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## Article

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## DEVELOPMENT ECONOMICS | RESEARCH ARTICLE

# Financial development and educational quality in Sub-Saharan Africa

Abubakar Musah<sup>1\*</sup> and Godfred Aawaar<sup>2</sup>

**Abstract:** This paper examines the effect of financial development on educational quality in Sub-Saharan Africa. This paper also analyses the interaction effect of public education financing and measures of financial development on quality of education in Sub-Saharan Africa. The study adopts the two—step system generalised method of moment (Two-Step System GMM) model in estimating the effect of financial development on educational quality and the interaction effect of financial development and public education financing on educational quality. We use data for the period 1990 to 2019 for 42 Sub-Saharan African countries obtained largely from the World Development Indicators of the World Bank and the International Monetary Fund (IMF) financial development index database. The results show that overall financial development, financial access, financial depth, and financial efficiency improve quality at the primary, secondary, and tertiary levels of education. We also find that public education financing improves quality at all levels of education. The results also show that public education financing positively moderates the nexus between measures of financial development and educational quality in Sub-Saharan Africa.

**Subjects:** Economics; Finance; Educational Research; Education Studies

**Keywords:** financial development; public education financing; educational quality; educational outcomes; Sub-Saharan Africa

## 1. Introduction

Education is of priority concern to governments and policy makers worldwide. Becker (1964; 1975, 1993) in his human capital theory suggests that better educational outcomes would improve economic outcomes. Subsequent Empirical studies indicate that sufficient and efficient resource allocation to education encourages human capital development and economic growth as well as lessens the poverty burden (Devarajan, 1996; Dissou et al., 2016; Lenkei et al., 2018; Ljungberg & Nilsson, 2009; Pelinescu, 2015; Psacharopoulos & Patrinos, 2002; Saviotti et al., 2016; Schultz, 1961; Nelson & Phelps, 1966). Education is therefore crucial in bridging the inequality gap between the rich and the poor. Many young people however lack the opportunity to access quality education in Sub-Saharan Africa (United Nations Educational, Scientific and Cultural Organization; United Nations Economic Commission for Africa, UNECA, 2019). Given the growing concerns about quality of education (Kooli, 2019), increasing enrollment is no longer enough and policymakers must direct their efforts towards enhancing quality of education, particularly at the primary and secondary levels (UNESCO, 2011). It was not surprising therefore that access to quality education featured prominently in the sustainable development goals (SDG4) adopted in 2015. Goal 4 has ten targets with the ultimate goal of “ensuring inclusive and equitable quality education and promoting lifelong learning.” The world recognises that education is key in “enabling upward socioeconomic

mobility and escaping poverty". Some successes have been chalked over the years across the globe, but many more problems still persist. The out-of-school rate is still high and even those that find themselves in school are not learning effectively United Nations Economic Commission for Africa, UNECA, 2019). Of all regions, Sub-Saharan Africa (SSA) has the highest rate of education exclusion and faces the greatest challenges in providing schools with the needed basic resources (UNESCO, 2021). Yes, enrolments have surge remarkably in SSA over the years but it is not enough to just be in school. Quality of education matters most.

Financing education is not just a public (government) issue, both government and private investments can grossly improve educational outcomes in SSA. Domestic revenue mobilisation is therefore necessary for sufficient investment into education. Improvement in financial access, financial depth, financial efficiency, as well as overall financial sector can enhance domestic revenue mobilisation by households, firms, and governments for investments into education. Financial development is the extent to which the financial system functions well. Financial development may be described as the expansion of the size, efficiency, and stability of financial markets, as well as expanded access to financial markets, which can have a variety of economic benefits (Guru & Yadav, 2019). Stiglitz and Weiss (1983) and diamond (1984) posit that a well-developed financial sector directs an economy's savings to profitable investments, whereas Greenwood and Jovanovic (1990) identify lower cost of information, resulting in better capital allocation as a key sign of financial development. Theoretically, financial development influences education indirectly through its effect on incomes of individuals, businesses, and government. Financial development opens opportunities for economic agents through its effect on economic growth. These improved incomes will enhance the ability of households, firms, and government to spend on education. Government will be able to expand access by providing the necessary infrastructure to reduce class sizes, and spending on teacher motivations to improve quality. Claessens and Feijen (2007) argue that financial development affects education directly by making it possible for households to access credit and insurance products to support their human capital investments.

Surprisingly though, studies that examine the effect of financial development on educational outcomes are limited (Kiliç & Ozcan, 2018) and almost non-existent for Sub-Saharan Africa. Nonetheless, a few attempts have been made in the literature to examine the effect of financial development on educational outcomes. There are however, notable gaps in these studies making the current research relevant. First of all, the literature fails to analyse how financial sector development impacts on quality of education which is the main focus of the sustainable development goal four (Quality Education). The sustainable development goal four (SDG4) lays emphasis on quality education and therefore incorporates quality into most of the targets for education. However, prior studies concentrate on how financial development and public education financing impacts on educational enrolment (Ansong et al., 2018; Bold et al., 2018; Bui et al., 2020; Kiliç & Ozcan, 2018; Thierry & Emmanuel, 2022) and expenditures (Kiliç & Ozcan, 2018) to the neglect of quality. The nexus between financial development and measures of quality education therefore remains unexamined in the education literature, particularly for the SSA sub-region. Much of the literature also analyse the nexus between financial development and educational outcomes at the micro level in cross-sectional studies (Bui et al., 2020; Shi, 2016), ignoring how, at the macro level across countries and time, financial development can impact on educational outcomes, particularly in SSA. A few studies also examine the nexus at the country level using time series data (Ansong et al., 2018; Bold et al., 2018; Shi, 2016). The measure of financial development also raises eyebrows in previous studies as single dimension measures are largely used in the literature in examining this nexus. Single dimension measures such as money supply, stock of private credit, and market capitalization as a share of GDP revolving around financial depth and financial access are largely used as proxies for financial development, ignoring financial efficiency. Sviryzdenka (2016) however notes that if financial markets and institutions are inefficient, the contribution of financial development would be limited even if a financial system is sufficiently large and can provide broad access to finance for firms and individuals. Researchers such as Čihák et al. (2013),

Sahay et al. (2015), Svirydenka (2016), and Topcu and Payne (2017) all express legitimate concerns about the use of single variable proxies for financial development and call for broad-based measures of financial development capturing the various aspects of financial development. In a more financially developed market, government is able to mobilize resources to finance development investments such as education. On the other hand, government spending expands the economy and therefore provides liquidity in the financial environment. An interaction effect of financial development and public education financing is therefore plausible and could provide useful insights in the nexus. This, however, remains a gap in literature.

The current study makes significant contributions to literature and policy. First it contributes to literature by examining the separate effects of broad—based measures of financial access, financial depth, financial efficiency, and overall financial development on educational quality in the Sub-Saharan African context, and also adopts a quality measure of educational outcomes. Second, the paper provides transmission mechanism through which the benefits of financial development can be translated into improved educational quality by analysing the interaction effect of measures of financial development and public education financing on educational quality. Third, this study contributes to methodology by computing broad based measures of financial access, financial depth, and financial efficiency. Fourth, this study guides policymakers (government and development partners) on the importance of financial development when it comes to improving the quality of education in Sub-Saharan Africa, and which components of financial development to target in order to achieve the desired outcomes.

## **2. Literature review**

### **2.1. Overview of education and financial development in Sub-Saharan Africa**

The importance of education in the sub-Saharan African context cannot be overemphasised given the low levels of development in the region. Across all regions, Sub-Saharan Africa (SSA) has the poorest achievement in terms of educational attainment and faces the greatest tasks in providing schools with the needed basic resources (UNESCO, 2021). Although progress is being made, the education situation in the region still looks gloomy. For instance, the exclusion rate is scary with over 20% of children aged 6 years and 11 years, over 33% of children aged 12 years and 14 years, and at least 50% of children aged 14 years to 17 years, out of school. Within Sub-Saharan Africa, nearly 9 million girls and 6 million boys will never go to school (UNESCO, 2021). Class sizes are also high in SSA compared to the world averages. In Sub-Saharan Africa, the average class size per teacher is 37 in primary schools higher than the global average of 23, and 22 in secondary schools also higher than the global average of 17 (UNESCO, 2021). This shows the low levels of quality of education in Sub-Saharan Africa and efforts towards devising strategies to deal with the menace needs to be put in place.

The state of financial development in SSA is poor. Over the last four decades, most Sub-Saharan African countries experienced improvement in financial development. With the exception of the middle-income countries in the sub-region, however, financial markets and financial institutions in the region are less developed than in other emerging regions (Mlachila et al., 2016). Pan-African bank development has facilitated more economic integration and has progressively filled the void left by European and American banks, but it also creates obstacles. These include ineffective centralized supervisory monitoring and relatively poor internal governance structures. It remains to be seen, however, whether the gains made in the financial sector translate into improvement in educational quality in the sub-region.

### **2.2. Theoretical and Empirical Literature**

The proponents of the human capital theory argue that investing in people through educational spending and expenditure on trainings yields positive results in the future, not only for the person concerned but for others and the economy at large (Almarzoqi et al., 2015; Becker, 1962; Kooli & Muftah, 2020; Law & Singh, 2014; Mushkin, 1962). Focusing on education, the theory stipulates

that out-of-pocket expenditure on education by households and increase in access to educational institutions by government and the private sector affect educational outcomes. The human capital theory holds that economic and social benefits accrue to individuals and society as investments in people surge (Becker, 1993). At the microlevel, human capital investment by households depends, to a greater extent, on level of income, cost of other goods, health of household members, and individual characteristics (Sánchez & Sbrana, 2009). Income is a key factor of the demand for education by households. The amount spent on education depends on the ability of households to mobilise sufficient resources. At the macrolevel, government's ability to spend on education depends largely on the ability of government to mobilise resources.

Financial development is one of the vehicles that broadens people's options by providing them with income-generating possibilities as well as competitive options for accessing education insurance services. Financial development helps to enhance income of individuals and businesses which leads to improvement in tax revenue to government. Sehrawat and Giri (2017) noted that a well-functioning financial market more efficiently mobilises resources for investment in education, health, and welfare aimed at improving human capital. Financial efficiency alleviates borrowing limits and allows individuals to invest in education and health care. Credit limitations, in particular, play a significant impact in poor nations' restricted options for human capital investment. Claessens and Feijen (2007) argue that financial development affects human capital directly by making it possible for households to access credit and insurance products to support their human capital investments. Indirectly, financial development opens up opportunities in the economy through economic growth. Higher incomes are therefore earned and people are better placed to spend on education and health. Government also earns higher incomes through tax revenue when the economy grows and hence, will be able to invest in educational infrastructure and subsidies for citizens.

Financial development therefore theoretically affects educational outcomes directly by easing borrowing and making insurance accessible, and indirectly through improved incomes for both households and government as a result of economic growth.

Other researchers reach the opposite conclusion, claiming a negative and linear association between financial sector development and educational outcomes (Banerjee & Newman, 1993; Galor & Zeira, 1993). This conviction is premised on the inefficient market theory. Financial market inefficiencies, such as financial asymmetries, transaction costs, and contract enforcement costs, may be more burdensome for individuals lacking collateral, credit history, and network ties. Even if the impoverished have high-yielding enterprises, loans to them might be limited. This decreased capital allocation efficiency inhibits impoverished people's social mobility.

The nexus between financial development and educational outcomes has not received significant empirical attention, particularly in the Sub-Saharan context. None the less, a few attempts are made. Empirical research into the finance—educational outcomes nexus is a recent phenomenon, and academics have used different variables such as school enrollment rates and public expenditure on education as proxies for educational outcomes (human capital) in examining the finance—educational outcomes nexus. These studies could be classified into two, based on samples: Country specific studies and cross-country studies.

Country specific studies such as that of Hakeem and Oluitan (2012), H. Nik et al. (2013); Sehrawat and Giri (2014), and Uddin and Masih (), apply time series techniques, such as co-integration test, Granger causality test, vector autoregressive models and variance decomposition analysis to examine the finance—education nexus. Studies such as Hakeem and Oluitan (2012), and A.H. Nik et al. (2013) find weak, marginal, and insignificant relationship between financial development and educational outcomes. Sehrawat and Giri (2014) discovers evidence of a significant unidirectional relationship between financial and economic progress and the human development index (HDI). Financial development, according to Uddin and Masih 2015, fosters human development through the channel of economic growth. Other studies show unidirectional

causal effects running from human capital to financial development (Demirci & Özyakışır, 2017; Hatemi-J & Shamsuddin, 2016).

Cross-country studies such as Akhmat et al. (2014), Arora (2012), Arora and Ratnasiri (2011), and Sibel et al. (2015), Hong-Ho (2013), Ostojic (2013), Outreville (1999), Sehrawat and Giri (2017), Kiliç and Ozcan (2018), and Thierry and Emmanuel (2022) generally employ static and dynamic panel data models to examine the finance—education nexus. Outreville (1999) showed that human capital and socio-political stability explains the level of financial development in developing countries. Pascucci (2012), in a panel study, established that improvements of financial market depth are strongly associated with changes in HDI. Arora (2012) concludes that educational quality is very poor in Asian countries where the level of financial development is low. Arora and Ratnasiri (2011) notes in a separate study that education significantly and positively affects financial sector development. Ostojic (2013) showed that financial development strongly and positively affects human development in Europe. Development of credit market enhances education as shown by Hong-Ho (2013). According to Akhmat et al. (2014), financial development is a key driver of human growth. Similarly, according to Sehrawat and Giri (2017), both financial development and economic growth contribute to improvement in human capital, with a unidirectional causation extending from financial development to human capital. According to Sibel et al. (2015), human capital accumulation has a favourable impact on financial development. Financial development and economic progress, according to Kiliç and Ozcan (2018), have significant and beneficial effects on human capital. According to Abubakar et al. (2015), financial development contributes greatly to economic growth in the Economic Community of West African States (ECOWAS) sub-region through human capital development. They did not, however, examine the interaction between human capital (education) and financial development. Thierry and Emmanuel (2022) examine the nexus between broad based measures of financial development and enrolment in primary, secondary, and tertiary schools in Sub-Saharan Africa. They find that financial development improves enrolment at all three levels of education.

Except for Kiliç and Ozcan (2018) and Thierry and Emmanuel (2022), most of these studies employ single variables as proxies for financial development. The proxies for education (human capital) also varied among these studies but all fail to include quality of education as an educational outcome variable.

### 3. Data and methodology

#### 3.1. Variables and data

This paper includes annual data for the period 1990 to 2019 for 42 Sub-Saharan African countries obtained largely from the World Development Indicators (WDI) of the World Bank and the International Monetary Fund (IMF) broad—based financial development index database. The choice of the study period and the countries is based purely on data availability on the study variables.

##### 3.1.1. Dependent variables

In the literature, various measures of educational outcomes have been used. Whereas a group of researchers measure educational outcomes using enrollment data, others use education expenditures as measures of educational outcomes. The focus of the current study is to examine the role financial sector development can play in improving quality of education at the primary, secondary, and tertiary levels. We adopt the pupil–teacher ratio as the measure of educational quality. The pupil–teacher ratio is computed by dividing the number of pupils at a certain educational level by the number of instructors at the same level. As a result, the pupil–teacher ratio is frequently used to assess the quality of education in different nations (United Nations Economic Commission for Africa, UNECA, 2019). Data on pupil–teacher ratio at primary, secondary, and tertiary levels are obtained for the period 1990 to 2019 from the WDI of the World Bank and the UNESCO Institute of Statistics.



### 3.1.2. *Independent variables*

Financial development is the main independent variable of the study. Different measures of financial development have been used by different researchers. Most of these studies (Arcand et al., 2011; Cavallo & Scartascini, 2012; Ibrahim & Alagidede, 2018; King & Levine, 1993) employ single dimension measures of financial development. This study however agrees with Sahay et al. (2015), Svirydenka (2016), and Topcu and Payne (2017) that financial development is multi-faceted. This study therefore relies on the International Monetary Fund (IMF) broad-based financial development measures computed by Svirydenka (2016). In all, the IMF data is made up of nine indices. They include financial markets development, financial institutions development, access to financial institutions, access to financial markets, depth of financial institutions, financial markets depth, efficiency of financial institutions, financial markets efficiency, and the overall financial development. We extend the IMF data by computing three measures of financial development using principal component analyses (PCA): financial access, financial depth, and financial efficiency. Financial access is the ease with which financial services can be accessed by economic agents (Morduch, 1999). We compute financial access using PCA with financial institution access and financial market access data. Financial depth measures the size of the financial sector relative to the size of the economy. We compute financial dept with financial institution depth and financial market depth using PCA. Financial efficiency is computed with financial institution efficiency and financial market efficiency using PCA. In all, four variables measuring financial development are used; overall financial development, financial access, financial depth, and financial efficiency.

Public education financing is measured as government expenditure on education as a percentage of GDP. Public education expenditure data is obtained from the World Development Indicators of the World Bank and the UNESCO Institute of Statistics (UIS).

### 3.1.3. *Control variables*

In line with existing literature, we include per capita income, remittances, and under-five mortality rate as control variables. These variables were adopted from studies on the determinants of educational outcomes such as the works of Yogo (2017), Shields and Menashy (2019), and Ansong et al. (2018). Remittances, per capita incomes, and under-five mortality rate are expected to show negative effects on the pupil-teacher ratio. Data on all the control variables are obtained from the World Development Indicators of the World Bank.

Remittance inflows typically minimize household liquidity pressures and translate into an increased number of school hours for their children (Abdul-Mumuni & Koomson, 2019). Remittances in this study refer to transfers received from non-residents of a country. We therefore expect a positive coefficient for remittances.

As income of households increase, the relative cost of enrolling children into school is reduced. This means that increases in household income might lead to improvement in educational outcomes (Gupta et al., 2002). We do know from the theory of demand that the demand for normal goods increases as consumer incomes rise. Granted that education is a normal good, the higher household incomes will lead to increases in the demand for education, holding all other factors constant. To capture household income levels, per capita income measured as GDP per capita is used.

Health outcomes have a direct effect on educational outcomes. For instance, a healthy pupil is more likely to stay in school and hence improves enrollment and persistence. Better nutrition for children enhances their health and therefore, improves school enrollment, persistence and mental development of children (Gupta et al., Glewwe & Jacoby, 1995). This study agrees with Gupta et al. (2002) and include under—five mortality rate as a proxy for child nutrition. We therefore expect a positive coefficient for under-five mortality rate



### 3.2. Empirical Model and Estimation Technique

Estimating with panel data is plague with difficulties especially in the presents of endogeneity. The use of traditional methodologies such as pooled ordinary least squares (OLS), fixed and random effects techniques are problematic and are avoided in this study. For example, Asteriou and Hall (2011) and Gujarati and Porter (2009) suggest that the pooled OLS enforces homogeneous intercept and slope parameters, obscuring country heterogeneity and perhaps enabling the error term to correlate with some explanatory variables. Also, when certain explanatory variables are endogenous and linked with the error terms, the fixed effects model cause severe bias (Baltagi, 2008; Campos & Kinoshita, 2008). Arellano (2003) noted that, because random effects models are time invariant, the error term at any point in time may be strictly exogeneous and uncorrelated to the past, present, or future series (Arellano, 2003). In practise, however, this strict assumption is less feasible (Loayza & Ranciere, 2006).

To examine the impact of financial development on educational quality, we specify a model where educational quality is a function of financial sector development, public education financing, and control variables as shown in the equation (1) below:

$$EQ_{it} = f(FD_{it}, PEF_{it}, Z_{it}) \quad (1)$$

Where EQ is educational quality measured as the pupil-teacher ratio at primary, secondary and tertiary levels, FD is financial sector development indicators, Z is a vector of control variables,  $i$  and  $t$  are country and time indices respectively while  $\varepsilon_{it}$  is the error term which captures the influence of other variables not included in the model. Assuming linearity, the model is stated as follows:

$$EQ_{it} = EQ_{it-1} + \emptyset FD_{it} + \gamma PEF_{it} + \delta Z_{it} + \varepsilon_{it} \quad (2)$$

By expanding the control variables, Z, the model is explicitly stated as follows:

$$EQ_{it} = EQ_{it-1} + \emptyset FD_{it} + \gamma PEF_{it} + \delta_1 PCI_{it} + \delta_2 REM_{it} + \delta_3 UFMR_{it} + \varepsilon_{it} \quad (3)$$

Where  $\emptyset$  measures the contribution of financial sector development to educational quality,  $\gamma$  measures the contribution of public education finance on educational quality, and  $\delta_i$  measures the effects of the control variables.

EQ is educational quality, FD represents financial development with four dimensions: overall financial development, financial access, financial depth, and financial efficiency. We estimate the effects of overall financial development, financial access, financial depth, and financial efficiency on educational quality at the three levels of education. PCI is the per capita income measured as GDP per capita, REM is remittances expressed as a percentage of GDP, and UFMR is under-five mortality rate.

$$EQ_{it} = \partial + \delta_1 EQ_{it-1} + \delta_2 FD_{it} + \delta_3 PEF_{it} + \delta_4 PCI_{it} + \delta_5 REM_{it} + \delta_6 UFMR_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (4)$$

Where;  $i = 1, 2, 3, \dots, 42$ ;  $t = 1, 2, \dots, 25$ .  $\delta_i$  are the respective parameters for financial development, public education financing and the control variables.

To examine the role of public education finance (PEF) in the nexus of educational outcomes and financial development, we introduce an interaction term of FD and PEF into the model. Specifically, we analyse the indirect effect of financial development by including an interaction term as presented in equation (5).

$$EQ_{it} = \varphi + \psi_1 EQ_{it-1} + \psi_2 FD_{it} + \psi_3 PEF_{it} + \psi_4 (FD_{it} \times PEF_{it}) + \psi_5 \ln PCI_{it} + \psi_6 REM_{it} + \psi_7 UFMR_{it} + \mu_i + \nu_t + \varepsilon_{it} \quad (5)$$

Where;  $i = 1, 2, 3, \dots, 42$ ;  $t = 1, 2, \dots, 25$ .  $\psi_i$  are the respective parameters for financial development, public education financing and the control variables.

We employ the two-step system generalised method of moment by Blundell and Bond (1998) with Windmeijer (2005) robust (corrected) standard errors in estimating equations (4) and (5). The two step GMM estimator is proven to be asymptotically more efficient than the one-step estimator. We employ the two step GMM for a number of reasons. First, educational outcomes are inherently dynamic since past values influences current levels of educational outcomes. Therefore, the inclusion of a lagged dependent variable makes fixed effect and OLS estimators bias (Nickell, 1981). Second, the two-step system GMM also corrects for reverse causality due to simultaneity where some independent variables may be endogenous. Since external instruments are hard to come by, choosing a model that relies on internal instruments is most appropriate. Third, our panel is a short panel where the number of countries (42) exceeds the number of years (30). Although our sample is strongly balance, there are gaps. We therefore estimate with orthogonal deviations in order to maximise the number of observations.

We use two tests to ensure that our estimates are consistent: the Hansen test for overidentification and the Arellano and Bond test for first-order and second-order serial correlation in the error term, AR (1) and AR (2), respectively. The Hansen tests, according to Roodman (2009), assess instrument validity by analysing sample duplicates of the moment conditions applied in estimation. As a result, the number of instruments should not exceed the number of groups, since results from proliferated instruments cannot be accepted. Finally, while the error term may be serially correlated in the first order, it must not be serially correlated in the second order because this might indicate model misspecification.

#### 4. Empirical results and Discussion

This section presents and discusses the results and major findings of the study.

##### 4.1. Descriptive statistics

Table 1 presents the descriptive statistics of the study variables and the source of the data for each variable. Table 1 shows the mean, standard deviation, minimum value, and maximum value of each variable for the study period.

Table 1 shows that the average pupil-teacher ratio for primary school is 42.481 indicating that there are 42.481 pupils per teacher among the countries used in this study. This is far above the global average of 23.6 pupils per teacher in primary school (based on 2018 figures of the World Bank) pointing to the poor quality of education in Sub-Saharan Africa. Student-Teacher Ratio. Although there is no standard ideal number for pupil-teacher ratio, The Right of Children to Free and Compulsory Education (RTE) Act, 2009 puts it at 30 pupils per teacher at the primary school level. There are about 12 more students per teacher in primary schools in Sub-Saharan Africa. The average for the secondary and tertiary levels stood at 25.115 and 18.714 respectively, both above the global average at the respective levels. Quality of education is generally poor across Sub-Saharan Africa. The global average for secondary school is 18 pupils per teacher (based on 2018 figures of the World Bank) which is better than the Sub-Saharan African average of 25.115.

##### 4.2. Correlation matrix

This section discusses the results of the cross correlations of the explanatory variables. This is to identify potential multicollinearity among the explanatory variables. The results are presented in Table 2.

**Table 1. Summary statistics and data sources**

Variable	Obs.	Mean	Std. Dev.	Min	Max	Source
Financial Development	1260	0.13	0.102	0	0.646	IMF (2022)
Financial Institutions	1260	0.211	0.128	0	0.74	IMF (2022)
Financial Markets	1260	0.046	0.089	0	0.546	IMF (2022)
Financial Institutions-depth	1260	0.106	0.162	0	0.885	IMF (2022)
Financial Institutions-access	1260	0.087	0.136	0	0.902	IMF (2022)
Financial Institutions-efficiency	1260	0.508	0.164	0	0.987	IMF (2022)
Financial Markets depth	1260	0.06	0.11	0	0.822	IMF (2022)
Financial Markets access	1260	0.044	0.136	0	0.927	IMF (2022)
Financial Market efficiency	1260	0.029	0.116	0	1	IMF (2022)
Financial access	1260	0.079	1.058	−0.602	6.435	Author Computed
Financial depth	1260	0.039	1.085	−0.553	7.556	Author Computed
Financial efficiency	1260	0.058	1.157	−0.229	9.743	Author Computed
Pupil-teach ratio_ primary	902	42.481	13.846	12.467	100.237	World Bank (2022)
Pupil-teach ratio_ secondary	517	25.115	9.528	5.314	80.052	World Bank (2022)
Pupil-teach ratio_ tertiary	420	18.714	11.704	1.563	147.56	World Bank (2022)
Public Education Expenditure	729	4.088	1.973	0.623	13.22	World Bank (2022)
Under—5 Mortality Rate	1260	110.377	56.657	13.7	341.2	World Bank (2022)
Per Capita Income	1228	1758.553	2835.275	102.598	22,942.609	World Bank (2022)
Remittances	1094	4.022	12.15	0	167.432	World Bank (2022)

Source: Author's computations from IMF and World Bank Data

**Table 2. Correlation matrix**

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Fin. Dev.	1.000							
(2) Fin. access	0.699	1.000						
(3) Fin. depth	0.782	0.419	1.000					
(4) Fin. efficiency	0.694	0.334	0.421	1.000				
(5) Public Edu. Exp	0.414	0.319	0.210	0.345	1.000			
(6) Under-5 Mortality	-0.463	-0.625	-0.275	-0.213	-0.329	1.000		
(7) Remittances	-0.065	-0.031	-0.130	-0.079	0.360	-0.048	1.000	
(8) Per Capita Income (ln)	0.703	0.759	0.495	0.364	0.286	-0.650	-0.078	1.000

Source: Author's computations from IMF and World Bank Data using Eviews software

Table 2 shows that the measures of financial development (overall financial development, financial access, financial depth, and financial efficiency) are highly correlated among themselves. This poses problems of multicollinearity among the explanatory variables. We therefore estimate separate regressions for each of them for each level of education in order to avoid possible collinearity among the measures of financial development.

#### 4.3. Stationary test

We conduct a unit root test to determine the stationary of the study data using the traditional Im, Pesaran, and Shin (1999) unit root test. The results shown in Table 3.

Table 3 shows that none of the variables is integrated at order two. Overall financial development, financial efficiency, pupil-teacher ratio \_ tertiary, under-5 mortality rate, and remittances are stationary at levels while financial access, financial depth, pupil-teacher ratio \_ primary, pupil-teacher ratio \_ secondary, public education financing, and per capita income are stationary at first difference.

Show graphs of overall financial development and pupil-teacher ratio at primary, secondary, and tertiary levels

#### 4.4. Financial development, public education financing, and quality of education

This section presents findings on the relationship between quality of education and the independent variables (financial development, public education financing, and the control variables). This is done separately for the four measures of financial sector development (overall financial development, financial access, financial depth, and financial efficiency). The estimation approach is the Two-Step System Generalised Method of Moments (2-Step SGMM). Table 4 presents the results of the 2-step SGMM estimations at the primary, secondary, and tertiary levels.

Table 4 shows that all four measures of financial development (financial access, financial depth, financial efficiency, and overall financial development) show significant effects on quality of education (pupil-teacher ratio). Columns 1 to 4 in Table 4 presents the results for primary school. Column 1 shows that overall financial sector development records a significant negative coefficient indicating that improvement in overall financial sector development reduces the pupil-teacher ratio in primary schools. In column 2, results on the effect of financial access on pupil-teacher ratio in primary school is presented. It shows that improvement in financial access significantly reduces pupil-teacher ratio in primary school since the coefficient is negative and significant. This shows that improvement

**Table 3. Unit root test results**

Variable	Levels		First difference		Decision
	Statistic	p-value	Statistic	p-value	
Financial Development	−2.23569	0.0127	Stationary at Levels		I (0)
Financial Access	8.98105	1.0000	−8.01564	0.0000	I (1)
Financial Depth	0.46447	0.6788	−13.9836	0.0000	I (1)
Financial Efficiency	−2.11182	0.0174	Stationary at Levels		I (0)
Pupil-teacher ratio_ primary	0.65351	0.7433	−8.37082	0.0000	I (1)
Pupil-teacher ratio_ second.	1.63801	0.9493	−5.41934	0.0000	I (1)
Pupil-teacher ratio_ tertiary	−1.94022	0.0262	Stationary at Levels		I (0)
Public Education Financing	0.21743	0.5861	−7.87719	0.0000	I (1)
Under—5 Mortality Rate	−8.16197	0.0000	Stationary at Levels		I (0)
Remittances	−2.33294	0.0098	Stationary at Levels		I (0)
Per Capita Income	4.40687	1.0000	−16.0926	0.0000	I (1)

Source: Author's computations from IMF and World Bank Data

in financial access improves quality of education in primary schools. Column 3 shows that financial depth negatively and significantly affects pupil-teacher ratio in primary indicating that increases in depth of the financial sector enhances quality of education in primary schools. Similarly in column 4, financial efficiency is shown to have a significant negative effect on quality of education in primary school as improvements in financial efficiency reduces the pupil-teacher ratio in primary schools. Overall financial development records a larger coefficient that its components of financial access, financial depth, and financial efficiency. This finding confirms the conclusion of Thierry and Emmanuel (2022) who examined the effect of financial devilmnt on enrollment. Columns 5 to 8 presents results on the effect of financial development on quality of education in secondary schools. In column 5, the results show that overall financial development has a negative and significant effect on pupil-teacher ratio in secondary schools. This indicates that improvement in overall financial sector development improves quality of education in secondary school by reducing the pupil-teacher ratio. Column 6 shows that financial access records a negative and significant coefficient showing that improvement in financial access improves quality of education through reduction in the pupil-teacher ratio in secondary schools. In column 7 and column 8, the results show that financial depth and financial efficiency both record negative and significant coefficients respectively, indicating that improvement in both financial depth and financial efficiency improve the quality of education in secondary schools. These findings are consistent with Bruhn and Love 2014, Doan et al. (2014), and more recently Thierry and Emmanuel (2022) who all find that improvement in financial sector development improves educational outcomes. The results at the tertiary level, presented in column 9 to column 12, are not different. Financial development, financial access, financial depth, and financial efficiency all show negative and significant coefficients indicating that improvement in over-all financial sector development, financial access, financial depth and financial efficiency all improve the quality of tertiary education through reduction in the pupil-teacher ratio at the tertiary level. Thierry and Emmanuel (2022) find a similar outcome at the tertiary level that improvement in measures of financial sector development translate into improvement in

Table 4. Effect of financial development and public education financing on educational quality

Variables	Dep Var: pupil—teacher ratio at primary				Dep Var: Pupil—teacher ratio at secondary				Dep Var: pupil—teacher ratio at tertiary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L. dependent	0.925*** (0.033)	0.764*** (0.04)	0.583*** (0.072)	0.637*** (0.059)	0.66*** (0.115)	0.769*** (0.02)	0.892*** (0.026)	0.851*** (0.015)	0.632*** (0.078)	0.592*** (0.08)	0.64*** (0.076)	0.646*** (0.069)
Overall Fin. dev	-1.468** (0.685)				-10.036** (4.278)				-4.448 (5.866)			
Fin. access		-0.888*** (0.143)				-0.208*** (0.069)				-1.228** (0.472)		
Fin. depth			-0.564*** (0.131)				-0.25*** (0.057)				-0.217 (0.635)	
Fin. efficiency				-0.809*** (0.246)				-0.336*** (.0064)				-0.389*** (0.137)
Pub Edu. Fin.	-0.082* (0.046)	-0.086 (0.065)	-0.208** (0.094)	-0.172* (0.085)	0.144** (0.068)	0.138*** (0.038)	-0.027 (0.046)	0.028 (0.027)	-0.468*** (0.12)	-0.569*** (0.114)	-0.531*** (0.118)	-0.669*** (0.133)
Per Capita Inc. (ln)	-0.495** (0.203)	-0.899*** (0.232)	-3.685*** (0.732)	-3.231*** (0.622)	-2.136*** (0.744)	-0.786*** (0.084)	-0.66*** (0.159)	-0.799*** (0.085)	-0.129 (0.477)	0.808 (0.599)	-0.3 (0.31)	-0.369 (0.268)
Remittances	-0.013*** (0.004)	-0.009 (0.008)	-0.032 (0.033)	-0.006 (0.025)	-0.026** (0.011)	-0.021*** (0.004)	0.008 (0.006)	-0.004 (0.003)	0.002 (0.011)	0.009 (0.011)	0.007 (0.011)	0.022** (0.01)
Under-5 mortality	0.001 (0.003)	-0.002 (0.002)	0.008 (0.012)	0.003 (0.01)	0.008*** (0.002)	0.004*** (0.001)	0.005*** (0)	0.003*** (0)	-0.015* (0.007)	-0.023*** (0.007)	-0.015* (0.009)	-0.013* (0.007)
Constant	5.889** (2.703)	16.322*** (3.355)	42.09*** (7.755)	36.962*** (6.645)	20.266*** (7.073)	10.448*** (0.681)	6.832*** (1.693)	8.849*** (0.916)	11.896*** (3.177)	7.156* (3.771)	12.535*** (2.656)	13.286*** (2.516)
Observations	380	380	380	380	211	211	211	211	151	151	151	151
Countries	35	35	35	35	33	33	33	33	32	32	32	32
Instruments	33	33	27	32	24	32	28	33	18	18	18	18
AR (1)	0.005	0.008	0.013	0.009	0.019	0.018	0.013	0.016	0.046	0.054	0.045	0.043

(Continued)



Table 4. (Continued)

Variables	Dep Var: pupil—teacher ratio at primary				Dep Var: Pupil—teacher ratio at secondary				Dep Var: pupil—teacher ratio at tertiary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
AR (2)	0.832	0.779	0.720	0.687	0.467	0.478	0.471	0.491	0.430	0.473	0.421	0.429
Hansen	0.485	0.297	0.227	0.514	0.231	0.380	0.476	0.422	0.281	0.274	0.278	0.233

Source: Author's computation; \*\*\*, \*\*, and \* show significance at 1%, 5%, and 10% respectively, corrected standard errors in parenthesis

educational outcomes in Sub-Saharan Africa. The results are consistent with the human capital theory that improvement in the financial sector will enhance expenditures on education which leads to improvement in educational outcomes. The findings are however contrary to the inefficient market premised theoretical analyses (Banerjee & Newman, 1993; Galor & Zeira, 1993).

Table 4 further shows that public education financing records largely negative and significant coefficients for primary and tertiary education, but positive and significant coefficients for secondary education. This means that public expenditure improves quality at the primary and tertiary levels but reduces quality at the secondary level. This is not surprising as primary education is free and compulsory in many countries. Spending on primary education is therefore directed towards improvement quality. In secondary schools however, enrolments still remain a problem for most Sub-Saharan countries. Government spending therefore goes into enrolment enhancement programmes.

The diagnostics for all the Systems GMM estimations shown in Table 4 all look great. All the models pass the AR (1) test and AR (2) test as shown in the Table 4. The Hansen test for all models shows probability values within acceptable range. The results are therefore robust.

#### **4.5. Interaction effect of public education financing and financial development measures on educational outcomes**

We discuss the interaction effect of financial development measures with public education financing on the quality of education in Sub-Saharan Africa. The results of the two-step system GMM are presented in Table 5.

Table 5 presents the results of the interaction effect of public education financing with the measures of financial development on the quality of education at the primary, secondary, and tertiary levels in Sub-Saharan Africa. Table 5 shows that the interaction of overall financial development and public education financing has a negative effect on pupil-teacher ratio at primary, secondary and tertiary level. However, it is only significant for tertiary education. The coefficient of the interaction of financial access and public education financing is negative for all three levels of education but is significant for only secondary education. Similarly, the interaction effect of financial depth and public education financing is negative for primary, secondary, and tertiary levels of education but is significant for secondary and tertiary education. The coefficient of the interaction of financial efficiency with public education financing is positive for primary education but negative for both secondary and tertiary education. The interaction is however significant for only tertiary education similar to the interaction of overall financial and public education financing. The results generally show that financial development contributes more to improving educational quality when government spends on education. Alternatively, we conclude that government spending on education is more effective in more developed financial sector than in less developed financial sector. Overall, the interaction of public education financing with measures of financial development does not significantly improve educational quality at the primary levels but significantly improve quality of education at the secondary and tertiary levels. This could be due to the fact that, in most SSA countries, primary education is free and hence government financing on primary education does not depend so much on government revenue. Most SSA countries receive donor support to finance education at the primary levels. In the secondary and tertiary levels however, public spending depends, to a large extent, on government's ability to raise revenue.

The diagnostics for all the Systems GMM estimations shown in Table 5 all look great. All the models pass the AR (1) test and AR (2) test as shown in the Table 5. The Hansen test for all models shows probability values within acceptable range. The results are therefore robust.

**Table 5. Interaction effect of public education financing and financial development on educational quality**

Variables	Dep. Var.: pupil—teacher ratio at primary				Dep. Var.: pupil—teacher ratio at secondary				Dep. Var.: pupil—teacher ratio at tertiary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
L. Dependent	0.9*** (0.037)	0.769*** (0.037)	0.58*** (0.071)	0.636*** (0.058)	0.656*** (0.114)	0.763*** (0.019)	0.89*** (0.023)	0.841*** (0.016)	0.693*** (0.074)	0.602*** (0.08)	0.701*** (0.068)	0.632*** (0.081)
Pub. Edu. Fin.	−0.054 (0.099)	−0.097 (0.06)	−0.216** (0.096)	−0.163* (0.091)	0.226 (0.137)	0.152*** (0.038)	−0.011 (0.047)	0.026 (0.039)	−0.851*** (0.18)	−0.614*** (0.127)	−0.511*** (0.11)	−0.766*** (0.221)
Fin. Dev.	−5.344*** (2.351)				−12.603** (4.643)				−28.653*** (10.356)			
Pub. Edu. × Fin. Dev	−0.738 (0.591)				−0.487 (0.576)				−3.03*** (0.92)			
Financial Access		−0.471 (0.459)				0.01 (0.125)				−1.737*** (0.516)		
Pub. Edu. × Fin. Access		−0.085 (0.084)				−0.048*** (0.014)				−0.115 (0.104)		
Financial Depth			1.062* (0.611)				−1.021*** (0.213)				−2.257*** (0.683)	
Pub. Edu. × Fin. Depth			−0.093 (0.098)				−0.145*** (0.037)				−0.461*** (0.119)	
Financial Efficiency				0.257 (1.379)				0.829 (0.989)				−3.688** (1.795)
Pub. Edu. × Fin. Effici.				0.108 (0.245)				−0.091 (0.183)				−0.328** (0.166)

(continued)

Table 5. (Continued)

Variables	Dep. Var.: pupil—teacher ratio at primary				Dep. Var.: pupil—teacher ratio at secondary				Dep. Var.: pupil—teacher ratio at tertiary			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Per Capita Income (ln)	-0.622** (0.237)	-0.854*** (0.221)	-3.747*** (0.747)	-3.249*** (0.624)	-2.163*** (0.733)	-0.811*** (0.096)	-0.753*** (0.153)	-0.824*** (0.086)	0.403 (0.413)	0.826 (0.575)	-0.184 (0.272)	-0.407 (0.281)
Remittances	-0.011* (0.006)	-0.009 (0.008)	-0.034 (0.034)	-0.006 (0.027)	-0.028** (0.012)	-0.024*** (0.004)	0.001 (0.006)	-0.007** (0.003)	0.013 (0.011)	0.017 (0.014)	0.032** (0.013)	0.025** (0.011)
Under-5 Mortality	0.001 (0.003)	-0.002 (0.002)	0.008 (0.012)	0.003 (0.01)	0.009*** (0.002)	0.004*** (0.001)	0.005*** (0)	0.004*** (0)	-0.014** (0.007)	-0.022*** (0.007)	-0.01 (0.007)	-0.014* (0.007)
Constant	8.384** (3.209)	15.935*** (3.127)	42.653*** (7.833)	37.114*** (6.644)	20.09*** (7.081)	10.71*** (0.724)	7.491*** (1.567)	9.267*** (.81)	10.039*** (2.885)	6.793* (3.54)	9.811*** (2.218)	14.636*** (3.524)
Observations	380	380	380	380	211	211	211	211	151	151	151	151
Countries	35	35	35	35	33	33	33	33	32	32	32	32
Instruments	34	34	28	33	25	33	29	34	19	19	19	19
AR (1)	0.005	0.008	0.013	0.009	0.097	0.018	0.014	0.017	0.046	0.052	0.041	0.046
AR (2)	0.814	0.755	0.696	0.681	0.473	0.482	0.447	0.489	0.424	0.477	0.432	0.443
Hanse Test	0.477	0.327	0.225	0.500	0.241	0.384	0.503	0.461	0.265	0.272	0.281	0.173

Source: Author's computation; \*\*\*, \*\*, and \* show significance at 1%, 5%, and 10% respectively, standard errors in parenthesis

## 5. Conclusions and implications

This paper provides empirical evidence on the effect of financial development and public education financing on educational quality. The paper further analyses the moderating role of public education financing on the nexus between financial development and educational quality in Sub-Saharan Africa. We employ the two-step system GMM in examining the relationships among the variables using data for 42 Sub-Saharan African countries over the period 1990 to 2019.

This study finds that public spending improves quality of education through reduction in pupil–teacher ratio in primary, secondary, and tertiary levels. The policy implication of this finding is that public education spending must target teacher motivation and expansion of the teaching staff size in order to enhance the quality of education by reducing the pupil–teacher ratio. This study also finds that financial development measures show significant effects on educational quality. The study reveals that overall financial sector development, financial access, financial depth, and financial efficiency all contribute positively to improving quality of education through reduction in pupil–teacher ratios at the primary, secondary, and tertiary levels. We therefore recommend that measures that improve the financial sector are put in place to ensure that domestic revenue mobilisation is enhanced in order to increase both private and public spending on education. The results also show that the interaction of the measures of financial development with public education financing significantly improves educational quality in Sub-Saharan Africa. This indicates that public spending on education is more effective in improving quality education when financial sector is more developed. The study recommends that governments of SSA countries must invest in improving financial access, financial depth, financial efficiency, and the entire financial sector at large. Such investment will yield positive results for the quality of education in the sub–region and speed up the process of attaining the sustainable development goals on education.

UNESCO's quality education framework has five dimensions—learner's characteristics, context, enabling inputs, teaching and learning, and outcomes. The current study employs just one measure of teaching and learning dimension (pupil–teacher ratio) as a quality measure. Future studies can employ different measures of educational quality such as those learning time, teaching methods, literacy and numeracy skills. Such studies will further enhance educational policies.

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### References

- Abdul-Mumuni, A., & Koomson, I. (2019). Household remittance inflows and child education in Ghana: Exploring the gender and locational dimensions. *Journal of Economic Research*, 24(2), 97–222.
- Abubakar, A., Kassim, S. H., & Yusoff, M. B. (2015). Financial development, human capital accumulation and economic growth: Empirical evidence from the economic community of West African States (ECOWAS). *Procedia-Social and Behavioral Sciences*, 172, 96–103. <https://doi.org/10.1016/j.sbspro.2015.01.341>
- Akhmat, G., Zaman, K., & Shukui, T. (2014). Impact of financial development on SAARC'S human development. *Quality & Quantity*, 48(5), 2801–2816. <https://doi.org/10.1007/s11135-013-9926-1>
- Almarzoqi, R., Naceur, M. S. B., & Kotak, A. (2015). *What matters for financial development and stability?* International Monetary Fund.
- Ansong, D., Renwick, C. B., Okumu, M., Ansong, E., & Wabwire, C. J. (2018). Gendered geographical inequalities in junior high school enrollment: Do infrastructure, human, and financial resources matter? *Journal of Economic Studies*, 45(2), 411–425. <https://doi.org/10.1108/JES-10-2016-0211>
- Arcand, J. L., Berkes, E., & Panizza, U. (2011). *Too much finance?* unpublished. International Monetary Fund.
- Arellano, M. (2003). *Panel data econometrics*. OUP Oxford.
- Arora, R. U. (2012). Financial inclusion and human capital in developing Asia: The Australian connection. *Third World Quarterly*, 33(1), 177–197. <https://doi.org/10.1080/01436597.2012.627256>
- Arora, R. U., & Ratnasiri, S. (2011). *Financial development, financial inclusion and human capital: How close is the link? A study of India*. Indian Economy Update, Australian National University.
- Asongu, S., & Nting, R. (2021). The role of finance in inclusive human development in Africa revisited.

- Journal of Economic and Administrative Sciences*, 381, 345–370. <https://doi.org/10.1108/JEAS-07-2020-0138/full/html>
- Asteriou, D., & Hall, S. G. (2011). *Applied econometrics second edition*. Palgrave Macmillan.
- Baltagi, B. H. (2008). Forecasting with panel data. *Journal of Forecasting*, 27(2), 153–173. <https://doi.org/10.1002/for.1047>
- Banerjee, A. V., & Newman, A. F. (1993). Occupational choice and the process of development. *Journal of Political Economy*, 101(2), 274–298. <https://doi.org/10.1086/261876>
- Becker, G. S. (1962). Investment in human capital: A theoretical analysis. *Journal of Political Economy*, 70(5, Part 2), 9–49. <https://doi.org/10.1086/258724>
- Becker, G. S. (1964). *Human capital: A theoretical and empirical analysis, with special reference to education*. National Bureau of Economic Research.
- Becker, G. S. (1975). *Human capital: A theoretical and empirical analysis, with special reference to education (2nd ed.)*. National Bureau of Economic Research.
- Becker, G. S. (1993). *Human capital: A theoretical and empirical analysis, with special reference to education (3rd ed.)*. University of Chicago Press.
- Blundell, R., & Bond, S. (1998). Initial conditions and moment restrictions in dynamic panel data models. *Journal of Econometrics*, 87(1), 115–143. [https://doi.org/10.1016/S0304-4076\(98\)00009-8](https://doi.org/10.1016/S0304-4076(98)00009-8)
- Bold, T., Kimenyi, M., Mwabu, G., & Sandefur, J. (2018). Experimental evidence on scaling up education reforms in Kenya. *Journal of Public Economics*, 168(C), 1–20. <https://doi.org/10.1016/j.jpubeco.2018.08.007>
- Bruhn, M., & Love, I. (2014). The real impact of improved access to finance: Evidence from Mexico. *The Journal of Finance*, 69(3), 1347–1376.
- Bui, T. A., Nguyen, C. V., Nguyen, K. D., Nguyen, H. H., & Pham, P. T. (2020). The effect of tuition fee reduction and education subsidy on school enrollment: Evidence from Vietnam. *Children and Youth Services Review*, 108, 104536. <https://doi.org/10.1016/j.childyouth.2019.104536>
- Campos, N., & Kinoshita, Y. (2008). Foreign direct investment and structural reforms: Panel evidence from Eastern Europe and Latin America. *IMF Staff Papers*, No. 08/26.
- Cavallo, E., & Scartascini, C. (12 May 2012). Interest groups and government capabilities matter for financial development. *Centre for Economic Policy Research Vox EU*. org.
- Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2013). *Financial development in 205 economies, 1960 to 2010* (No. w18946). National Bureau of Economic Research.
- Claessens, S., & Feijen, E. (2007). *Financial sector development and the millennium development goals* (No. 89). World Bank Publications.
- Demirci, N. S., & Özyakışir, D. (2017). Finansal Gelişmişlik ve Beşerî Sermaye Arasındaki İlişki: Türkiye için Zaman Serileri Analizi (1971–2013). *Finans Politik ve Ekonomik Yorumlar*, 624, 25–39. <https://dergipark.org.tr/tr/pub/fpeyd/issue/48021/607314>
- Devarajan, S. (1996). The composition of public expenditure and economic growth. *Journal of Monetary Economics*, 37(2), 313–344. [https://doi.org/10.1016/0304-3932\(96\)01249-4](https://doi.org/10.1016/0304-3932(96)01249-4)
- Dissou, Y., Didic, S., & Yakoutsava, T. (2016). Government spending on education, human capital accumulation, and growth. *Economic Modelling*, 58, 9–21. <https://doi.org/10.1016/j.econmod.2016.04.015>
- Doan, T., Gibson, J., & Holmes, M. (2014). Impact of household credit on education and healthcare spending by the poor in peri-urban areas, Vietnam. *Journal of Southeast Asian Economies* 31 1, 87–103.
- Galar, O., & Zeira, J. (1993). Income distribution and macroeconomics. *The Review of Economic Studies*, 60(1), 35–52. <https://doi.org/10.2307/2297811>
- Glewwe, P., & Jacoby, H. G. (1995). An economic analysis of delayed primary school enrollment in a low income country: The role of early childhood nutrition. *The Review of Economics and Statistics*, 77(1), 156–169. <https://doi.org/10.2307/2110001>
- Greenwood, J., & Jovanovic, B. (1990). Financial development, growth, and the distribution of income. *The Journal of Political Economy*, 98(5, Part 1), 1076–1107.
- Gujarati, D. N., & Porter, D. (2009). *Basic Econometrics*. International Edition. McGraw Hill Inc.
- Gupta, S., Verhoeven, M., & Tiongson, E. R. (2002). The effectiveness of government spending on education and health care in developing and transition economies. *European Journal of Political Economy*, 18(4), 717–737. [https://doi.org/10.1016/S0176-2680\(02\)00116-7](https://doi.org/10.1016/S0176-2680(02)00116-7)
- Hakeem, M., & Oluitan, O. (2012). Financial development and human capital in South Africa: A time-series approach. *Research in Applied Economics*, 4(3), 18. <https://doi.org/10.5296/rae.v4i3.1498>
- Hatemi-J, A., & Shamsuddin, M. (2016). The causal interaction between financial development and human development in Bangladesh. *Applied Economics Letters*, 23(14), 995–998. <https://doi.org/10.1080/13504851.2015.1128066>
- Ho, W. H. (2013). A note on credit market development and human capital accumulation. *Macroeconomic Dynamics*, 17(7), 1525–1541. <https://doi.org/10.1017/S1365100512000156>
- Ibrahim, M., & Alagidede, P. (2018). Effect of financial development on economic growth in sub-Saharan Africa. *Journal of Policy Modeling*, 40(6), 1104–1125. <https://doi.org/10.1016/j.jpolmod.2018.08.001>
- Kiliç, C., & Özcan, B. (2018). The impact of financial development on human capital: Evidence from emerging market economies. *International Journal of Economics and Financial Issues*, 8(1), 258.
- King, R. G., & Levine, R. (1993). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics*, 108(3), 717–737. <https://doi.org/10.2307/2118406>
- Kooli, C. (2019). Governing and managing higher education institutions: The quality audit contributions. *Evaluation and Program Planning*, 77, 101713. <https://doi.org/10.1016/j.evalprogplan.2019.101713>
- Kooli, C., & Muftah, H. A. (2020). Impact of the legal context on protecting and guaranteeing women's rights at work in the MENA region. *Journal of International Women's Studies*, 21(6), 98–121.
- Law, S. H., & Singh, N. (2014). Does too much finance harm economic growth? *Journal of Banking & Finance*, 41, 36–44. <https://doi.org/10.1016/j.jbankfin.2013.12.020>
- Lenkei, B., Mustafa, G., & Vecchi, M. (2018). Growth in emerging economies: Is there a role for education? *Economic Modelling*, 73, 240–253. <https://doi.org/10.1016/j.econmod.2018.03.020>
- Ljungberg, J., & Nilsson, A. (2009). Human capital and economic growth: Sweden 1870–2000. *Cliometrica*, 3(1), 71–95. <https://doi.org/10.1007/s11698-008-0027-7>
- Loayza, N. V., & Ranciere, R. (2006). Financial development, financial fragility, and growth. *Journal of*



- Money, Credit and Banking*, 38(4), 1051–1076. <https://doi.org/10.1353/mcb.2006.0060>
- Mlachila, M. M., Jidoud, A., Newiak, M. M., Radzewicz-Bak, B., & Takebe, M. M. (2016). *Financial development in Sub-Saharan Africa: Promoting inclusive and sustainable growth*. International Monetary Fund.
- Morduch, J. (1999). The microfinance promise. *Journal of Economic Literature*, 37(4), 1569–1614.
- Mushkin, S. J. (1962). Health as an Investment. *Journal of Political Economy*, 70(5, Part 2), 129–157. <https://doi.org/10.1086/258730>
- Nelson, R. R., & Phelps, E. S. (1966). Investment in humans, technological diffusion, and economic growth. *The American Economic Review*, 56(1/2), 69–75. <https://www.jstor.org/stable/1821269>
- Nickell, S. (1981). Biases in dynamic models with fixed effects. *Econometrica: Journal of the Econometric Society*, 49(6), 1417–1426. <https://doi.org/10.2307/1911408>
- Nik, H., Nasab, Z., Salmani, Y., & Shahriari, N. (2013). The relationship between financial development indicators and human capital in Iran. *Management Science Letters*, 3(4), 1261–1272. <https://doi.org/10.5267/j.msl.2013.02.020>
- Nik, A. H., Zahra, S. N., Yunes, S., & Nima, S. (2013). The relationship between financial development indicators and human capital in Iran. *Management Science Letters*, 3(4), 1261–1272. <https://doi.org/10.5267/j.msl.2013.02.020>
- Ostojic, S. (2013). *Financial development and human development in the European Union*. The University of North Dakota.
- Outreville, J. F. (1999). Financial development, human capital and political stability. United Nations Conference on Trade and Development UNCTAD/OSG/DP/142.
- Pelinescu, E. (2015). The impact of human capital on economic growth. *Procedia Economics and Finance*, 22, 184–190. [https://doi.org/10.1016/S2212-5671\(15\)00258-0](https://doi.org/10.1016/S2212-5671(15)00258-0)
- Pesaran, M. H., Shin, Y., & Smith, R. P. (1999). Pooled mean group estimation of dynamic heterogeneous panels. *Journal of the American Statistical Association*, 94(446), 621–634. <https://doi.org/10.1080/01621459.1999.10474156>
- Psacharopoulos, G., & Patrinos, H. (2002). *Returns to investment in education: A further update world bank policy research working paper 2881*. World Bank: Washington.
- Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal*, 9(1), 86–136. <https://doi.org/10.1177/1536867X0900900106>
- Sahay, R., Čihák, M., N'Diaye, P., & Barajas, A. (2015). Rethinking financial deepening: Stability and growth in emerging markets. *Revista de Economía Institucional*, 17(33), 73–107. <https://doi.org/10.18601/01245996.v17n33.04>
- Sánchez, M. V., & Sbrana, G. (2009). *Determinants of education attainment and development goals in Yemen. Prepared for the Project Assessing Development Strategies to achieve the Millennium Development Goals in the Arab Region, UNDP-RBAS, UN-DESA and World Bank*. <http://www.un.org/en/development/desa/policy/capacity/yemen.Shtm>
- Saviotti, P. P., Pyka, A., & Jun, B. (2016). Education, structural change and economic development. *Structural Change and Economic Dynamics*, 38, 55–68. <https://doi.org/10.1016/j.strueco.2016.04.002>
- Schultz, T. W. (1961). Investment in human capital. *The American Economic Review*, 51(1), 1–17.
- Sehrawat, M., & Giri, A. K. (2014). The relationship between financial development indicators and human development in India. *International Journal of Social Economics*, 41(12), 1194–1208. <https://doi.org/10.1108/IJSE-11-2013-0268>
- Sehrawat, M., & Giri, A. K. (2017). An empirical relationship between financial development indicators and human capital in some selected Asian countries. *International Journal of Social Economics*, 44(3), 337–349. <https://doi.org/10.1108/IJSE-05-2015-0131>
- Shi, X. (2016). The impact of educational fee reduction reform on school enrolment in rural China. *The Journal of Development Studies*, 52(12), 1791–1809.
- Shields, R., & Menashy, F. (2019). The network of bilateral aid to education 2005–2015. *International Journal of Educational Development*, 64, 74–80. <https://doi.org/10.1016/j.ijedudev.2017.07.003>
- Sibel, B. E., Kadir, Y. E., & Ercan, D. (2015). Local financial development and capital accumulations: Evidence from Turkey. *Panaeconomicus*, 62(3), 339–360. <https://doi.org/10.2298/PAN1503339E>
- Sviryzdenka, K. (2016). *Introducing a new broad-based index of financial development*. International Monetary Fund.
- Thierry, M. A., & Emmanuel, O. N. B. (2022). Does financial development increase education Level? Empirical evidence from Sub-Saharan Africa. *Journal of the Knowledge Economy*, 1–26. <https://doi.org/10.1007/s13132-022-01020-y>
- Topcu, M., & Payne, J. E. (2017). The financial development–energy consumption nexus revisited. *Energy Sources, Part B: Economics, Planning, and Policy*, 12(9), 822–830. <https://doi.org/10.1080/15567249.2017.1300959>
- Uddin, M. A., & Masih, M. (2015). Finance, growth and human development: An Islamic economic development perspective, MPRA Paper No. 65818. <https://mpra.ub.uni-uenchen.de/65818/>
- UNESCO. (2011). *Education for Sustainable Development: An Expert Review of Processes and Learning*. <http://unesdoc.unesco.org/images/0019/001914/191442e.pdf>
- UNESCO Institute for Statistics. (2021). Data for the sustainable development goals, Accessed 15 09 2022 <http://uis.unesco.org/>
- United Nations Economic Commission for Africa, UNECA. (2019). *Economic report on Africa 2019: Fiscal policy for financing sustainable development in Africa*. United Nations Economic Commission for Africa. Retrieved June 12, 2022, from [https://www.uneca.org/sites/default/files/fullpublicationfiles/era2022\\_eng\\_fin.pdf](https://www.uneca.org/sites/default/files/fullpublicationfiles/era2022_eng_fin.pdf)
- Windmeijer, F. (2005). A finite sample correction for the variance of linear efficient two-step GMM estimators. *Journal of Econometrics*, 126(1), 25–51. <https://doi.org/10.1016/j.jeconom.2004.02.005>
- Yogo, T. U. (2017). Assessing the effectiveness of foreign aid in the education sector in Africa: The case of primary education. *African Development Review*, 29(3), 389–402. <https://doi.org/10.1111/1467-8268.12276>



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