Research article

The association between the labor force and socio-economic forces in Sub-Saharan Africa: Evidence from a VECM approach

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Abstract: Since gaining independence in the 1960s, education has dramatically increased in African nations. Immediate emphasis was placed on human resource development to advance and modernize many economic areas. As a result, education was seen as a development instrument since it produced a larger number of skilled workforces, which helped to build a critical mass of experts and specialists for economic development. In this study, we explored the association between the labor force and socio-economic forces in Sub-Saharan Africa from the period 2000 to 2020. A vector error correction model was exercised to observe the long-run and short-term cointegration between the labor force and explanatory factors such as literacy rate, economic growth, government expenditure, and progression to the secondary school level. What's more, we discerned the causality among the variables to conclude if there is a unidirectional or bidirectional relationship. The findings demonstrated that in the short run socioeconomic forces do not have any considerable impact on the labor force. Nonetheless, the long-run results revealed that economic growth and progression to the secondary education level have a positive impact on the labor force. Whilst, the Sub-Saharan African government's expenditure presented a negative impact on the labor force. Last but not least, the literacy rate exhibited an insignificant impact which suggests how inconsequential the literacy rate is to determine the labor force in Africa. Further, the findings will assist managers, scholars, and lawmakers in identifying the appropriate types of measures required in their fields of expertise or countries of interest in order to capitalize on the labor force and upgrade the current policies and reforms concerning the workforce, employment, and job market.

Keywords: Labor Force, Sub-Saharan Africa, socio-economic forces, Education Access, VECM model.

JEL Classification: J08, I25, I28.

1. Introduction

Roughly the forty emerging nations in Sub-Saharan Africa are significantly more diversified in terms of their socioeconomic frameworks, levels of income, regulations, and achievements in comparison to the less developed nations of Asia. Some nations, like Ivory Coast and Kenya, have achieved sustainable agricultural exportation. However, while some nations successfully accomplished progress others have a long path to go. For instance, Mali and the Sahel region are majorly restricted by their insufficient resources and geographic position, which limit transportation. Additionally, highlighting these structural distinctions are the various imperial and social legacies and post-colonial theories of industrial prosperity (Bosio et al., 2021). The largely rural nature and the low rate of industrialization in Sub-Saharan Africa are prominent characteristics of the continent. Agriculture typically employs the majority of people with 60 to 90% of the labor force working in that specific sector it also accounts for about half of the overall output (Brück and d'Errico, 2019). Sub-Saharan Africa consists of generally

open economies in which the majority of the populace participates in the cultivation of agro-based exports.

Despite all of these barriers, for approximately five years from 2016 to 2020, Africa has achieved nearly five years of consistent economic development. This is an unprecedented result and a positive turnaround from the preceding five years of deterioration, which was from 2012 to 2016 (Fasih et al., 2020). The primary sources of income for the majority of African countries are the mining and petroleum industries, which also depend largely on export markets with low wages and very little beneficial impact on household consumption. Furthermore, it has not always resulted from a sequence of institutional transformation and increased productivity but rather from a continual population increase and an extension in economic output and wealth creation (Kilic et al., 2020).

From 2020 until 2050, the labor force in Sub-Saharan Africa is expected to increase systematically. The labor force populations of Asia and Latin America, on the other hand, will only grow about tenfold during this time span and will start to drop by 2050. At the end of 2050, the only significant region with an increasing labor force population is Sub-Saharan Africa. The pace of increase of the labor force population in Africa will reach a maximum of about 3% annually (Rovo, 2020). In Africa, the workforce participation level is extremely high, which indicates that a sizable share of the populace, aged 15 and over, is engaged in the labor force. Another far greater issue for Africa is the lack of quality and decent work, even though the employment levels percentage of a country's labor force that is unemployed is frequently rather high, especially in Africa. Labor force-to-population percentages are typically high, indicating that a sizable fraction of Sub-Saharan Africa's country's population is employed, nevertheless, there are frequently inadequate good-paying jobs available (Dieppe, 2021).

A sizable share of the workforce is employed in minor retail sales operations like selling things on the road or in subsistence farming. A large portion of occupation, either farming or other fields, is self-employment, usually carried out through family companies, which are more prone to be subsistence-oriented. To explain it broadly, self-employment incorporates not just the "ownership" of the operation but also actively participating, unpaid members of the families. Therefore, it is possible that the global concepts of work and unemployment do not adequately describe the actual labor working circumstance in African nations in which there is a significant focus on self-employment, family work, and farming labor (Baker et al., 2016).

In conclusion, the Sub-Saharan Africa region faces labor issues brought on by historical colonial oppression, poor economic development decisions, and poverty itself. However, we cannot overstate things; doing so prevents us from comprehending the real source of problems or remedies. Consequently, the paper examines the association that exists between the labor force and economic forces in Sub-Saharan Africa during the past 20 years. In this context, we selected a handful of factors that we believe have a prominent impact on the labor force. Among these factors, we name the literacy rate, GDP, total government expenditure, and progression to the secondary school level. To continue with the study a vector autoregressive model was performed to inspect the cointegration among the variables and if each factor in the model is a linear function of its own and the other factors' previous lags. In addition to that, a granger causality test was performed to observe if the variables have a unidirectional or bidirectional association.

This article is set up in the following manner. The following subsection presents the contextual background, which includes earlier literature. The third section of the paper describes the study's methodology and provides information on the data source and model specification. The findings are presented in the fourth section, which is preceded by the last section's discussion and conclusion.

2. Background Information

Labor forces are not continental but rather regional, it is to be anticipated that the Sub-Saharan African nations with high levels of labor force expansion or very low economic development, may face significant difficulties with labor assimilation (Cleland, 2017). Numerous sizable nations in Africa have labor forces that are expanding quickly but possess limited access to education, which leads to high adolescent labor force participation rates. For instance, the workforce is expanding quickly in Niger due to the country's highest birth rates in the world, yet girls in particular have limited access to education. Only 54% of females complete middle school. Consequently, the labor force participation rate for the 15–24 age category is 61% (Assaad, 2019). The Central African Republic and the DRC are other African nations with comparable problems. In nations like South Africa, which have stable economies but reduced rates of employment growth, a separate issue arises. These nations presently have relatively high rates of youth unemployment, which suggests problems with inadequate policies to tackle unemployment. The labor market in Africa is characterized by a surplus of work searchers combating a disproportionately small number of openings. As a result, between 1995 and 2005, the overall amount of young people unemployed in Africa increased by about 30%, and the median jobless rate was projected to be a very high 19.5% in that year. Accordingly, the likelihood of unemployment among African youth is 3:1 higher than that of their elderly peers (Bloom et al., 2017).

2.1. An Outlook of the Sub-Saharan Africa Labor Force

Sub-Saharan Africa is the youngest place in the world, and boosting employment possibilities is crucial for a number of bases. Starters, 43 % of individuals below the age of 15 rely largely on their families' salaries to ensure their personal sustenance, development, and self-growth. In addition, 41% of people reside in poverty, putting their children at risk for social and physical harm as well as death due to hunger, infant illnesses, and a shortage of access to an excellent education as well as other forms of human capital development (Beegle and Christiaensen, 2019).

In order to generate sustained revenue and pave the way out of poverty, meaningful work is essential. All people in the workforce who were engaged in paid jobs or entrepreneurship for a predetermined short time, like one week or a day, are included in the definition of "employment." At first impression, the level of unemployment in Africa is no worse than anywhere, compared to numerous other locations around the world, rates are much more reasonable here. According to the ILO approach, Africa has an amazingly low official unemployment rate. For instance, from 2000 until 2017, the jobless level in Benin was not higher than 2.2%. Similarly, during that time Burkina Faso's rate of unemployment never rose beyond 5.0%. It ranged from 10% to 15%. Although the work landscape in Africa is generally highly challenging, three disadvantaged demographics face significantly greater difficulties (Casterline and Agyei-Mensah, 2017).

Theoretically, young labor is becoming a political tool. Depending on the nation, adolescents experience employment rates that are about 20 times lower than those of adults. Additionally, frustrated teenagers who have already left the job market in favor of education are not included, and the young unemployment rate could decrease without a commensurate increase in employment. What is more, the majority of Sub-Saharan African women are employed in remote regions notwithstanding the expanding urbanization (Mbaye and Gueye, 2018). Women are the main producers of food security in rural communities since they work predominantly in the food service industry. The majority of women in metropolitan region work in the informal industry, such as entrepreneurship, international trade, or the sale of farm commodities that have been partially or fully processed. The employment of women is impacted by various circumstances. The major problems are cultural and ethnic prejudices, which are frequently incorporated into social regulations and lead to racial and gender discrimination in the workplace and academic institutions. Girls typically start working 2 years earlier than males do in many nations (Chacaltana et al., 2018).

The median income for each level of schooling was cited as proof of inequality in the workforce. Males frequently make between 30% and 50% higher in comparison to female colleagues. It is also demonstrated by the difference in the unemployment rates of qualified males and females. For instance, women who graduated from universities in a country such as Burkina Faso had unemployment rates that were nearly 20% greater compared to men (Orkin et al., 2021). Additionally, research conducted in Morocco has demonstrated that some schools and families dissuade girls from enrolling in particular programs or continuing university education. But educated women spend up to a year longer looking for work than their male colleagues, and they almost invariably start with lesser wages (Klasen et al., 2021).

Africa is not unique in this. Both high- and low-income nations frequently exhibit noticeable variances in unemployment levels, with the underprivileged nations frequently having insignificant rates. 6.5% of young people are unemployed in middle-income nations in relevance with the low-income nations. The reason behind this is due to the wealth influence, when substantially better teenagers perceive the labor market to be excessively informal, they decide to forego working (potentially returning to school), whereas disadvantaged youths are forced to work (Rodrik et al., 2022).

2.2. The Hidden Link between the Government Expenditure on Education and the Labor Force

Sub-Saharan Africa's economies must train their labor force in order to better utilize the nation's limited resources and achieve a steady future. Therefore, putting money into tertiary education is crucial if a nation desires to provide people with the information and skills, they need to maintain economic transition and revolution (Monga et al., 2019). Education greatly helps the economy expand and thrive, according to studies. If schooling plays a part in enlarging and strengthening the labor market, generating jobs, and expanding Sub-Saharan Africa’s development, then it should meet labor market requirements. According to (Amin and Ntembe,2021) youngsters, communities, and industries all stand to gain significantly from spending on education in Africa: there will be more chances for occupation, a greater standard of living, and faster economic development.

Nevertheless, Sub-Saharan Africa’s education lacks the necessary financing amid the growing enrolment that exceeds funding capabilities. The decrease in state financing for higher education shows how well this means of funding is inadequate in the long and medium term. The majority of authorities are stretched to the limit and unable to meet the soaring demand for tertiary education availability within those nations (Valero and Van Reenen, 2019). The amount of money spent on education now does not allow for the degree of demand that is needed, giving trainees the necessary competencies to succeed in the job marketplace and obtain employment. The region's countries must implement budgeting policies that concentrate on the expansion of viable funding mechanisms because the issue of financing constraints is widespread in Sub-Saharan Africa (Fosu and Abass, 2019).

The rapid expansion in the middle and primary academic circles, which are the major elements of the education system, is one of the socioeconomic variables that determine development in education enrolment (Aden, 2022. A large portion of Sub-Saharan Africa's, for instance approximately 70% of the populace, is below the age of 30 years, which makes enrollment considerations crucial. Additionally, an upsurge in the populace's demand for higher education is frequently linked to things like revenue and economic growth, a revival in international competitiveness, the development of secure and solid political structures, a boost in private consumption for the potential to get meaningful employment, and an improvement in social justice (Gill and Karakulah, 2019). One important claim is that the majority of the advantages of education favor the individual. Broadly, investing in education is a form of physical capital investment that is equally important to the development of human capital. Education and training produce skills and knowledge that turn individuals into valuable human capital. As a result, gains in human capital boost productivity, which raises earnings (Isukul et al., 2019).

The majority of authorities, particularly in emerging economies, invest a sizeable sum of money in educational institutions with the overarching goal of raising the level, volume, and caliber of their human resources for better economic performance (Urhie, 2014). Numerous empirical findings indicate that most governments in emerging economies are fully in charge of funding education at both the lower and higher levels of the educational system. For instance, numerous studies have shown a long-term connection between educational spending by the government and economic development. (Musila and Belassi, 2004) demonstrated a significant and positive connection for both public spending per worker and economic development in both the long run and the short run using annual data for Uganda from 1965 to 1999.

Babatunde and Adefabi using Johansen's co-integration approach have examined the long-run relationship between education and economic growth in Nigeria. The results of their study suggest there is a long-run relationship between enrolments in primary and tertiary levels of education and the average years of schooling with output per week. The relationship between economic development and expenditure on education is causal, but not reciprocal. Additionally, (Omojimite, 2010) used time series data for the years 1980 to 2005 to conduct both the co-integration and Granger causality tests to determine whether there is a significant correlation between public spending on education and economic growth in Nigeria. The findings showed that while public spending Granger does not prevent economic growth, the opposite is true. The causality relationship also revealed that public recurrent spending on schooling and the economy's expansion are causally related in both directions. The outcome also stated that there was no causal connection found between primary school enrollment and economic growth or between public investment in education and economic advancement.

It is abundantly clear from analyses of published findings carried out in Africa and developing nations that the link between the labor force and economic advancement is contested. Some might claim it has a positive effect, while others might claim the opposite. However, a careful examination would reveal that the differences from the prior studies could be caused by the methods used, the absence of consistent data, the factors selected, the type of quantitative specification utilized, and other factors.

3. Methodology

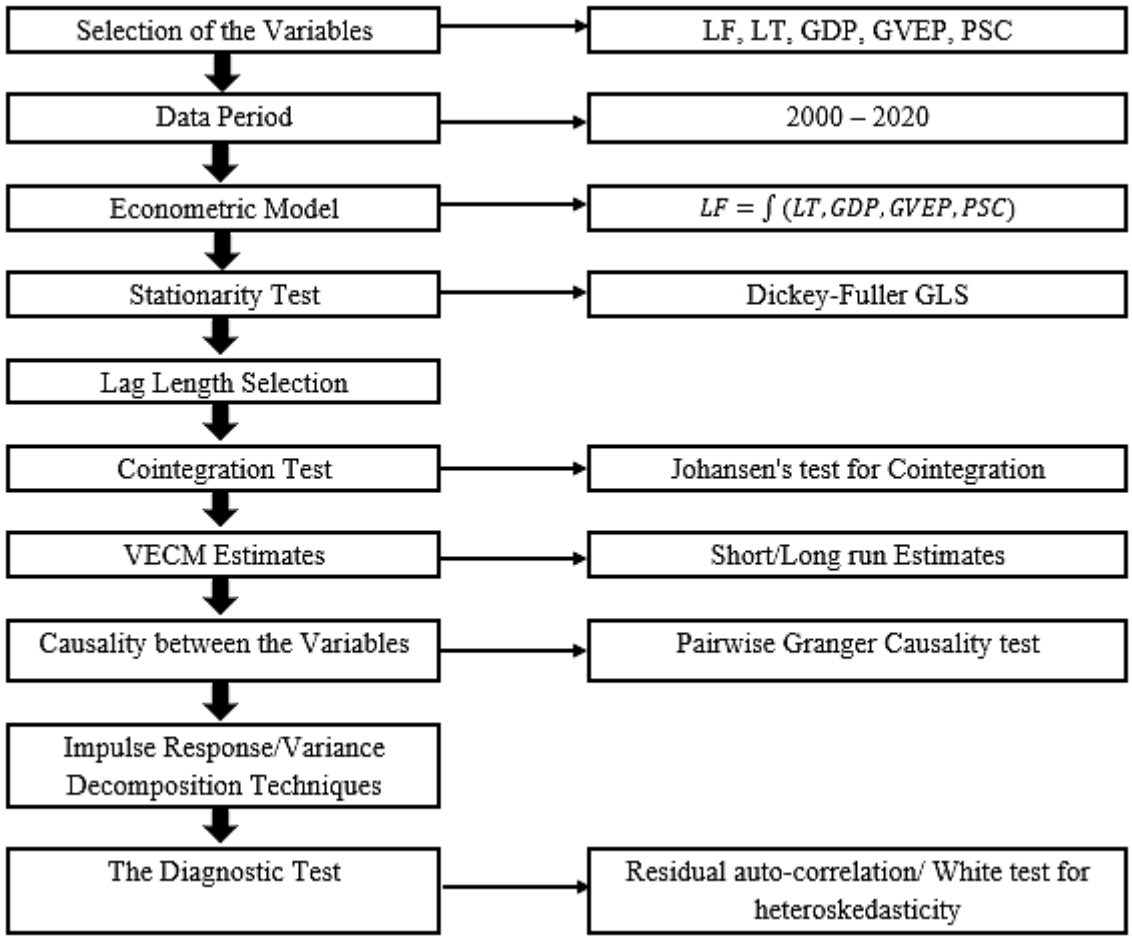
The study investigates the association between the labor force and socio-economic forces in Sub-Saharan African countries. The data are extracted from the World Bank database, particularly from aid effectiveness, economic growth, and education indicators from the period 2000 to 2020. With that in mind variables such as the labor force which is the dependent variable and explanatory variables such as literacy rate, the gross domestic product, government expenditure, and progression to secondary school are selected. In addition to that, a vector error correction model is used to assess the cointegration between the variables while the granger causality test was applied to determine the nature of causality (unidirectional or bidirectional).

Table 1. Summary of Variables

Variables	Description	Source
Years	20 years	From 2000 until 2020
Countries	Sub-Sahara African Countries	
LF	Labor force, total	World Bank Database especially from aid effectiveness, economic & growth, and education indicators.
LT	Literacy rate, adult total (% of people ages 15 and above)	
GDP	GDP (current US$)	
GVEP	Gross national expenditure (current US$)	
PSC	Progression to secondary school (%)	

3.1. Research Process

The study carefully examines the flowchart of the analytical approaches proposed by (Raihan & Tuspekova, 2022). The chart includes the entire methodological frameworks that were used in the findings part of the research to produce logical conclusions. Hence, Figure 1 provides an overview of the overall analytical chart structure.



3.2. Econometric Model

The study uses a vector error correction model to assess the cointegration between the selected variables. Besides, we will perform a granger causality test to determine the direction and the causality among the variables. The presence of cointegration in the VECM model suggests that the VECM is known as a restricted VAR. In proportion to the assumption that needs to be satisfied the underlying premise is that all variables must be stationary in the same direction or magnitude, specifically in the first difference (Gujarati, 2010). The VECM technique is a model that can be used to separate the long-run and short-run components from the data design process. It is a variant of the VAR (Vector Autoregressive) approach. Therefore, the VECM approach can be expressed in the following equation:

$$\Delta Y_t = \sigma + \sum_{i=1}^{k-1} \gamma_i \Delta Y_{t-1} + \sum_{j=1}^{k-1} \eta_j \Delta X_{t-j} + \sum_{m=1}^{k-1} \xi_m \Delta R_{t-m} + \lambda ECT_{t-1} + \cdots + u_t \quad (1)$$

$$\Delta LF_t = \sigma + \sum_{i=1}^{k-1} \beta_i \Delta LF_{t-i} + \sum_{j=1}^{k-1} \phi_j \Delta LT_{t-1} + \sum_{l=1}^{k-1} \eta_l \Delta GDP_{t-l} + \sum_{m=1}^{k-1} \xi_m \Delta GVEP_{t-m} + \sum_{n=1}^{k-1} \vartheta_n \Delta PSC_{t-n} + \lambda ECT_{t-1} + u_t \quad (2)$$

The equation above contains the various variables used in the study. First, we observe the dependent variable which is LF labor force and the independent variables that consist of LT, GDP, GVEP, and PSC. The VECM equation has k-1 which implies that the lag length is reduced by 1. Then we perceive $\beta_i, \phi_j, \eta_l, \xi_m, \vartheta_n, \omega_p$ that stands for the short-run dynamic coefficients of the model's adjustment long-run equilibrium. Next, there is the ECT_{t-1} that signifies the error correction term. And finally, u_t which is the residuals (impulses).

Further, the goal was to document the causal relationships between the variables. and determine whether there is a causal relationship between the variables, the Granger causality test suggested by (Granger, 1969) was used. The model is explained in more detail below:

$$X_t = \sum_{l=1}^{p} \left(a_{11,1} \mathrm{X}_{t-1} + a_{12,1} \mathrm{Y}_{t-1} \right) + \mu_t \quad (3)$$

$$Y_t = \sum_{l=1}^{p} \left(a_{21,1} \mathrm{X}_{t-1} + a_{22,1} \mathrm{Y}_{t-1} \right) + \epsilon_t \quad (4)$$

As illustrated in equation 3 and 4p is the model order, $a_{ij,1}(i,j = 1,2)$ are the coefficients of the model, and μ_t and ϵ_t denotes the residuals. Ordinary least squares can be used to estimate the coefficients, and F tests can identify the Causality relationship between X and Y.

In addition to the econometrics equations above, the study employs the Dickey-Fuller test for Unit Root to examine the stationarity of the variables. According to Dickey and Fuller (1979), the test inspects the value of Ø. It specifically contrasts the null hypothesis that Ø = 1 in comparison to the alternative that Ø < 1. The test requires the employment of several forms in actual practice. The following equation express the test.

$$y_t = \alpha + \beta t + \emptyset y_{\epsilon-1} + e_t \quad (5)$$

$$\Delta y_t = y_t + y_{t-1} + \alpha + \beta t + \emptyset y_{t-1} + e_t \quad (6)$$

As expressed in equations (5) and (6), Ho: Ø = 1 suggests the variables are non-stationary while Ø < 1 implies the stationarity of the data. What is more, y_t stands for the overall study's data and the regression form is rewritten as Δy_t (Holmes et al., 2020).

4. Findings

During 2000 and 2020, LF had an average of 1.691%, while LT had an average of 8.525%. Similarly, between 2000 and 2020, Sub-Saharan Africa's GDP grew by an average of 1.782%, ranging from 1.818% to 1.748%. The standard deviation for GVEP and PSC was found to be much higher (0.230% and 0.236%), followed by those for LT (0.069%), GDP (0.022%), and LF (0.018%). Smaller standard deviation values often indicate that the datasets are closer to the average, while larger standard deviation values typically indicate that the datasets are spread. Lastly, it appears that variables like LD, GEVP, and PSC are negatively skewed. See table 2.

Table 2. Descriptive Statistics

ITEM	LF	LT	GDP	GVEP	PSC
Mean	1.691955	8.525257	1.782160	12.05342	12.05172
Maximum	1.715236	8.634136	1.818613	12.27153	12.27432
Minimum	1.653839	8.411548	1.748047	11.60850	11.60547
Std. Dev.	0.018389	0.069661	0.022873	0.230407	0.236031
Skewness	-0.261461	0.010403	0.236447	-0.890164	-0.848005
Kurtosis	1.824460	1.849634	1.610907	2.304416	2.243193
Jarque-Bera	1.448423	1.158302	1.884057	3.196731	3.018055
Observations	21	21	21	21	21

In table 3 Stationarity test is performed by using the Dickey-Fuller test. The statistical results are contrasted with the MacKinnon critical values. Hence, the data is deemed to be non-stationary if the results show that the t statistic count is more than the MacKinnon critical value. On the other hand, it is said to be stationary if the value is less than the estimated MacKinnon critical value. The Dickey-Fuller test revealed that at first difference all the variables are stationary while at a level only GVEP and PSC showed to be stationary. Hereby, we will continue with the model estimation since the variables presented the absence of unit roots.

Table 3. Unit root estimates

Variables	Dickey-Fuller GLS						McKinnon Critical Value
	At level	Note	At first difference	Note	Remark	Lag order	
LF	0.661	Not stationary	-1.935*	Stationary	I (1)	1	
LT	-1.360	Not stationary	-2.058**	Stationary	I (1)	1	1% -2.692
GDP	0.057	Not stationary	-2.227**	Stationary	I (1)	1	5% -1.960
GVEP	-1.709*	Stationary	-1.810*	Stationary	I (0) I (1)	1	10% -1.607
PSC	-1.717*	Stationary	-1.773*	Stationary	I (0) I (1)	1	

Note: ***, **, and * denotes significance at 1%, 5%, and 10% respectively.

The ideal lag to utilize is one of the indicators used to evaluate the VAR model. By determining the optimal lag, autocorrelation problems in a VAR system can be resolved, which is useful for showing how long a variable takes to react to other variables. This test additionally checks the veracity of the data produced by the Vector error correction model estimation. In order to estimate lag candidates, (LR), (AIC), (FPE), (SC), and (HQ) are assessed. The results in table 4 display that the optimal lag for the study is at lag 1.

Table 4. Lag length selection

Lag	LogL	LR	FPE	AIC	SC	HQ
0	251.9819	NA	3.52e-18	-25.99809	-25.74956	-25.95603
1	403.2029	206.9341*	6.69e-24*	-39.28452	-37.79330*	-39.03215*
2	432.8514	24.96716	8.32e-24	-39.77384*	-37.03993	-39.31115

Note: * indicates the lag order selected by the criterion. LR: sequential modified LR test statistic (each test at 5% level). FPE: final prediction error. AIC: Akaike information criterion. SC: Schwarz information criterion. HQ: Hannan–Quinn information criterion.

The cointegration test aims to determine the cointegration of the non-stationary variables. If there is cointegration, the investigation of the VECM model can be continued. Table 5 demonstrates a cointegration with statistical values above the threshold value for the Trace statistic test. As a result, we establish the existence of a long-term link between the variables. Hereby, we will continue with the error correction model.

Table 5. Cointegration test

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.897333	94.20658	69.81889	0.0002
At most 1 *	0.696192	50.95750	47.85613	0.0248
At most 2	0.559100	28.32167	29.79707	0.0732
At most 3	0.373605	12.76188	15.49471	0.1238
At most 4 *	0.184459	3.874177	3.841465	0.0490

Note: * Denotes rejection of the hypothesis at the 0.05 level. Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

The result for the short-run estimation demonstrates an insignificant impact on the labor force. This suggests that literacy rate, GDP, government expenditure, and progression to secondary school do not influence the total labor force of Sub-Sahara African countries. Nevertheless, there is the presence of a distinctive impact among the rest of the variables. First, we observe that the total labor force has a significant negative impact on GDP. For instance, an increase of 1% in LF decreases the GDP by 5.39%. On the other hand, an increase in the amount of labor force in Sub-Saharan Africa results in an increase in government expenditure and progression to the secondary school level with 25.16% and 24.77% respectively.

Moreover, in the long run, variables such as GDP, government expenditure, and progression to the secondary school level have a positive impact on the labor force and it is significant at 1% levels. This implies an increase of 1% in GDP and PSC will rise the labor force by 0.57% and 0.30% respectively. Inversely, the government expenditure in Sub-Sahara African countries revealed to reduce the labor force by 0.29% in the long run. Finally, the literacy rate presented an insignificant effect on the labor force. This implicitly denotes that literacy does not have a substantial role in labor because in Africa the majority of individuals work in agriculture and in the informal sector which as result do not require literacy.

Table 6. Short-run estimates

VARIABLES	DLF	DLT	DGDP	DGVEP	DPSC
CointEq1	-0.3531	-0.1774	-1.3173***	5.0502*	4.3158*
	(0.414)	(0.211)	(0.386)	(2.649)	(2.444)
	[-0.851]	[-0.839]	[-3.412]	[1.905]	[1.765]
DLF (-1)	1.4670	0.4978	-5.3986***	25.165**	24.776**
	(1.907)	(0.972)	(1.775)	(12.19)	(11.24)
	[0.769]	[0.511]	[-3.039]	[2.064]	[2.202]
DLT (-1)	-1.0913	-0.0624	14.829***	-70.222***	-69.869***
	(4.480)	(2.285)	(4.172)	(28.64)	(26.42)
	[-0.243]	[-0.027]	[3.554]	[-2.4517]	[-2.643]
DGDP (-1)	0.0581	0.0399	0.0148	-0.4652	-0.2864
	(0.228)	(0.116)	(0.212)	(1.462)	(1.349)
	[0.254]	[0.342]	[0.069]	[-0.318]	[-0.212]
DGVEP (-1)	-0.0463	-0.0199	-0.0863	-0.0806	0.4098
	(0.137)	(0.070)	(0.128)	(0.879)	(0.811)
	[-0.336]	[-0.284]	[-0.673]	[-0.091]	[0.504]
DPSC (-1)	0.0532	0.0214	0.1097	0.4890	-0.0593
	(0.157)	(0.080)	(0.146)	(1.008)	(0.930)
	[0.337]	[0.266]	[0.747]	[0.485]	[-0.063]
Constant	0.0121	0.0126	-0.1810	0.8877	0.8852
	(0.056)	(0.028)	(0.052)	(0.360)	(0.332)
	[0.215]	[0.441]	[-3.450]	[2.464]	[2.663]
Observations	21	21	21	21	21
R-squared	0.1361	0.1061	0.6055	0.5327	0.5589
Adj. R-squared	-0.2957	-0.3407	0.4082	0.2991	0.3383
F-statistics	0.3152	0.2375	3.0698	2.2806	2.5341
Mean Dependent	-0.0031	0.0111	0.0033	0.0328	0.0331
chi2	8.140	295.780	26.2864	30.039	34.853
P>chi2	0.320	0.0000***	0.0004***	0.0001***	0.0000***

Note: Standard errors in parentheses, while T-statistics are in brackets. *** p<0.01, ** p<0.05, * p<0.1

Table 7. Long-run estimates

Variables	Coefficient	Std.Dev	T-statistics	P-value
LT	0.0322	0.0322	1.00	0.317
GDP	0.5725	0.0531	10.77	0.000
GVEP	-0.2927	0.0754	-3.88	0.000
PSC	0.3022	0.0762	3.96	0.000
Constant	-2.916			

Note: *** p<0.01, ** p<0.05, * p<0.1

After analyzing the cointegration that exists between the dependent variable (LF) and explanatory factors (LT, GDP, GVEP, and PSC), now we will run the granger causality test to determine the connection among the variables (Granger, 1969). To start with panel A, we perceive a Bidirectional relationship between the labor force (LF) and literacy rate (LT) at 1% and 10% significance levels. This implies there is a long-run causality running from both sides. Secondly, in panel B we observe a

unidirectional long-run causality running from LF to GDP. In this relation, the total amount of the labor force has an influence on GDP growth. However, the lagged variable of GDP does not cause LF.

Moreover, in panel C the result also denotes a unidirectional long-run causality running from LF to GVEP, with a significance value of 1%. Based on this we comprehend that labor force granger causes government expenditure in the long run. In the case of panel D, which expresses the causality between LF and PSC, we discern a unidirectional causality running from LF to PSC with a 1% critical value. Hence, we conclude that the labor force has a long-run relationship with literacy rate, government expenditure, GDP, and progression to the secondary school level. See table 8.

Table 8. Granger causality estimation

Equation	Excluded	chi2	df	Prob>Chi2	
Panel A. Causality between LF and LT					
LF	LT	1422.8	2	0.000***	Bidirectional
LT	LF	4.499	2	0.082*	
Panel B. Causality between LF and GDP					
LF	GDP	3.033	2	0.219	Unidirectional
GDP	LF	407.41	2	0.000***	
Panel C. Causality between LF and GVEP					
LF	GVEP	4.130	2	0.127	Unidirectional
GVEP	LF	51.023	2	0.000***	
Panel D. Causality between LF and PSC					
LF	PSC	4.052	2	0.132	Unidirectional
PSC	LF	39.51	2	0.000***	

Note: *** p<0.01, ** p<0.05, * p<0.1

The impulse responses and variance decomposition function estimates in Table 9 show that the amount of labor force in Sub-Saharan Africa would probably decrease as a result of GDP and literacy rates, supporting the theory that the majority of the SSA labor force would probably prefer working in an informal or agricultural sector in order to avoid sectors that might require a certain level of education or literacy rate. On the other hand, it would seem that government spending and move on to secondary school would expand the overall labor force. Therefore, these areas require additional focus and funding to help boost the workforce during the coming ten years. Furthermore,

In relevance, with the variance decomposition estimation, the results imply that the literacy rate, which is anticipated to increase from 0.099 percent in 2021 to 15.629 percent in 2030, would have a greater variance shock of 15.628 percent on the labor force. The remaining factors GDP, government spending, and progression to secondary education are not expected to impose a significant impact on the labor force until 2030, with variance shocks of 0.524%, 0.731%, and 0.273%, respectively.

Table 9. Impulse response and variance decomposition

Impulse Response Function					
Period	LF	LT	GDP	GVEP	PSC
1	0.005533	0.000000	0.000000	0.000000	0.000000
2	0.008684	-0.000325	-0.000265	4.34E-05	-0.000350
3	0.008052	-0.001389	-0.000712	0.000114	-0.000617
4	0.005355	-0.002702	-0.000962	0.000278	-0.000473
5	0.003323	-0.003543	-0.000814	0.000505	-5.24E-05
6	0.003412	-0.003642	-0.000432	0.000709	0.000347
7	0.005094	-0.003282	-0.000106	0.000817	0.000491
8	0.006801	-0.002955	-2.45E-05	0.000830	0.000387
9	0.007349	-0.002970	-0.000152	0.000801	0.000205
10	0.006704	-0.003277	-0.000321	0.000791	0.000121
Variance decomposition of labor force (LF)					
Period	LF	LT	GDP	GVEP	PSC
1	100.0000	0.000000	0.000000	0.000000	0.000000
2	99.71782	0.099272	0.065999	0.001769	0.115141
3	98.20077	1.169667	0.331993	0.008525	0.289046
4	94.48040	4.420649	0.711304	0.043621	0.344024
5	89.33750	9.287528	0.918249	0.147314	0.309406
6	85.00204	13.44845	0.899371	0.325054	0.325084
7	82.98116	15.35687	0.789964	0.507261	0.364743
8	82.96155	15.40175	0.665864	0.621341	0.349500
9	83.27259	15.17038	0.570258	0.680279	0.306491
10	82.84294	15.62863	0.524134	0.731136	0.273154

After concluding all the tests, we finally run the diagnostic test to assess the validity of the model used in the study. To begin with the residual of autocorrelation, the test demonstrates no prominent autocorrelation among the variables at lag order. Next, the white test for heteroskedasticity presented a prob value of 0.405 hence we reject the hypothesis of heteroskedasticity and confirm that the model is free from heteroskedasticity. Finally, the stability condition imposes 4-unit moduli. This suggests the model is stable.

Table 10. Diagnostic tests

Tests	Prob	Note
Residual auto-correlation	Lag 1 (0.70) lag 2 (0.46)	No prominent autocorrelation at lag order.
White test for heteroskedasticity	0.4051	No heteroskedasticity
Eigenvalue stability condition	The VECM specification imposes 4-unit moduli	

5. Discussion and Conclusion

Sub-Saharan Africa is the youngest region in the world and boosting job opportunities and the quality of the labor force is crucial, particularly to young people, for a number of reasons, including the fact that most people struggle their way out of poverty. Additionally, there will be a limited number of options available to young people joining the labor market in the coming ten years. The rapid pace of labor force increase, which is fueled by previous and present high birth rates, will not be sufficiently met by pay employment possibilities at present stages of economic growth and transformation. Africa's urban labor markets are remarkably uniform. Even though school enrolment rates are rising, Africa's

workforce lacks in education. The number of years spent in school in general in Sub-Saharan African nations is roughly equivalent to the level in France in 1913.

The prominence of the informal sector (which hires around 70% of all employees) and its consequence, the low proportion of wage employment, are two key characteristics of urban labor markets in Sub-Saharan Africa. No other place on the planet, from outside agriculture, and regardless of how far back the historical records go, wage employment rates are just as minimal as they are in Africa. In addition, gender inequality and discrimination in terms of gender in sub-Saharan Africa is evident in the male labor force which significantly outnumbers female labor, with a weighted mean of 61.2 for the female labor force and a mean median of 75.5 for the male labor force.

Whilst education is crucial to Sub-Saharan Africa's workforce, the region's education enrollment is surprisingly low when contrasted to other regions. Despite obstacles and difficulties, Sub-Saharan African countries have achieved progress in expanding access and admittance to education. The initiatives have increased enrolment, but many nations did not foresee a rise in unemployment due to the higher levels of student integration into the market in proportion to the limited job opportunities.

The study scrutinized the association between the labor force and socio-economic forces in Sub-Saharan Africa from the period 2000 to 2020. It also determines by using a vector error correction model the presence of a long-run or short-term cointegration between the labor force and socio-economic factors such as literacy rate, economic growth, government expenditure, and progression to the secondary school level. In addition to that, the study observed the causality among the variables to conclude if there is a unidirectional or bidirectional relationship.

Accordingly, the results demonstrated in the short run socioeconomic factors have no influence on the labor force. This suggests that the total labor force of Sub-Saharan African countries is unaffected by the literacy rate, GDP, government spending, or the progression to secondary school. On the other hand, in the long run, variables such as economic growth, and progression to the secondary school level have a positive impact on the labor force and it is significant at 1% levels. This implies an increase in these socio-economic forces will rise the labor substantially. Inversely, the government expenditure in Sub-Sahara African countries revealed to reduce the labor force in the long run. Finally, the literacy rate presented an insignificant effect on the labor force. Because most people in Africa work in agriculture and the unofficial and undeclared sectors, which do not require an educational level.

Furthermore, the granger causality test demonstrated a bidirectional relationship between the labor force and the literacy rate, this signifies that an increase in the percentage of the labor force in Sub-Saharan Africa contributes to boasting the literacy rate among the population and vice versa. The reason behind this is when individuals integrate into the job market, they tend to enroll their children or family member in education with the hope of increasing their children’s chances of getting a decent job. Next, the result presented a unidirectional causality running from the labor force to economic growth. Hereby, we deduce that in SSA the labor force affects economic growth due to the population integrating early into the job market. Interestingly, the causality between government expenditure and the labor force unveiled a unidirectional relationship. As a result, an increase in the amount of labor force causes to increase the government expenditure. This can be explained due to the fact of the potential workforce integrating the job market hence, seeking job opportunities which as result pressures the government to spend money in the public sector and work creation. Finally, the labor force appeared to elevate the progression to the secondary school level. This denotes that in SSA the more individuals integrate into the job market the more they encourage and invest in their families, relatives, and peers to continue their education because they know the importance of acquiring cultural capital.To sum up, the paper outlines and explains the interlinkage that exists between the labor force and socio-economic forces in Sub-Saharan Africa It also contributes to the body of existing knowledge by assessing the current development of African countries. Finally, researching factors that encourage a skilled workforce will help us comprehend the novel approaches required to expand and profit from human capital. In this context, producing a skilled and fully integrated workforce in every country is crucial to maintain the

country's development from every aspect. Hereby, this study will assist managers, scholars, and lawmakers in identifying the appropriate types of measures required in their fields of expertise or countries of interest in order to capitalize on the labor force and upgrade the current policies and reforms concerning the workforce, employment, and job market. Further, the paper also provides a comprehensive framework that focuses on a wide range of macro factors, allowing researchers to further investigate their effects and verify novel hypotheses about how they may influence a country's performance.

References

Aden, K. (2022). Does the perception of government integrity differ across regions? A comparative study between several sub-Saharan and Asian countries. *Geopolitics under Globalization, 4*, 1-12.

Amin, A. A. and Ntembe, A. (2021). Sub-Sahara Africa's Higher Education: Financing, Growth, and Employment. *International Journal of Higher Education, 10*(1), 14-23.

Assaad, R. B. (2019). Public employment in the Middle East and North Africa. *IZA World of Labor.*

Babatunde, M. A. and Adefabi, R. A. (2005). Long run relationship between education and economic growth in Nigeria: Evidence from the Johansen's cointegration approach. *In regional conference on education in west Africa.*

Baker, S. R., Bloom, N. and Davis, S. J. (2016). Measuring economic policy uncertainty. *The quarterly journal of economics, 131*(4), 1593-1636.

Beegle, K., and Christiaensen, L. (Eds.). (2019). Accelerating poverty reduction in Africa. *World Bank Publications.*

Bloom, D. E., Kuhn, M. and Prettner, K. (2017). Africa's prospects for enjoying a demographic dividend. *Journal of Demographic Economics, 83*(1), 63-76.

Bosio, E., Ramalho, R. and Reinhart, C. M. (2021). The Invisible Burden: How Arrears Could Unleash a Banking Crisis. *VoxEU, March, 22.*

Brück, T. and d'Errico, M. (2019). Reprint of: food security and violent conflict: introduction to the special issue. *World Development, 119*, 145-149.

Casterline, J. B. and Agyei-Mensah, S. (2017). Fertility desires and the course of fertility decline in sub-Saharan Africa. *Population and Development Review, 43*, 84-111.

Chacaltana, J., Leung, V. and Lee, M. (2018). New technologies and the transition to formality: The trend towards e-formality. *ILO Employment Policy Department Working Paper*, 247.

Cleland, J. (2017). Population growth, employment, and livelihoods: The triple challenge. *Journal of Demographic Economics, 83*(1), 51-61.

Rodrik, D., Diao, X., McMillan, M. and Ellis, M. (2022). Africa's Manufacturing Puzzle: Evidence from Tanzanian and Ethiopian Firms.

Dickey, D. A. and Fuller, W. A. (1979). Distribution of the estimators for autoregressive time series with a unit root. *Journal of the American statistical association, 74*(366a), 427-431.

Dieppe, A. (Ed.). (2021). *Global productivity: trends, drivers, and policies.* World Bank Publications.

Fasih, T., Patrinos, H. A. and Shafiq, M. J. (2020). The impact of COVID-19 on labor market outcomes: lessons from past economic crises. The World Bank Blogs, https://blogs. worldbank. org/education/impact-covid-19-labor-marketoutcomes-lessons-past-economic-crises.

Fosu, A. K. and Abass, A. F. (2019). Domestic credit and export diversification: Africa from a global perspective. *Journal of African Business, 20*(2), 160-179.

Granger, C. W. (1969). Investigating causal relations by econometric models and cross-spectral methods. *Econometrica: Journal of the Econometric Society,* 424-438.

Gill, I. S. and Karakulah, K. (2019). Has Africa Missed the Bus? The Confusing Consensus about the Continent's Growth.

Holmes, E. E., Scheuerell, M. D. and Ward, E. J. (2020). *Applied time series analysis for fisheries and environmental data.* Seattle: Northwest Fisheries Science Center.

Isukul, A., Chizea, J. J. and Agbugba, I. (2019). Economic diversification in Nigeria: Lessons from other Countries of Africa. *DBN Journal of Economics & Sustainable Growth, 2*(1).

Kilic Celik, S., Kose, M. A. and Ohnsorge, F. (2020). Subdued potential growth: Sources and remedies. Policy Research *World Bank, Working Paper* 9177.

Klasen, S., Le, T. T. N., Pieters, J. and Santos Silva, M. (2021). What drives female labour force participation? Comparable micro-level evidence from eight developing and emerging economies. *The Journal of Development Studies, 57*(3), 417-442.

Mbaye, A. A. and Gueye, F. (2018). The competitiveness challenge of the formal sector in Francophone Africa: Understanding the role of the informal sector and the business environment. In Africa's competitiveness in the global economy, Palgrave Macmillan, Cham.

Monga, C., Shimeles, A. and Woldemichael, A. (2019). Creating decent job strategies, policies, and instruments. *Africa Development Bank*.

Musila, J. W. and Belassi, W. (2004). The impact of education expenditures on economic growth in Uganda: evidence from time series data. *The Journal of Developing Areas*, 123-133.

Omojimite, B. U. (2010). Education and economic growth in Nigeria: A Granger causality analysis. *African Research Review, 4*(3).

Orkin, K., Garlick, R., Hurtado, I. R., Kreft, B., Grabowska, M. and Channon-Wells, H. (2021). International Evidence to Inform Decision Making on Implementing Social Protection Measures During a Crisis.

Raihan, A. and Tuspekova, A. (2022). Nexus between economic growth, energy use, agricultural productivity, and carbon dioxide emissions: new evidence from Nepal. *Energy Nexus, 7*, 100113.

Rovo, N. (2020). Structural Reforms to Set the Growth Ambition. *World Bank Policy Research Working Paper*, (9175).

Urhie, E. (2014). Public education expenditure and economic growth in Nigeria: a disaggregated approach. *Journal of Empirical Economics, 3*(6), 370-382.

Valero, A. and Van Reenen, J. (2019). The economic impact of universities: Evidence from across the globe. *Economics of Education Review, 68*, 53-67.

World Development Report (2019). Washington, DC: The World Bank.