THE MODERATING ROLE OF HUMAN CAPITAL DEVELOPMENT IN BANKING SECTOR DEVELOPMENT AND ECONOMIC GROWTH NEXUS: THE CASE OF SUB-SAHARA AFRICA (2000 – 2020)

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Abstract

This study examined the interactive effect between human capital development and banking sector development on economic growth in Sub-Saharan Africa (SSA) for the period 2000 to 2020. Specifically, the study investigated the long-run and short-run relationship between banking sector development and economic growth and the long-run and short-run relationship between human capital development and economic growth in SSA. Using an *ex-post* research design, the study analysed data of 28 selected SSA countries obtained from World Development Indicators, (2022). The dependent variable was economic growth captured by GDP per capita growth. The independent variables were education, health, Physical Capital, Broad Money, Bank Credit to Private Sector, Interactive effect of health and education, Employed labour force, Openness to trade, Terms of Trade and Inflation. The panel Auto Regressive Distributed Lag (ARDL) model was used for estimation and the findings show that, human capital development and banking sector development both impacted economic growth positively and significantly in the long run. Also, a higher rate of economic growth was observed when human capital development was interacted with banking sector development. However, the variables did not have a significant effect on economic growth in the short run. The study suggested the need to invest more in human capital development as a means to maximise the effect of banking sector development on economic growth.

Keywords: Human Capital Development, Banking Sector Development, Economic Growth, Sub-Saharan Africa.

1. INTRODUCTION

The role of human capital development in economic growth is becoming more relevant in the world today as most countries and firms rapidly shift towards knowledge-based sectors such as information technology (IT), telecommunication, and Research and

development (R&D), amongst others (OECD,1996). Without human capital, the resources at the disposal of countries and firms will be useless, therefore, for an economic entity to attain its growth objectives, it is necessary to develop and use its human capital (Adelakum, 2011). The type and quality of human capital a country has is a key determinant of its economic growth (Binuyo, et al., 2019; Awogbemi, 2023) and this depends on the amount of investment and importance the country gives to the development of its human capital (Okumoko, et al., 2018). Human capital is the ability and skills of a country's human resources while human capital development is the process of obtaining and nurturing people with the skills, knowledge and experience necessary for economic growth (Harbison, 1962). As cited by Binuyo, et al., (2019), this definition is in line with that proposed by the classical economist Adam Smith in his book titled The Wealth of Nations. According to Smith (1776), human capital refers to talents, education and apprenticeship which is guite costly to obtain but is rewarded with profit. Most human capital is created in the education and healthcare sectors (Awogberni, 2023). The human development index (HDI) is commonly used as a proxy to capture human capital development because it takes into consideration the level of education, living standard and health of humans in the country (Arif, & Khan, 2019). In the same light, Becker (1962) also suggested that human capital can be developed through education, employee training and health. However, the study carried out by Schultz (1960) which considered education as the main proxy for capital formation forms the basis of recent research on human capital development as cited by Binuyo, Feyis et al., (2019) in their study.

As cited by Arif and Khan (2019), human capital development and financial sector development are significant determinants of economic growth. They opined that financial sector development with low human capital will result in low economic growth. The findings of Chadha, and Daleep (2017) throw more light on this as it confirms that human capital development has a positive impact on banking sector development. Mahmood, *et al.*, (2019) assert that the financial sector plays the most crucial role in developing countries. Nguyen (2022) also confirms that the banking system is the core of any country's financial system. This, therefore, means that human capital development affects the relationship between banking sector development and economic growth. The ability of the banking sector to collect deposits and grant loans is an important factor that leads to economic growth (Nwagu, *et al.*, 2023). The development of the banking sector will facilitate the mobilisation and allocation of capital, management of risk, and the sale of goods and services by companies thereby, stimulating capital accumulation, technology development and enhancing economic growth (Levine, 1997).

Nguyen (2022) emphasised the importance of the studies on the relationship between banking sector development and economic growth in providing policy implications for developing countries. As stated by Omoruyi and Osawmonyi (2019), many studies have been conducted which emphasised the importance of the banking sector's role in economic growth. Several authors also joined the debate with some suggesting a significant effect of banking sector development on economic growth while others opined that the role of banking sector development on economic growth is insignificant. In the same light, some researchers argue that banking sector development has a positive impact on economic growth, while others share a contrary opinion. Similar debates are ongoing regarding human capital development and banking sector development nexus and also, human capital development and economic growth nexus. Adelakum (2011), in his study, cited Romer (1986) and Lucas (1988) who opined that human capital development significantly and positively impacts economic growth in the long run. However, Arabi and Abdalla (2013) had a contradictory opinion as their work revealed that education and technology were not affecting economic growth positively due to obsolete technology.

The empirical literature on the effect of human capital development on economic growth, and the effect of banking sector development on economic growth reveals a lack of agreement in the findings. Also, amid these debates, several studies suggest that human capital development as well as banking sector development affects economic growth. However, the joint effect of human capital development and banking sector development on economic growth has not been exploited. Inspired by studies on the effect of human capital development on economic growth such as those of Chadha, and Daleep (2017), Hussain *et al* (2023), and Ihensekhien and Soriwei (2023), it is logical to think that human capital development has a moderating effect on the banking sector development and economic growth nexus. This study, therefore, aims to examine the interactive effect of human capital development and banking sector development on economic growth in Sub-Saharan Africa (SSA). Specifically, the study investigates the long-run and short-run relationship between banking sector development and economic growth in SSA and the long-run and short-run relationship between human capital development and economic growth in SSA.

2. LITERATURE REVIEW

Scholars across the world have shown interest and carried out several studies related to Human capital development, banking sector development, and economic growth. This study reviews related studies by categorising them into those related to banking sector development and economic growth, those related to human capital development and economic growth, and those related to human capital development and banking sector development.

Banking sector development and economic growth

Ahmed, *et al.*, (2022) investigated environmental technology and banking sector development's impact on green growth using the Auto Regressive Distributed Lag (ARDL) approach. The findings revealed a positive and significant impact of environmental technology and banking sector development on green growth in the long run and the short run. They encouraged policymakers to promote environmental-based technology and banking sector development as a way to achieve green growth.

The banking sector development and economic growth nexus was examined by Onaolapo and Ajose (2019) in Nigeria using the ARDL model. The main variables used to capture banking sector development were domestic credit, liquid liability and money supply. The findings suggested that domestic credit negatively affected economic growth in the long run while liquid liability and money supply had a positive impact on economic growth in the long run. They recommended that government policies should favour bank lending channelled towards productive purposes to enhance economic growth.

Nwagu, *et al.*, (2023) assessed the role of banking sector development in the economic growth of selected G8 countries and African countries using the Pedroni test and the ARDL bound test to investigate the long-run relationship and test the long-run cointegration between the variables under consideration. The study revealed a positive impact of banking sector development and exchange rate on economic growth while inflation negatively affected economic growth. They suggested that countries should develop their banking sectors and that policymakers incorporate the banking sector as a determinant of economic development.

Magaji and Musa (2023) analysed the banking sector credit's impact on the real sector of Nigeria for the period 1986 to 2019 using the ARDL model. The study suggested that credit by commercial banks affected the real GDP of Nigeria both in the long and short run. Government capital expenditure was also found to have a significant and positive effect on the real GDP. However, the findings also suggested the existence of a negative and significant effect between domestic private investment and real GDP. They concluded that if bank credit to the real sector is effectively distributed and utilised, it will result in economic growth. They recommended an improvement of the banking sector credit to boost real sector output thereby enhancing economic growth.

Wijesinghe and Pallearachchi (2022) evaluated banking sector development's role in Sri Lanka's economic growth for the period 1960 to 2019 using the ARDL technique and the Granger causality test to investigate the direction of causality between banking sector development and economic growth. The findings revealed the existence of a long-run and short-run relationship between banking sector development indicators and economic growth which was significant and positive at both levels. The Granger causality test also revealed a unilateral relationship between banking sector development and economic growth.

Tsaurai (2023) analysed the effect of banking sector development on economic growth in BRICS for the period 1987 to 2020. The study employed three separate estimation techniques fixed effects (FE), fully modified ordinary least squares (FMOLS) and pooled ordinary least squares (OLS). The results of pooled OLS and that of FMOLS revealed a significant and positive effect of banking sector development on economic growth while the FE on the other hand revealed that banking sector development significantly and negatively affected economic growth. The study recommended that to enhance economic growth, policies favourable to banking sector development and domestic investment should be implemented.

Xi'an Shiyou Daxue Xuebao (Ziran Kexue Ban)/ Journal of Xi'an Shiyou University, Natural Sciences Edition ISSN: 1673-064X E-Publication: Online Open Access Vol: 67 Issue 08 | 2024 DOI: 10.5281/zenodo.13268129

Pokharel (2021) examined the effect of banking sector development on economic growth in Nepal for the period 1975 to 2019 using the Johansen cointegration test and vector error correction model (VECM). Real GDP per capita growth rate was used to capture economic growth and Private sector credit to capture banking sector development. The findings indicated the existence of a positive and significant effect of banking sector development on economic growth through an efficient allocation of financial resources. A unidirectional causality was also established suggesting that banking sector development leads to economic growth in the long run. The study recommended that policies favourable for the extension of banking services to individual investors, small and medium-sized enterprises and those in rural areas should be implemented.

Nigeria's banking sector development's impact on economic growth was investigated by Omoruyi and Osawmonyi (2019) for the period 1981 to 2011 using the OLS estimation technique and the Granger causality test. The findings indicated that banking sector development significantly and positively affected Nigeria's economic growth. It also revealed a one-way causality running from economic growth to banking sector development. They recommended policies aimed at developing the banking sector should be encouraged by the monetary authorities. Rushchyshyn *et al* (2021) did a comparative analysis of the impact of banking sector development on the economic growth of Ukraine and some European Union (EU) countries using component analysis, causal relationship and vector regression modelling. The findings show that Ukraine had a low level of banking sector development to EU countries and also revealed a strong and positive causal relationship between banking sector development and economic growth. It recommended the development of the banking sector for achieving economic growth.

The role of banking sector development on Vietnamese economic growth for the period 2007 to 2020 was analysed by Nguyen (2022) using the ARDL estimation technique. Broad money and bank credit was used to capture banking sector development. The results indicated the existence of a positive effect of banking sector development on economic growth in the long run. The study however noted that for the sub-period 2007 to 2020, there was a diminishing marginal effect of banking sector development on economic growth. It, was, recommended that the expansion of bank credit should be controlled and adaptive to the capital-absorption capacity of the economy.

Human Capital Development and Economic Growth

The study on the impact of human capital development on the economic growth of Nigeria for the period 1980 to 2017 conducted by Babatunde, *et al.*, (2019) used the OLS technique of analysis. The study captured economic growth using real GDP while human capital development was captured by recurrent expenditure on health and recurrent expenditure on education. The findings indicated that human capital development affects economic growth positively and recommends that school enrolment and basic healthcare services should be encouraged by policymakers through the development of education and health institutions' infrastructures as this will result in economic growth in some selected

developing countries. They used expenditures on health and education to capture human capital development. The study also analysed the interactive effect of the human capital development variables on the economic growth of the forty-three countries under consideration in the study. The findings indicated that expenditure on education has a positive effect on economic growth as opposed to expenditure on health. However, the interactive effect of both human capital development variables has a significant and positive effect on economic growth.

Awogbemi (2023) researched the impact of human capital development on the economic growth of Nigeria using a descriptive analysis and observation approach. The study suggested a positive relationship exists between human capital development and the economic growth of Nigeria. It was recommended that private sector investment in health and education should be encouraged because government expenditure on the health sector to address health challenges is ineffective in the absence of private investment in health.

Madugba, *et al.*, (2022) examined the effect of human capital investment on Nigeria's economic growth using the OLS estimation technique. They used capital expenditure on education, capital expenditure on health, recurrent expenditure on education, recurrent expenditure on health and universal education as proxies for human capital development. The findings revealed that the human capital development variables except recurrent expenditure on education and recurrent expenditure on health had a positive impact on economic growth but only capital expenditure on education was significant. The study concluded that the effect of human capital investment on the economic growth of Nigeria was not significant for the period 2004 to 2021. It was recommended that both the government and policymakers should show sincere effort in the development of human capital through adequate educational funding across all levels.

Human Capital and Banking Sector Development

Arif and Khan (2019) examined the impact of financial development on the human capital development of Pakistan for the period 1991 to 2016 using bank deposits, broad money supply and domestic credit to the private sector as proxies to capture financial development. The human development index was also used as a proxy to capture human capital development. The results revealed the existence of a significant positive relationship between financial sector development and human capital development.

Chadha and Parimoo (2017) researched human capital management in the banking sector. They examined the background, current status and practices adopted by banks for their human capital development through conceptual and theoretical review. The study revealed that human capital is the most valuable resource of any organisation including banks. It suggested that human capital development activities should be encouraged. Al-Shimari and Jihad (2021) analysed the reciprocal relationship between the banking sector and the human capital index in selected Arab countries for the period of 2010 to 2018. Their findings suggested that the banking sector and human capital development index

are highly correlated. It also revealed that the bank nonperforming loans index and human development index are negatively correlated.

The impact of human capital development in the service sector of Nigeria for the period 1986 to 2020 was investigated by Ihensekhien and Soriwei (2023) using the ARDL cointegration method of estimation. The study used secondary school enrolment, government expenditure on education and government expenditure on health as proxies for human capital development. The results indicated that government expenditure on education and secondary school enrolment rate negatively affected the service sector in the short run. These indicators were however found to be positive and significant in the long run. Government health expenditure on the other hand had a negative and significant impact on the service sector in both the long and short run. The study recommended that the government should increase investment in both the education and healthcare sectors to enhance economic growth through increased productivity.

Hussain *et al* (2023) examined the role of intellectual capital on the financial performance of banks in Pakistan. The study collected cross-sectional primary data with the help of questionnaires using a convenient sampling technique and employed a structural equation modelling technique to test the hypotheses. The findings revealed that investment in intellectual capital has a positive effect on financial performance in the banking sector. The study recommended that policymakers should invest in intellectual capital to improve the financial performance of banks and consequently enhance Pakistan's banking sector development.

3. METHODOLOGY

3.1. Theoretical Framework

This study is anchored on the endogenous growth model of Romer (1986) and Lucas (1988) which states that long-term economic growth results from the introduction of new accumulation factors like knowledge, innovation and research and development (R&D). This model where advancement in technology is endogenous in impacting long-term growth was developed to address the limitations of the exogenous growth model proposed by Solow (1956). The neoclassical endogenous growth model can be specified with the Cobb-Douglas production function as:

 $Y_{it} = (A_{it}L_{it})K_{it}\beta \qquad (1)$

Where Y_{it} represents the output of a country at a point in time, K_{it} is capital representing both physical and human capital in each country at a point in time, L_{it} is the labour force available in a country at a point in time and A_{it} is a labour-augmenting factor representing the level of technology. Equation one (1) is presented in a functional form as:

 $Y_{it} = f(K, BSD, L).....(2)$

Where K is capital (both Human and Physical capital), BSD is banking sector development and L is labour force available.

3.2. Data, variables and model

Data and variables

The study uses the *ex-post facto* research design. Panel data of 28 selected SSA countries sourced from World Development Indicators (WDI), World Bank (2022) were used for the period of twenty years from 2000 to 2020. The base years and selected SSA countries were chosen based on data availability. The variables of interest are described in table 1.

Variables	Description	Source
Economic growth (RGDPGR)	GDP per capita growth (annual %)	
Education (EDEX)	Government expenditure on education, total (% of GDP)	
Health (HEX)	Domestic general government health expenditure (% of GDP)	
Physical Capital (GFCF)	Gross fixed capital formation (% of GDP)	
Broad Money (BMO)	Broad money (% of GDP)	World
Bank credit to private sector (DCR)	Domestic credit to private sector by banks (% of GDP)	Developm
Interactive effect of health and education (IE)	Multiplication of EDEX and HEX	Indicators
Employed labour force (ELF)	Population growth (annual %)	(2022)
Openness to trade (OPN)	Trade (% of GDP)	
Terms of Trade (TOT) Net barter terms of trade index (2000 = 100)		
Inflation (INF)	Inflation, consumer prices (annual %)	

Table 1: Description of variables

Source: Authors' construct (2023)

3.3. Empirical model

This study adopted and modified the empirical model from the studies by Shahzad, *et al.*, (2022) and Onaolapo and Ajose (2019). The model uses economic growth as the dependent variable to represent the level of output. Human capital development is captured by two variables; government expenditure on education and domestic general government health expenditure. Domestic credit to private sector by banks and Broad money are used as indicators for banking sector development. The empirical model is stated as:

 $RGDPGR_{it} = EDEX + HEX + GFCF + BMO + DCR + IE + ELF + OPN + TOT + INF ... (3)$

Where RGDPGR_{it} is economic growth, EDEX is education, HEX is health, GFCF is physical capital, BMO is broad money, DCR is bank credit to private sector, IE is the interactive effect of health and education, ELF is the employed labour force, OPN is openness to trade, TOT is terms of trade, INF is inflation.

3.4. Estimation technique

The panel ARDL model is used in this study to examine the interactive effect of human capital development and banking sector development on economic growth in SSA, the long-run and short-run relationship between banking sector development and economic growth in SSA and the long-run and short-run relationship between human capital development and economic growth in SSA since it is a robust method to analyse both the long-run and short-run relationships between variables (Pesaran *et al.*, 2001). The model can also accommodate both stationary and non-stationary (first difference) variables. Adopting Shahid *et al.* (2022), the panel ARDL model for this study is stated in equation 4:

Where: β_0 is the constant term, α_1 to α_9 indicates the long-run coefficients, β_1 to β_9 indicates the short-run coefficients, Δ indicates the difference and *m* and *n* indicate the respective lags of the dependent and independent variables. The existence of cointegration amongst the variables is confirmed by the long-run parameters in **Equation 4** thereby justifying the need for an error correction model. The error correction equation shows the speed at which disequilibrium in the short run converges to long-run equilibrium. Adopting Makun (2021) the Pesaran et al. (2001) error correction model is stated in **equation 5**:

Where δ indicates the cointegration term's coefficient, $\mathcal{E}_{i,t-1}$ represents the cointegration parameter and e_{it} is the parameter for error correction.

4. RESULTS AND DISCUSSION

Descriptive statistics

It is necessary to analyse the statistical properties and correlation of the variables under consideration before determining the relationship between the variables with the use of econometric techniques. **Table 2** shows both the summary statistics and correlation analysis of the variables.

	RGDPGR	DCR	BMO	EDU	HEL	INTERACT	INV	ELF	INF	TOP
Descriptive Statistics										
Mean	1.642995	0.048848	0.039451	0.029885	0.045789	0.005849	0.049555	0.055083	0.524952	0.005603
Median	2.007503	0.033602	0.030783	0.000704	0.017719	2.13E-05	0.003113	-0.003154	-0.111230	0.004024
Maximum	27.83109	0.914652	0.620123	2.382904	2.038982	0.543239	8.907020	33.95173	208.5119	0.964351
Minimum	-36.77770	-0.999251	-0.410957	-0.543436	-0.614113	-0.157014	-0.605268	-6.566547	-31.19207	-0.498640
Std. Dev.	4.513974	0.163392	0.116132	0.220871	0.238591	0.043723	0.446729	1.522204	9.960382	0.131104
Correlation	Analysis									
RGDPGR	1.000000									
DCR	-0.035035	1.000000								
BMO	-0.275427	0.515120	1.000000							
EDU	-0.097936	0.121842	0.156223	1.000000)					
HEL	-0.107235	0.115591	0.110514	0.132348	3 1.000000)				
INTERACT	-0.095741	-0.022464	-0.039664	0.441545	5 0.053430) 1.000000				
INV	-0.075147	-0.216360	-0.056806	-0.090464	4 0.044140	0.210673	1.000000			
ELF	-0.034526	0.023301	0.010401	0.010244	0.009705	0.009266	-0.004009	9 1.000000)	
INF	-0.003563	0.008544	-0.040392	-0.008529	9 -0.02941	9 -0.039810	0.003018	-0.009782	2 1.000000	
TOP	0.131253	0.094100	0.082018	-0.049503	3 -0.04699	8 -0.174923	0.043040	-0.073386	6 0.053762	1.000000

Table 2: Summary Statistics and Correlation Analysis

Source: Authors' computation using E-views 10

The study examines the interactive effect of human capital development and banking sector development on economic growth in SSA for the period 2001 to 2020 using 560 observations. As seen in **table 2**, the summary statistics show the mean, median, maximum, minimum, and standard deviation of the variables. The average values are 164.29%, 4.88%, 3.94%, 2.98%, 4.57%, 4.99%, 5.55%, 5.24%, and 0.56% for RGDPGR, DCR, BMO, EDU, HEL, INV, ELF, INF and TOP respectively. These values vary widely from their standard deviations of 45.13%, 16.33%, 22.08%, 23.85%, 4.37%, 44.67%, 152.22%, 996.03%, and 13.131% respectively. The existence of wide dispersion in the data is a clear indicator of cross-sectional differences and high volatility in the variables during the period of study.

The correlation analysis in **table 2** was carried out to determine the linear relationship between the variables in the model. The analysis revealed that the real GDP growth rate has a negative correlation between domestic credit to private sector, broad money, education expenses, health expenses, investment, employed labour force, and inflation while there exists a positive relationship between real GPD growth rate and trade openness. The correlation coefficients of the variables show a weak correlation among the variables which is good for the model as the weak correlation between the variables is evidence of the absence of the problem of multicollinearity in the model.

Unit Root Test

The ARDL estimation technique does not support variables that are stationary at second difference. Therefore, before estimating the ARDL model, it is necessary to test for stationarity to ensure that all the variables are stationary at level or first difference. Unit root tests were conducted to test for stationarity of the variables. **Table 3** shows the results of the Levin, Lin and Chu (LLC) test, the Breitung test, the Im, Pesaran and Shin (IPS) test, Augmented Dickey Fuler-Fisher (ADF-Fisher) and Phillips and Perron-Fisher (PP-Fisher) tests. The LLC and Breitung tests assume a common unit root process while IPS, ADF-Fisher and PP-Fisher assume an individual unit root process.

	Common Unit Root Process		Individual Unit Root Process			
Variables	LLC Breitung		IPS	ADF – Fisher	PP – Fisher	
Level						
RGDPGR	-9.67909***	0.73068	-9.86064****	197.405***	201.123***	
DCR	-14.5674***	-6.64387***	-13.5345***	256.323***	298.673***	
BMO	-12.3099***	-1.52971*	-11.4369***	224.328***	270.872***	
EDU	-15.9112***	-10.0135***	-15.5537***	293.669***	394.187***	
HEL	-20.1972***	-3.80801***	-16.4558***	272.460***	386.362***	
INTERACT	-15.8063***	-4.33999***	-15.4002***	295.579***	411.490***	
INV	-18.6309***	-7.54950***	-15.6653***	265.269***	367.187***	
ELF	-4.03181***	-2.18978**	-8.30695***	173.771***	209.089***	
INF	-39.9731***	-5.77100***	-17.8256***	227.845***	343.726***	
TOP	-14.2659***	-6.40538***	-14.9162***	276.436***	295.716***	
First Difference						
RGDPGR	-19.7280***	-2.42911***	-18.9317***	340.190***	456.077***	
DCR	-11.6174***	-5.84168***	-18.3772***	347.192***	556.010***	
BMO	-14.5261***	-3.71403***	-17.1726***	313.216***	498.730***	
EDU	-13.2399***	-7.30526***	-19.0272***	351.692***	559.668***	
HEL	-17.5163***	-5.12342***	-21.0848***	376.590***	571.762***	
INTERACT	-17.1641***	-5.30418***	-21.5241***	367.383***	523.594***	
INV	-19.2664***	-7.63805***	-21.5910***	387.515***	543.420***	
ELF	0.82274	-3.08428***	-11.8682***	232.671***	404.814***	
INF	-18.4391***	-7.63234***	-22.3734***	375.557***	543.599***	
TOP	-20.0938***	-7.15899***	-21.8824***	377.928***	587.675***	

Table 3: Unit Root Test Result

Source: Authors' Construct using Eviews 10

Where: ***, ** and * represents 1%, 5% and 10% level of significance respectively

The unit root tests result presented in **table 3** shows that all the variables are significant either at level or at first difference. This means the results show that all variables were less than 5% level of significance so we reject the null hypothesis of the existence of unit root and accept the alternate. Therefore, the variables are all stationary at level or first difference. This meets the requirements for the ARDL estimation technique.

Optimal Lag Length

Before running the ARDL model, the optimal lag has to be selected. The study employed the Vector auto regression (VAR) lag order selection criteria to select the maximum lag to be used in estimating the ARDL model. **Table 4** Presents the results of the various lag selection criteria.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-408.3195	NA	5.71e-12	2.489997	2.603602*	2.535283*
1	-234.4922	336.2732	3.68e-12	2.050549	3.300198	2.548694
2	-119.3354	215.9189	3.37e-12*	1.960330*	4.346025	2.911335

Table 4: Optimal lag selection

Source: Authors' construct using Eviews 10

The optimal lag length used in the study is lag 2 based on the Akaike Information Criteria (AIC) since its optimal lag had the lowest value (1.960330) among the values for the optimal lag of the other lag selection criteria.

Cointegration Test

As a condition to run the ARDL estimation technique, it is also necessary for the variables to be cointegrated in the long run. The Kao Residual cointegration test as seen in **Table 5** was carried out to ensure that the variables have a long-run relationship.

Table 5: Ka	o Residual	Cointegration	Test
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	t-Statistic	Prob.
ADF	-9.064352	0.0000

Source: Authors' construct using Eviews 10

Null: No Cointegration

The panel cointegration test carried out has a null hypothesis of no cointegration. The test results show a probability value of 0.0000% which is less than the 5% level of significance therefore we reject the null hypothesis of no cointegration and accept the alternative of long-run cointegration between the variables. The presence of cointegration aligns with the conditions necessary to estimate the ARDL model.

Pooled Mean Group / ARDL Model

Preliminary test results permit the estimation of the ARDL model since the variables have a long-run relationship and are integrated at level or at first difference. The PMG / ARDL test results of the long run and short run equation are presented in **Table 6**.

Xi'an Shiyou Daxue Xuebao (Ziran Kexue Ban)/ Journal of Xi'an Shiyou University, Natural Sciences Edition ISSN: 1673-064X E-Publication: Online Open Access Vol: 67 Issue 08 | 2024 DOI: 10.5281/zenodo.13268129

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Dependent Variable: RGDPGR				
DCR	5.743717	1.700575	3.377514	0.0009
BMO	-14.43666	1.589530	-9.082344	0.0000
EDU	6.277093	1.203022	5.217769	0.0000
HEL	-0.708296	0.885578	-0.799813	0.4246
INTERACT	16.19810	6.681688	2.424252	0.0161
INV	0.403708	0.764904	0.527790	0.5981
ELF	-0.442480	0.032495	-13.61703	0.0000
INF	-0.045047	0.010173	-4.428074	0.0000
TOP	3.092283	1.914432	1.615248	0.1076
	Short Run Equ	ation		
COINTEQ01	-0.459872	0.080191	-5.734692	0.0000
D(DCR)	-1.092170	1.618575	-0.674772	0.5005
D(BMO)	-5.809765	2.219777	-2.617274	0.0094
D(EDU)	-1.040929	1.294427	-0.804162	0.4221
D(HEL)	-1.348605	1.119277	-1.204889	0.2294
D(INTERACT)	10.20555	43.96494	0.232129	0.8166
D(INV)	3.366108	1.804000	1.865913	0.0633
D(ELF)	8.219223	9.894479	0.830688	0.4070
D(INF)	-0.197699	0.091295	-2.165511	0.0313
D(TOP)	1.739962	1.351825	1.287121	0.1993
С	0.847696	0.264281	3.207556	0.0015

Table 6: PMG / ARDL test results

Source: Authors' construct using Eviews 10

Considering 5% level of significance, the findings on **table 6** revealed that In the long run, DCR, EDU and IE positively and significantly affect RGDPGR while BMO, ELF and INF negatively and significantly affect RGDP. This means that a unit increase in DCR, EDU and IE will lead to 5.74, 6.28, 16.19, 0.4 and 3.09 increases in RGDPGR respectively while a unit increase in BMO, ELF and INF will respectively, lead to 14.44, 0.70, 0.44 and 0.04 decrease in RGDPGR. The long-run effects of HEL and INV on RGDPGR are not significant. In the short run, only BMO and INF exert significant and negative effect on RGDP. A unit increase in BMO and INF will lead to 5.80 and 0.19 decrease in RGDPGR. COINTEQ is significant with a coefficient of -0.45 which means any disequilibrium in the short run adjusted to equilibrium in the long run at the speed of 45%.

5. SUMMARY OF FINDINGS AND CONCLUSION

Summary of findings

This study, examined the interactive effect of human capital development and banking sector development on economic growth in Sub-Saharan Africa (SSA). Specifically, the study investigated the long-run and short-run relationship between banking sector development and economic growth in SSA and the long-run and short-run relationship

between human capital development and economic growth in SSA. Secondary data of 28 SSA countries were obtained from World Development Indicators, World Bank database (2022). The variables under examination were, economic growth (RGDPGR) as the dependent variable, and the independent variables were education (EDEX), health (HEL), Physical Capiral (GFCF), Broad Money (BMO), Bank Credit to Private Sector (DCR), Interactive effect of health and education (IE), Employed labour force (ELF), Openness to trade (OPN), Terms of Trade (TOT) and Inflation (INF). Banking sector development was captured by two variables; DCR and BMO and. Similarly, Human capital development was measured using EDEX and HEX. Correlation analysis carried out confirmed there was no sign of multicolinearity amongst the variables. Unit root test confirmed the variables were stationary at either level or first difference. Also, the cointegration test confirmed the variables were cointegrated therefore had a long run relationship. The panel ARDL estimation technique was then employed to arrive at the findings.

Findings revealed that the interactive effect of human capital development and banking sector development has a positive and significant effect on economic growth in the long run. It is observed that the joint effect of human capital development and banking sector development on economic growth accounts for a greater increase (16.19%) in the rate of economic growth. Findings on the relationship between human capital development and economic growth revealed that government expenditure on education has a positive and significant effect (6.27%) on economic growth in the long run while domestic general government health expenditure does not have a significant effect on economic growth. This means governments are not investing enough in the health sector especially when it comes to personnel training, infrastructures and equipment. Similarly, findings on the relationship between banking sector development and economic growth revealed that domestic credit to private sector by banks has a positive and significant effect (5.74%) on economic growth in the long run while Broad money has a negative and significant effect (-14.43% and -5.80% respectively) on economic growth both in the long run and in the short run. The negative effect of broad money on economic growth in SSA is also justified by the fact that most SSA countries have so much money in circulation which is a hindrance to economic growth.

Conclusion and recommendations

The study revealed that in the long run, banking sector development affects economic growth positively as bank credit to private sector affects economic growth positively while broad money harms growth. The negative effect of broad money on economic growth is due to the high rate of inflation in many SSA countries which affects the economies negatively. Human capital development also affects economic growth positive since education exerted positive effect on economic growth. However, health had negative effect on economic growth due to low investment in health facilities and the training of health personnel. The findings also revealed a higher level of economic growth when human capital development is interacted with banking sector development. This confirms

the moderating role of human capital development in the banking sector development and economic growth nexus, meaning that for the banking sector development to have high impact on economic growth, it is important to invest in the development of human capital as well. In the short run, however, human capital development, banking sector development and their interaction did not have any significant effect on economic growth.

The study recommends that human capital development and banking sector development jointly accelerate economic growth and therefore recommends that policies favourable for human capital development and banking sector development should simultaneously be implemented by regulators in SSA to boost economic growth in the region. Particularly, Domestic credit to private sectors by banks should be encouraged; efforts should be made to reduce the quantity of money in circulation in most SSA countries; governments should invest more in education and health by adequately and actively training personnel, putting good infrastructures in place and obtaining new and updated technology to accelerate economic growth in SSA countries.

References

- 1) Adelakum, O. J. (2011). Human Capital Development and Economic Growth in Nigeria, *European Journal of Business and Management, 3(9),* 30-38.
- 2) Ahmed, M., Hafeez, M., Kaium, M. A., Ullah, S. & Ahmad, H. (2022). Do Environmental Technology and Banking Sector Development Matter for Green Growth? Evidence from top-polluted economies, *Environmental Science and Pollution Research, 10.*
- 3) Al-Shimari, K. J. & Jihad, J. F. (2021). Analysing the Reciprocal Relationship between the Banking sector and the Human Development Index in Arab Economies, *International Journal of Management*, *12(1)*, 1320-1331.
- 4) Arabi, K. A., & Abdalla, S. Z. (2013). The impact of human capital on economic growth: empirical evidence from Sudan. *Research in World Economy*, 4(2), 43-53.
- 5) Arif, I. & Khan, L. (2019). The role of Financial Development in Human Capital Development: An Evidence from Pakistan, *Pakistan Journal of Commerce and Social Sciences*, *13(4)*, 1029-1040.
- 6) Asemota, O. G., Asemota, I. O. & Omoregie, L. C. (2023). An Analytical Financial System Development and Banking Sector Performance in Nigeria, *International Journal of Research and Innovation in Social Science*, *7*(5), 1459- 1472
- 7) Awogbemi, T. O. (2023). Human Capital Development and Nigeria's Economic Growth, *Journal of Public Administration, Finance and Law, 27(5),* 67-76.
- 8) Binuyo, B. O., Feyisayo, O. O. & Adekunle, O. B. (2019). Human Capital Development and Economic Growth in Nigeria, *International Journal of Research and Scientific Innovation, 6(8),* 71-76.
- 9) Chadha, S. & Daleep, P. (2017). Human Capital Management in Banking Sector- A Conceptual Framework, *Internation Journal of Management, 8(6),* 44-55.
- 10) Harbison F.H. (1962). Human resources development planning in modernizing economies; *international labor review* pp453-458.
- 11) Hussain, A., Nisar, Q. A., Khan, W., Niazi, U. I. & Malik, M. (2022). When and how big Data Analytics and Work Practices Impact on Financial Performance: an Intellectual Capital Perspective from Banking Industry, *Kybernetes, 10.*

- 12) Ihensekhien, O. A. & Soriwei, E. (2023). Impact of Human Capital Development in the Service Sector of the Nigerian Economy, *West Africa Social and Management Science Review*,59-73.
- 13) Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature*, 35 (2), 688-726
- 14) Lucas S.R. (1988); 'The mechanics of economic development' *Journal of monetary economics* pp30-42.
- 15) Madugba, J. U., Oparah, V. I. & Onuoha, C. J. (2022). Effect of Human Capital Investment on Economic Growth: Nigeria Perspective, *Journal of Management and Economics Studies, 4(3),* 282-297.
- 16) Magaji, S. & Musa, I. (2023). Analysis of the impact of Banking Sector Credit on the Real Sector, *Asian Journal of Economics and Empirical Research*, *10(1)*, 11-19.
- 17) Mahmood, Y., Ahmad, M., Rizwan, F. & Rashid, A. (2019). Do Banking Sector Concentration, Banking Sector Development and Equity Market Development influence Firm's Financial Flexibility? Evidence from Pakistan, *South Asian Journal of Business Studies*, *10(1108)*.
- 18) Makun, K., (2021). External debt and economic growth in Pacific Island countries: A linear and nonlinear analysis of Fiji Islands. *The Journal of Economic Asymmetries*, 1703-4949 https://doi.org/10.1016/j.jeca.2021.e00197
- 19) Nguyen, P. T. (2022). The Impact of Banking Sector Development on Economic Growth: The Case of Vietnam's Transitional Economy, *Journal of Risk and Financial Management, 15,* 1-18.
- 20) Nwagu, U. G., Onoriode, H. & Edeh, C. C. (2023). An Assessment of the Banking Sector Development in Economics Performance: A Case of Selected Countries, *Journal of Advance Research in Economics and Administrative Sciences*, *4*(1), 15-25.
- Okumoko, T. P., Omeje, D., & Udoh, F.M. (2018). The Dynamics of Human Capital Development and Industrial Growth in Nigeria, *International Journal of Developing and Economic Sustainability* 6(2), 41-51
- 22) Omoruyi, A. & Osawmonyi, I. O. (2019). Banking Sector Development and Economic Growth in Nigeria, *AAU JMS 4(1)*, 15-32.
- 23) Onaolapo, A. R. & Ajose, K. G. (2019). Banking Sector Development and Economic Growth in Nigeria, *Fountain University Journal of Management, 4(2),* 140- 158.
- 24) Organisation for Economic Co-operation and Development (1996). *Territorial indicators of employment*, OECD Publications, Paris.
- 25) Pesaran, M. H., Shin, Y. and Smith, R. (2001). Bounds Testing Approaches to the Analysis of Level Relationships. *Journal of Applied Econometrics*, 16, 289-326.
- 26) Romer P. (1986): 'Increasing returns and long-run growth'. Journal of political economy pp12-37.
- 27) Rushchyshyn, N., Mulska, O., Nikolchuk, Y., Rushchyshyn, M. & Vasyltsiv, T. (2021). The Impact of Banking Sector Development on Economic Growth: Comparative Analysis of Ukraine and some EU Countries, *Investment Management and Financial Innovations*, 18(2), 193-206.
- 28) Shahid, R., Shijie, L., Yifan, N., & Jian, G. (2022). Pathway to green growth: A panel-ARDL model of environmental upgrading, environmental regulations, and GVC participation for the Chinese manufacturing industry. *Frontier in Environmental Science*, 10:972412. doi:10.3389/fenvs.2022.972412

- 29) Shahzad, S., Yasin, A. & Luqman, M. (2022). Human Capital the Key to Economic Growth: Some New Evidence from Selected Developing Countries, *Journal of Business and Social Review in Emerging Economies*, *8*(1), 61-70.
- 30) Smith A. (1776). The Wealth of Nations: An Inquiry into the Nature and Causes of the Wealth of Nations.
- 31) Solow, R.M. (1956), "A contribution to the theory of economic growth", *Quarterly Journal of Economics*, Vol. 70, pp. 65-94.
- 32) Tsaurai, K. (2023). Banking Sector Development and Economic Growth Nexus in BRICS, *Banks and Bank System*, *18*(2), 38-47.
- 33) Wijesinghe, M. D. J. W. & Pallerachchi, D. (2022). Banking Sector Development and Economic Growth in Sri Lanka: An Econometric Analysis, *South Asian Journal of Finance*, *2(1)*, 1-13.