA countries.

The Jarque-Bera statistic of government integrity was 10.99 while its probability was 0.00. This implied that the data for government integrity in SSA was not normally distributed. This emphasized even more that while some of the sub-Saharan African countries included in the sample had high government integrity, others did not.

TB: The mean tax burden was 72.74, while the standard deviation was 10.03. The selected sub-Saharan African countries' average tax burden was higher than average, as indicated by the mean value of 72.74. The tax burden was dispersed from the mean to around 10.03, according to the standard deviation of 10.03. Inferring that the tax

burden was subject to change over time, the standard deviation was distant from the mean. It was clear from the minimum value of 41.00 and the maximum value of 92.70 showed that the tax burdens in the chosen sub-Saharan African countries varied widely.

The Jarque-Bera statistic of tax burden was 19.62 while its probability was 0.00. This implied that the data for tax burden in SSA was not normally distributed. Hence, there is high level of variation in the size and magnitude of the tax burden imposed in the selected sub-Saharan African countries.

BF: With a mean of 57.86 and a standard deviation of 11.40, business freedom was measured. The selected sub-Saharan African countries' business freedom was suggested to be above average by the mean score of 57.86. The means score for Business freedom was shown to be dispersed to around 11.40 by the standard deviation of 11.40. As a result, the standard deviation number was very different from the mean, indicating that business freedom could alter change time in the selected SSA countries.

The selected sub-Saharan African nations have varying degrees of commercial freedom, as evidenced by the minimum value of 26.80 and the maximum value of 85.00. Most importantly, it suggested that while some of the sub-Saharan African nations included in the sample enjoyed great commercial freedom, others did not. The Jarque-Bera statistic of business freedom was 8.91 while its probability was 0.01. This implied that the data for tax burden in SSA was not normally distributed.

TF: With a mean of 62.70 and a standard deviation of 13.91, trade freedom was measured. The selected sub-Saharan African countries appeared to have above-average trade freedom, as indicated by the mean value of 62.70. The trade freedom from the mean was dispersed to around 13.91, according to the 13.91 standard deviation. As a result, the standard deviation number was very different from the mean, indicating that trade freedom could alter over time.

The selected sub-Saharan African countries have varying degrees of trade freedom, as seen by the minimum value of 20.00 and the maximum value of 89.00. It was also inferred that some of the sub-Saharan African countries included in the sample had high trade freedom while others had poor trade freedom in terms of market openness, access to loanable funds and regulatory efficiency of businesses. The Jarque-Bera statistic of trade freedom was 85.57 while its probability was 0.00. This implied that the data for trade freedom in SSA was not normally distributed.

IF: The mean and standard deviation for investment freedom were 50.25 and 15.00, respectively. The selected sub-Saharan African countries' average investment freedom was 50.25, which indicated that it was above average. The investment freedom was dispersed from the mean to around 15.00, according to the standard deviation of 15.00. This inferred that the investment freedom was subject to fluctuate over time in most of the selected SSA countries.

The sub-Saharan African nations that were chosen have varying degrees of investment freedom, as indicated by the minimum value of 10.00 and the maximum value of 90.00. Most importantly, it suggested that while some of the sub-Saharan African nations included in the sample enjoyed substantial investment freedom, others did not. Also, the Jarque-Bera statistic of investment freedom was 6.37 while its probability was 0.04. This implied that the data for tax burden in SSA was not normally distributed.

FF: The average level of financial freedom was 45.56, with a standard deviation of 14.60. The selected sub-Saharan African countries' average financial freedom was 45.56, which indicated that it was below average. Hence, functional and effective banking systems were not prevalent in most of the SSA countries selected. The 14.60 standard deviation indicated a dispersion of financial independence from the mean to approximately 14.60. As a result, the standard deviation number was very different from the mean, indicating that financial independence could alter over time.

With a minimum value of 10.00 and a maximum value of 70.00, the sub-Saharan African nations that were chosen have varying degrees of financial freedom. This showed even further that while some of the sub-Saharan African countries included in the sample had high financial freedom, others did not. The Jarque-Bera statistic of financial freedom was 1.94 while its probability was 0.38. This implied that the data for tax burden in SSA was normally distributed.

Table 2: Panel Unit Root Tests (1995-2021) for twenty sub-Saharan African Countries

Variables	LLC	IPS	ADF	PP	Remarks
BF	-0.101	-0.036	38.419	36.281	
ΔBF	-8.883***	-10.246***	179.093***	338.931***	I(1)
FF	0.015	-0.618	5.104	6.786	
ΔFF	-8.076***	-11.396***	159.001***	263.459***	I(1)
GI	-1.153	-1.724	6.629	11.876	
ΔGI	-10.946***	-12.396***	220.109***	351.212***	I(1)
GSON	0.989	-1.009	5.958	1.237	
ΔGSON	-7.320***	-13.427***	232.736***	389.848***	I(1)
IF	2.248	2.203	19.154	37.739	
ΔIF	-5.934***	-8.213***	135.809***	310.276***	I(1)
PR	2.937	2.488	11.456	34.308	
ΔPR	-9.343***	-10.684***	196.075***	268.016***	I(1)
TB	0.077	-0.553	49.225	28.469	
ΔTB	-8.097***	-9.713***	169.171***	328.508***	I(1)
TF	-1.024	-2.449**	78.951**	83.371**	I(0)
ΔTF	-10.591***	-13.361***	237.827***	414.679***	

Source: Researcher`s computation

Notes: Table 2 showed the panel unit test. The variables are: Adult Literacy Rate (ADR), Secondary School Enrolment Rates (SSE), Tertiary School Enrolment Rates (TSE), Female Secondary School Enrolment Rates (FSSE), Life Expectancy (LEXP), and Government Spending on Education (GSON), Trade Freedom (TF), Property Right (PR), Tax Burden (TB), Investment Freedom (IF), Business Freedom (BF), Government Integrity (GI), and Financial Freedom (FF). All the values were calculated from the 520 country-year observations for twenty sub-Saharan African countries. The estimation process was facilitated using E-Views 10.

*, **,and *** indicated 10, 5, and 1 per cent level of significant.

The unit root test results reported in Table 2 showed that Government Spending on Education (GSON), Property Right (PR), Tax Burden (TB), Investment Freedom (IF), Business Freedom (BF), Government Integrity (GI), and Financial Freedom (FF) were stationary in their first differences I(1) except for Trade Freedom (TF) which was stationary at levels I(0). Arising from the panel unit root test where there was mixed order of integration, thus the use of Panel ARDL methodology as appropriate for this study.

Table 3: Economic freedom and government spending on education in sub-saharan African

Pedroni Residual Panel Co-integration Test		
Statistic	t-statistics	Prob
Panel PP-Statistic	-10.815	0.000
Panel ADF-Statistic	-10.434	0.000
Group PP-Statistic	-11.254	0.000
Group ADF-Statistic	-9.307	0.000

Source: Researcher`s computation

Thus, the study examined the long-run co-integrating relationship between economic freedom and government spending on education using four different versions of Pedroni residual co-integration test. The results in Table 3 showed that the null hypothesis of no co-integration was rejected at the 1% significance level. Thus, there was evidence of a long-term equilibrium between economic freedom and government spending on education of selected

sub-Saharan African countries. The result was in conformity with the studies of Woessmann (2012); Hanushek and Woessmann (2015); Feldmann (2021).

Table 4:   Panel pooled mean group for economic freedom and government spending on education

Dependent variable: government spending on education (GSON)

Panel A: Long-Run Estimates				
Variable	Coefficient	Std. Error	t-Stat	Prob
TF	0.040	0.013	3.108	0.002
PR	-0.010	0.013	-0.723	0.470
TB	0.014	0.015	0.933	0.351
IF	0.005	0.011	0.435	0.664
BF	-0.018	0.017	-1.067	0.287
GI	-0.012	0.016	-0.711	0.477
FF	-0.001	0.009	-0.154	0.877
Panel B: Short-Run Estimates				
Variable	Coefficient	Std. Error	t-Stat	Prob
C	1.095	0.369	2.964	0.003
D(TF)	-0.007	0.018	-0.385	0.700
D(PR)	-0.035	0.032	-1.100	0.272
D(TB)	-0.021	0.047	-0.447	0.655
D(IF)	-0.014	0.024	-0.601	0.548
D(BF)	-0.034	0.024	-1.465	0.144
D(GI)	0.000	0.023	0.014	0.989
D(FF)	-0.035	0.035	-0.993	0.321
ECM	-0.641	0.055	-11.694	0.000
Panel C: Diagnostic test	Statistic	Prob.		
Wald Test	7.794	0.000		

Source: Researcher`s computation

Notes: Table 4 reported the Pooled Mean Group (PMG) regression results of the effects of economic freedom on government spending on education of Sub-Saharan Africa countries**.** The dependent variable is Government Spending on Education (GSON) and the explanatory variables are Trade Freedom (TF), Property Right (PR), Tax Burden (TB), Investment Freedom (IF), Business Freedom (BF), Government Integrity (GI), and Financial Freedom (FF). * Significant at 10%, ** Significant at 5%, *** Significant at 1%.

From the results in Panel A of Table 4, there was evidence that trade freedom, tax burden, and investment freedom have a positive relationship with government spending on education, while property right, business freedom, government integrity and financial freedom have negative relationship with government spending on education. Furthermore, there was evidence that trade freedom has significant relationship with government spending on education of the selected sub-Saharan African countries (TF = 0.040, t-test = 3.108, $p < 0.05$). This implied that trade freedom were significant factors influencing changes in government spending on education in selected sub-Saharan African countries.

In contrast, there was evidence that the government spending on education in the chosen sub-Saharan African countries did not have significant relationship with the property rights, tax burden, investment freedom, business freedom, government integrity, and financial freedom (PR= -0.010, t-test= -0.723, $p > 0.05$; TB = 0.014, t-test = 0.933, $p > 0.05$; IF = 0.005, t-test= 0.435, $p > 0.05$; BF = -0.018, t-test= -1.067, $p > 0.05$; GI = -0.012, t-test = -0.711, $p > 0.05$ and FF = -0.001, t-test= -0.154, $p > 0.05$). This implied that changes in government spending on education in the chosen sub-Saharan African countries were not significantly influenced by changes in property

rights, tax burden, investment freedom, company freedom, government integrity, or financial freedom.

According to the calculated parameters' magnitudes, a 1% increase in trade freedom, tax burden, and investment freedom will result in 0.040%, 0.014%, and 0.005% respective increase government spending on education while 1 percent increase in property right, business freedom, government integrity and financial freedom will lead to 0.010, 0.018, 0.012 and 0.001 percent decrease in government spending on education, respectively.

According to the findings in Panel B, in the short term, government spending on education has a positive but insignificant relationship with government integrity, whereas trade freedom, property rights, tax burdens, investment freedom, business freedom, and financial freedom have a negative but insignificant relationship.

Furthermore, the calculated coefficient for the ECM which is shown in Panel B of Table 2, is unfavorable and statistically significant (ECM= -0.641, t-test = -11.694, p = 0.05). his meant that throughout the course of the following year, deviations from the equilibrium path of government spending on education are adjusted by roughly 64%. In other words, the selected sub-Saharan African countries have a comparatively quick adjustment process. The Pedroni residual co-integration test, which is summarized in Table 2, indicated that there was a long-run equilibrium relationship between economic freedom and government spending on education. This was supported by the statistical significance of the ECM. The Wald chi-Square statistic of 7.794 with a probability value of 0.000 is statistically significant at 5% level; this implied that the null hypothesis which states that economic freedom has no effect on government spending on education in selected countries of sub-Saharan Africa was rejected. Hence, all things being equal, increase in the level of economic freedom positively affected government spending on education if the government is responsive in their pattern of spending.

Table 5:   Summary of findings

VARIABLE	SHORT RUN EFFECT	LONG RUN EFFECT
GSON	D(TF) = (-ve, insignificant)	TF = (+ve, significant)
	D(PR) = (-ve, insignificant)	PR = (-ve, insignificant)
	D(TB) = (-ve, insignificant)	TB = (+ve, insignificant)
	D(IF) = (-ve, insignificant)	IF = (+ve, insignificant)
	D(BF) = (-ve,insignificant)	BF = (-ve, insignificant)
	D(GI) = (+ve, insignificant)	GI = (-ve, insignificant)
	D(FF) = (-ve, insignificant)	FF = (-ve, insignificant)

Source: Researcher`s computation

The reason for the differences in the short run and long run estimates is a result of heterogeneity of some of the variables used to capture economic freedom and human capital investment in sub-Saharan African countries.

6. Conclusion and Recommendation

The study concluded that opening up the educational sector in SSA, will boost private and public investment. Therefore, the government needs to promote healthy competition by increasing the efficiency rate of spending on education in order to improve human capital investment in SSA.

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