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Financial development, remittances and access to education in Nigeria

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Abstract
Purpose: This study investigates the effects of financial development, remittances and their interaction on access to education in Nigeria.
Methodology: The study used the Autoregressive Distributed Lag and Dynamic Ordinary Least Squares technique on time-series data sourced from the International Monetary Fund, the World Bank and the Central Bank of Nigeria for the period 1980 to 2021.
Results and conclusion: Findings from the analysis reveal that remittances had a statistically significant and positive effect on access to education in the short and long run, unlike financial development, which was negative and non-significant. When both variables were interacted, a negative and non-significant effect was observed suggesting that a developing financial sector does not mediate the positive impact of remittances on education in Nigeria. Additionally, government expenditures on education positively and significantly enhances access to education.
Implication of findings: Policy makers and relevant stakeholders in the financial and educational sectors in Nigeria should intensify ways to improve access to formal financial services, develop financial products and services tailored towards education and provide incentives to channel remittances aimed at funding education.

Keywords: Financial development, Education, Nigeria, Remittances, Sustainable development.

1. Introduction

The accessibility of quality and affordable education is a fundamental driver of poverty reduction, human capital formation, and economic development in any economy, particularly in developing economies. It encompasses not only the physical availability of schools but also their affordability, inclusivity, and quality of learning opportunities (Hanushek & Woessmann, 2021; Mandahu, 2025). Ensuring equitable access to education enables individuals to acquire necessary skills, enhance socioeconomic status, and contribute meaningfully to national development. The United Nations affirms the importance of education via its Sustainable Development Goal 4 (SDG-4) of providing quality education to all. The goal is to achieve an all-encompassing and equitable quality education to enhance lasting knowledge. Extant literature shows that educational access is influenced by several interrelated factors that determine whether individuals can enroll, participate, and succeed in educational programs. Among these factors is the financial infrastructure needed to provide affordable education to all.

Financial development is important in shaping socioeconomic outcomes such as enhancing access to education. As economies evolve, the interplay between markets and institutions creates a financial ecosystem that influences educational opportunities. Recent studies emphasize that financial development is a key component in the achievement of educational equity and fostering sustainable development (Hanushek & Woessmann, 2020; Leach et al., 2026). On the one hand, efficient and robust financial markets facilitate resource allocation, promote investments in human capital, and reduce financial barriers in markets enabling them to perform a critical role in financing education by making available the resources used for educational infrastructure and innovation. Additionally, the expansion of these markets can reduce the cost of financing education, making it more accessible to a broader socioeconomic demographic (Nadabo et al., 2024; Thapa et al., 2020). Innovative financial instruments

and public-private partnerships are increasingly being employed to channel investments into sectors such as education, although they remain underutilized. These mechanisms help lower risks for investors and enhance the scalability of projects through better credit ratings and structured financing models. Such advancements underscore the potential of capital markets to address educational funding challenges effectively (Berry et al., 2015). On the other hand, financial institutions for example banks, play a pivotal role by offering financial products such as educational loans, savings accounts, and grants. Well-developed banking institutions provide credit to students and families, ensuring that liquidity constraints do not impede educational attainment. Moreover, banks foster financial knowledge, equipping individuals with the information needed to manage educational expenses effectively (Beck & Mooney, 2021; Domeher et al., 2022). Additionally, the COVID-19 pandemic highlighted the need for resilient financial systems to support digital and remote learning, reinforcing the connection between financial infrastructure and educational access (Lennox et al., 2021).

Remittances, especially those that flow from developed economies to less developed economies increase household income, provide an opportunity to invest in financial resources and access educational opportunities. Arising from this, the value of such remittances over the years has seen appreciable growth. The International Fund for Agricultural Development (IFAD) estimated that the remittance inflow into low- and middle-income countries in 2024 averaged $685 billion, whereas over $5 trillion was cumulatively sent over the last decade. These statistics underscore the importance of remittances in enhancing the quality of life in these countries, a role that complements some of the sustainable development goals such as quality education for all, reduced inequalities, decent work, and poverty eradication. To the extent that remittances increase household income that can be invested in the financial sector, it is possible that returns from the invested resources are ploughed back into the educational sector. However, returns may only be obtained where the financial system is well developed to provide the necessary infrastructure that provides several investment outlets and access to affordable credit facilities (Ali Bare et al., 2022). Investments in educational infrastructure funded through financial markets and institutions can bridge these gaps and ensure access to conducive learning environments (Adekunle et al., 2022; Nnoje & Ikechukwu, 2025).

Despite the significant progress made globally in expanding educational opportunities via financial development, disparities persist due to various economic, social, and institutional factors that hinder access to quality and affordable education, particularly in developing economies (UNESCO, 2022). These disparities are often attributed to systemic barriers such as unequal access to financial services, the absence of education-specific financial products, and ongoing socioeconomic inequalities (Ozili, 2021). For example, rural and low-income populations often encounter challenges such as restricted access to financial services, higher borrowing costs, and insufficient financial products tailored to education needs. This situation is exacerbated by the lack of robust collaboration between financial institutions and policymakers, which leads to a gap in financial resources available for educational purposes (Azimi, 2022; , Demirgüç-Kunt & Singer, 2017). In Nigeria for example, access to education remains an unsolved problem, particularly in marginalized populations in rural and low-income areas, where financial and infrastructural barriers are prevalent (Amadi & Nwogu, 2023; Offiong et al., 2021). Furthermore, Nigeria's 2024 budget for education was 7.85% of the total budget, a percentage that falls short of UNESCO's recommended 15 - 20%. Affordability has been identified as one of the most important limiting factors in accessing education. High tuition fees, coupled with the costs of books, uniforms, and transportation, often place education beyond the reach of low-income families in Nigeria (Nnoje & Ikechukwu, 2025; Udoh, 2025). Additionally, limited access to subsidized loans and grants exacerbates this issue, as many families lack the financial capacity to fund education.

The rest of the study is structured as follows: the relevant literature presented in Section 2; the methodology of the study is described in Section 3; the results and discussion of the findings are presented in Section 4; and the conclusions and relevant policy recommendations are presented in Section 5.

2. Literature review

Theoretical literature

The Human Capital Theory (HCT) posited that investments in education enhance individuals' productivity and skills, thereby contributing to economic development (Caire, 1967). Education is seen as a form of capital that improves an individual's earning potential and societal contributions by fostering innovation, entrepreneurship, and workforce competence (Hanushek & Woessmann, 2020; Thapa et al., 2020). This theory underscores the role played by education in driving economic growth by increasing the quality and quantity of human capital within a society. As individuals acquire knowledge and skills through education, productivity improves and in turn, raises incomes that add to national economic progress (Domeher et al., 2022; Tikly & Barret, 2011). The HCT provides the foundational background for understanding the importance of financial investments in education. In developing countries such as Nigeria where educational disparities persist, the theory highlights the need for accessible financial systems to facilitate investments in education. Financial development supports human capital formation by addressing barriers such as high tuition fees, inadequate infrastructure, and financial risks that hinder educational access (Mandahu, 2025; Azimi, 2022).

Relatedly, financial intermediation theory (FIT) emphasizes the critical role of financial systems in mobilizing funds for investment and facilitating economic development (Schumpeter, 1934). Financial intermediaries act as conduits that channel savings from surplus units (savers) to deficit units (investors), thereby reducing transaction costs and information asymmetries in the economy (Demirgüç-Kunt & Singer, 2017, Sehrawat & Giri, 2017). FIT asserts that efficient financial intermediation enhances the apportionment of resources, fosters investment, and stimulates economic growth by providing liquidity, managing risks, and offering diverse financial services and products. In the educational context, financial intermediation enables households, governments, and institutions to access the funding needed to invest in human capital development (Beck & Mooney, 2021; Domeher et al., 2022).

Empirical review

The extant empirical literature has demonstrated how financial development and remittances influence access to education in developed and developing economies. Financial development through financial intermediation enhances the provision of accessible and affordable financial instruments to disadvantaged economic units. Development that leads to increased financial access, depth and efficiency enhances education via affordable funding.

A study by Thierry and Emmanuel (2023) shows that financial development drives educational improvement in Sub-saharan African (SSA) countries by providing investment in human capital and facilitating equitable access to education. Similarly, Sezgin et al. (2023) concluded that financial development in 18 MSCI emerging markets positively influences educational attainment. Studies such as Sehrawat and Giri (2017) and Claessens and Perotti (2007) show how financial efficiency, credit and insurance products support education via improved household income. Furthermore, financial institutions such as banks play an important role in enhancing access to education by providing financial products and services custom-made to meet the needs of students, families, and educational institutions. By providing loans, savings accounts, and grants, banks address liquidity constraints and make

education more affordable and accessible (Beck & Mooney, 2021; Domeher et al., 2022; Offiong et al., 2021).

Similarly, Udoh (2025) highlighted the success of targeted savings accounts, such as education savings plans, in Ghana and Kenya, which allowed households to allocate funds systematically for tuition fees and related costs. These programs were particularly impactful in areas where access to formal savings mechanisms was often limited. Despite the positive relationship between financial development and educational outcomes, research has also documented that inefficiencies in financial markets (asymmetric information and transaction costs) may lead to a negative effect. This happens when these inefficiencies act as barriers that limit available funding for education (Arora, 2012; Hakeem & Oluitan, 2012). Nonetheless, these studies did not account for country-specific effects given the different income level classifications of the countries in the study. It is possible that data from countries with higher incomes drive the findings from those studies.

In accordance with the literature, remittances make available the financial resources utilized for educational purposes (Arif et al., 2019). On one hand, the transfer of income back home from individuals working abroad positively affects education by increasing the financial resources needed to fund educational activities especially in low- and middle-income countries (Gyimah-Brempong & Asiedu, 2015, Mansoue et al., 2011; Shafiq et al., 2022). On the other hand, studies such as those of Bouoiyour and Miftah (2015) and Cortes (2015) established a negative relationship between education and remittance in Mexico and the Philippines, respectively. This happens when children compensate for the parent's absence, become a part of the labour force in the domestic economy and spend time working rather than being enrolled in school.

Financial systems that reduce market imperfections serve as catalysts for institutions and markets to develop financial instruments and investment outlets for remittance inflows (2020). Ali Bare et al. (2022) recently investigated the mediating effect of financial development and remittances on human capital investment in Sub-saharan African (SSA) countries. The result revealed a positive effect of remittances on education which was more pronounced when remittances interacted with financial development. However, the extent to which the findings are applicable to individual countries (country-specific effects) was not explored given the different income classifications and remittance levels of each country in the study. The present study builds on this gap by investigating a lower middle-income country (Nigeria).

Related works to the present study are Thierry and Emmanuel (2023) and Sezgin et al. (2023). Our study deviates from these works and extends the extant literature in several ways. First, the former study used aggregate pooled country-level data that did not account for differences in the level of financial development and income classification of the 37 sampled African countries. For example, countries such as Kenya, Nigeria, and South Africa do not have the same level of financial development as Burkina Faso or Niger do. Similarly, the income classification of the countries used in the study varied from low-income, lower-middle-income to upper-middle-income countries. These differences suggest that some of these countries do not have systems that adequately provide the financial resources needed to improve access to education. Accordingly, the findings may have been driven by the results of the better developed financial systems. Second, although Sezgin et al. (2023) captured differences in the level of financial development by using countries classified as emerging markets by Morgan Stanley Capital International (MSCI), South Africa was the lone sub-Saharan African country in the sample, and there was no country-specific breakdown. The present study builds on this by focusing on a single country-specific analysis that captures the peculiarities of Nigeria, a lower-middle income country. Third, these

studies did not examine the interaction effect of financial development and remittances on access to education.

Given these scenarios, the present study provides a contextualized Nigerian study that addresses how financial development (via a comprehensive measure that captures the depth, breadth, and efficiency of the financial sector) and remittances affect access to education. In addition, the study period captures recent developments in Nigerian financial and educational sectors, such as the introduction of financial inclusion policies to improve access to formal financial services at affordable costs. The interactive effect of remittances and financial development on access to education is investigated given that remittances improve household income, which may be invested in the financial sector. Additionally, unlike other empirical studies, our study uses a comprehensive measure of access to education that captures education at all levels (primary, secondary and tertiary). The financial development measure is also an all-inclusive one that covers the breadth, depth, and efficiency of markets and institutions.

Accordingly, and based on the empirical review, the study formulated the following hypotheses:
H1: Financial development does not significantly affect access to education in Nigeria.
H2: Remittances do not have any significant relationship with access to education in Nigeria.
H3: The interactive effect of financial development and remittances does not have any significant effect on access to education in Nigeria.

3. Methodology

The data period for this study ranged from 1980-2021 because of the availability of data. Annual time series data were sourced from the International Monetary Fund (IMF) Global Financial Development database, UNESCO database, World Bank Development Indicators (WDI) database, and Central Bank of Nigeria (CBN) statistical bulletin. The variable descriptions and measurements are presented in Table 1.

Model specification and method of data analysis

This study adapts the model of Ali Bare et al. (2022) stated in Eq. (1) to evaluate financial development, remittances and education in Nigeria:

$$\mathrm{HC}_{it} = \beta_0 + \beta_1 HC_{it} + \beta_2 PREM_{it} + \beta_3 FD_{it} + \beta_4 GDPC_{it} + \beta_5 GEE_{it} + \beta_6 INF_{it} + \eta_t + \mu_i + \varepsilon_{it} \ldots\ldots (1)$$

The model is modified to capture a comprehensive measure of education access and financial development for our country-specific study. Education access in our study is an equal-weighted composite of gross primary, secondary and tertiary school enrolment in Nigeria capturing all levels of education unlike Ali Bare et al. (2022) who measured human capital investment using gross secondary school enrolment. Similarly, the financial development variable is a comprehensive measurement that captures financial markets, institutions, instruments, and regulatory and legal frameworks unlike Eq. (1) which captures only financial institutions. Consequently, the modified ARDL baseline model for the present study is expressed as:

$$\mathrm{EDI}_t = \beta_0 + \beta_1 FD_t + \beta_2 REM_t + \beta_3 IFR_t + \beta_4 PCI_t + \beta_5 EDGDP_t + \varepsilon_t \ldots\ldots (2)$$

where:
EDI = Education Index
FD = Financial development (FD)
REM = Remittances
IFR = Inflation rate

PCI = Per capita income
EDGDP = Education spending as a % of gross domestic product (GDP)
β_1…… β_6= Slopes; β_0 = Intercept; ε = Error Term; $_t$ = the t-th period of variables

The ARDL model that captures the long and short runs for the baseline model is:

$$EDI_t = \alpha + \sum_{i=1}^{n1} \gamma\, EDI_{t-i} + \sum_{i=1}^{n2} \beta_1\, FD_{t-i} + \sum_{i=0}^{n3} \beta_2\, lnREM_{t-i} + \sum_{i=0}^{n4} \beta_3\, IFR_{t-i} + \sum_{i=0}^{n5} \beta_4\, PCI_{t-i} + \sum_{i=0}^{n6} \beta_5\, EDGDP_{t-i} + \sum_{i=1}^{n1} \gamma\, \Delta FD_{t-i} + \sum_{i=1}^{n2} \beta_1 \Delta\, lnREM_{t-i} + \sum_{i=0}^{n3} \beta_2\, \Delta IFR_{t-i} + \sum_{i=0}^{n4} \beta_3\, \Delta PCI_{t-i} + \sum_{i=0}^{n5} \beta_4 \Delta\, EDGDP_{t-i} + \sum_{i=0}^{n6} \beta_5\, \Delta EDGDP_{t-i} + \delta ECT_{t-i} + \varepsilon_t \quad \ldots\ldots (3)$$

To analyse the interactive effect of financial development and remittances on access to education, Eq. (2) was expanded to:

$$\mathrm{EDI}_t = \beta_0 + \beta_1\, FD_t + \beta_2\, REM_t + \beta_3 (FD * REM)_t + \beta_4\, IFR_t + \beta_5\, PCI_t + \beta_6\, EDGDP_t + \varepsilon_t \quad \ldots\ldots (4)$$

The ARDL model that captures the long and short run for the interaction model is:

$$EDI_t = \alpha + \sum_{i=1}^{n1} \gamma\, EDI_{t-i} + \sum_{i=1}^{n2} \beta_1\, FD_{t-i} + \sum_{i=0}^{n3} \beta_2\, lnREM_{t-i} + \sum_{i=0}^{n4} \beta_3\, FD * REM_{t-i} + \sum_{i=0}^{n5} \beta_4\, IFR_{t-i} + \sum_{i=0}^{n6} \beta_5\, PCI_{t-i} + \sum_{i=0}^{n7} \beta_6\, EDGDP_{t-i} + \sum_{i=1}^{n1} \gamma\, \Delta FD_{t-i} + \sum_{i=1}^{n2} \beta_1 \Delta\, lnREM_{t-i} + \sum_{i=0}^{n3} \beta_2\, \Delta FD * REM_{t-i} + \sum_{i=0}^{n4} \beta_3\, \Delta IFR_{t-i} + \sum_{i=0}^{n5} \beta_4 \Delta\, PCI_{t-i} + \sum_{i=0}^{n6} \beta_5\, \Delta EDGDP_{t-i} + \delta ECT_{t-i} + \varepsilon_t \quad \ldots\ldots (5)$$

The Autoregressive Distributed Lag (ARDL) estimation method was used to analyse Eq. (3) and (5). ARDL is applied because it is suitable when dealing with small samples and is also appropriate when there are varying levels of stationarity of the variables. The application of the ARDL method can be justified when there are combinations of I(0) and I(1) stationarity of variables, whereby no variable is integrated at order two I(2) of integration. It also allows the determination of short-run and long-run relationships in one single framework, which is justified for the type of data used in this study. Additionally, endogeneity issues between the ECT and independent variables are considered.

The Dynamic Ordinary Least Squares (DOLS) is used as a robustness check to confirm the long-run coefficients of the ARDL model. DOLS satisfies endogeneity and serial correlation by incorporating lead and lags of the explanatory variables in differenced form, which ensures consistency and reliability of the long-run estimates.

Table 1: Variable description and measurement

Variables	Description/ Measurement	Data Source
Education Index (EDI)	The Equal-Weighted composite is used to measure EDI. This averages the primary, secondary and tertiary gross enrollment rates.	UNESCO (2025)
Financial Development (FD)	This is a comprehensive index that captures the depth, breadth, and efficiency of financial markets and institutions.	IMF (2025)
Remittances (REM)	This is proxied by Personal remittances which is expressed by two components which are personal transfers and compensation of employees. This is in accordance with sixth edition of IMF's Balance of Payments Manual.	WDI (2025)
Inflation Rate (IFR)	Consumer price index is used to measure inflation and is defined as the percentage change in the cost of goods and services at a specified interval such as yearly.	WDI (2025)
Per Capita Income (PCI)	This measured the average economic output per individual in the country reflecting standard of living.	WDI (2025)
Education pending % of Gross Domestic Product (EDGDP)	This is the overall spending (current, capital, and transfers) by government on education expressed in percentage of GDP.	CBN (2025)

Source: Literature review in Section 2**.**

4. Results and discussion

Table 2 shows that the mean value for the dependent variable, the Education Index (EDI) exhibited moderate variability at 41.95 with a standard deviation of 4.56. Financial Development (FD) and the log of Remittances (lnREM) have mean values of 0.187 and 20.48 and standard deviation values of 0.034 and 3.21, respectively which are smaller than the mean, indicating moderate variability. The inflation rate (IFR), per capita income (PCI) and education spending as a % of GDP (EDGDP) have mean values of 18.74, 1066.59, and 0.654 respectively. However, with respective high standard deviation values of 16.52, 710.42 and 1.086, the variability is high; implying a wide disparity of values compared to their mean values over the years.

Table 2: Descriptive statistics

Variables	EDI	FD	lnREM	IFR	PCI	EDGDP
Mean	41.95	0.187	20.48	18.74	1066.59	0.654
Median	42.51	0.182	20.90	12.70	755.718	0.317
Maximum	50.32	0.272	23.91	72.84	2601.38	5.062
Minimum	26.77	0.123	14.70	5.400	176.00	0.061
Std. Dev.	4.56	0.034	3.21	16.52	710.42	1.086
Observations	42	42	42	42	42	42

Note: Variables are as described in Table 1.

Table 3: Correlation analysis

	EDI	FD	LNREM	IFR	PCI	EDGDP
EDI	1.000					
FD	0.399	1.000				
LNREM	0.379	0.642	1.000			
IFR	-0.287	-0.519	-0.279	1.000		
PCI	0.414	0.649	0.631	-0.431	1.000	
EDGDP	0.153	-0.116	-0.425	-0.121	0.230	1.000

Note: Variables are as described in Table 1.

The correlation analysis result shown in Table 3 implies the absence of concerns related to multicollinearity. The values are low, with none exceeding 0.80. According to Gujarati and Porter (2009) and Wooldridge et al. (2020), multicollinearity is typically considered problematic when the correlation coefficient is greater than 0.80.

Table 4: Unit root test for stationarity

Variables	ADF Stat. Values	Sig. Value	Philips Perron (PP) Stat. Values	Sig. Value	Order of Integration	Remarks
Education Index (EDI)	-3.76	0.029	-3.82	0.026	I(0)	Stationary
Financial Development (FD)	-5.39	0.001	-5.57	0.000	I(1)	Stationary
Remittances (LNREM)	-6.49	0.000	-6.49	0.000	I(1)	Stationary
Inflation Rate (IFR)	-3.78	0.029	-5.90	0.000	I(0)	Stationary
Per Capita Income (PCI)	-7.75	0.000	-7.40	0.000	I(1)	Stationary
Education Spending (% of GDP) (EDGDP)	-11.13	0.000	-12.67	0.000	I(0)	Stationary

Note: Variables are as described in Table 1.

The result of the unit root test in Table 4 for the stationarity of the variables indicates that the Education Index is stationary at level I(0). Among the explanatory variables were a mixture of different levels of stationarity. Financial development, remittances, and per capita income were stationary after first difference, I(1), whereas the inflation rate and education spending to GDP were stationary at level I(0). The combination of stationarity levels of I(1) and I(0) variables suggests that the ARDL estimation technique is the most suitable for our study, as it can accommodate both stationary and first-differenced variables without requiring them to be integrated of the same order (Pesaran et al., 2001).

Table 5: Bound test for cointegration

ARDL Bounds Test		
Test Statistic	Value	K
F-statistic	7.319	5
Critical Value Bounds		
Significance	I0 Bound	I1 Bound
10%	2.26	3.35
5%	2.62	3.79
2.5%	2.96	4.18
1%	3.41	4.68

The ARDL bounds test result in Table 5, shows that the F-statistic of 7.319 is greater than the upper critical bound value of 4.68 at the 1% significance level. Accordingly, we reject the null hypothesis of a no long-run relationship among the variables. This implies the existence of a long-run equilibrium relationship between access to education and the various explanatory variables in the model.

Table 6: Regression results

Variables	Baseline model (1)	Interaction model (2)	DOLS Baseline Model (3)	DOLS Interactive Model (4)
Panel A: Long Run				
Financial Development (FD)	-23.639	66.337	-68.660	-877.253
	(-0.670)	**(0.303)**	(-1.294)	(-1.382)
Remittances (LNREM)	1.229***	3.861***	4.816**	-2.638
	(2.827)	(2.820)	(1.919)	(-0.830)
Financial Development × Remittances (FDREM)	-	-3.858	-	31.773
		(-0.381)		(1.252)
Inflation Rate (IFR)	-0.096	-0.047	-0.107	-0.142*
	(-1.559)	(-0.890)	(-1.685)	(-1.995)
Per Capita Income (PCI)	-0.002	-0.001	0.001	-0.002
	(-1.095)	(-0.654)	(0.616)	(-0.748)
Education Spending (% of GDP) (EDGDP)	5.527***	5.553***	5.171**	5.888**
	(4.325)	(3.812)	(2.102)	(2.057)
Constant (C)	22.309**	6.181	36.658**	137.061
	(2.745)	(0.174)	(3.339)	(1.618)
Panel B: Short run				
Financial Development (FD)	-21.112	58.487		
	(-0.679)	(0.300)		
Remittances (LNREM)	1.097***	1.641		
	(3.171)	(1.089)		

Financial Development × Remittances (FDREM)	-	-3.402 (-0.376)
Inflation Rate (IFR)	0.001 (0.037)	0.024 (0.557)
Per Capita Income (PCI)	0.010** (2.638)	0.010** (2.500)
Education Spending (% of GDP) (EDGDP)	4.936*** (4.533)	4.896*** (4.192)
ECT (-1)	-0.8931** (-5.974)	-0.882*** (-5.652)

Note: Variables are as described in Table 1. *, **, *** indicates level of significance at 10%, 5% and 1% respectively.

Table 7: Diagnostic tests

	Baseline Model		Interaction Model	
	F-Stat	Prob. Value	F-Stat	Prob. Value
Breusch–Godfrey Serial Correlation LM test	1.5823	0.2240	1.2566	0.3007
Heteroskedasticity Test (ARCH)	0.2243	0.8002	0.1531	0.8586
Ramsey RESET Test for Model Specification	2.5908	0.0935	2.8789	0.0736
Durbin Watson test	2.1484	-	2.0266	-

Table 7 presents the diagnostic test result and suggests that the estimated models (baseline and interaction) are robust and free of major econometric problems. The result of the Breusch-Godfrey test indicates the absence of serial correlation, and the ARCH test suggests that there is no heteroskedasticity of the residuals. Additionally, the Ramsey RESET test infers that the model's functional form is correctly specified. The Durbin–Watson statistics of approximately 2.15 and 2.03, which are close to the ideal value of 2, imply that there is no autocorrelation problem in the model. Overall, these results validate the robustness and adequacy of the estimated model for policy interpretation and analysis.

Table 6 presents the regression outcomes for the baseline and interactive models that investigated the impact of financial development and remittances on education in Nigeria. The results of the ARDL baseline model presented in Column 1 show that financial development has a negative and statistically insignificant effect on education in the short and long run (H1 is not rejected). Remittances are seen to have positive and statistically significant effects on access to education in both the short and long run in the same column (H2 is rejected). In the interaction model (Column 2), financial development has a positive but insignificant relationship with education whereas remittances, although positive, are statistically significant only in the long run. Consistent with the baseline model result, spending on education as a percentage of GDP remains positive and significant in the short and long run.

The financial development result aligns with the findings of Arora (2012) and Hakeem and Oluitan (2012) who argue that inefficient financial markets due to information asymmetries limit access to funds and financial instruments that would have been available to fund education. This suggests that changes in

financial development have no significant influence on educational outcomes given that financial markets and institutions are not well developed to accommodate innovative financial products directed towards improving access to education. Rather, their products are tailored for businesses and other personal banking wants such as cars, housing, home appliances, etc., but not for educational purposes. The findings are also in contrast with those of Beck and Mooney (2021), Ali Bare et al. (2022), and Azimi (2022), who show that financial development variables have a positive and significant relationship with education such that financial development makes provisions for loans, savings accounts, and grants, address liquidity constraints and make education more affordable and accessible.

The statistically significant coefficients of remittances suggest that a unit increase in remittances will increase education access in Nigeria by 1.23% and 3.86% in the long run for the baseline and interaction models respectively. The results from previous studies such as those of Shafiq et al. (2022) and Amakom and Iheoma (2014) are in line with the findings of this study and argue that transfers from individuals working abroad have a positive and statistically significant effect on access to education. Our paper thus posits that money remitted to Nigeria from individuals working overseas when channeled towards educational spending, improves access to education by making more funds available. Additionally, diaspora remittance is utilized by families to support investment in education, thereby improving access to education and supporting human capital theory. The results further support the view that remittances can mitigate liquidity constraints, enabling households to invest in education. Nevertheless, some studies such as those of Bouoiyour and Miftah (2015) and Cortes (2015) established a negative relationship between education and remittance implying that remittance from abroad is not used for educational expenditure but rather for other basic amenities or businesses.

In Table 6, the financial development and remittances interaction has inverse and insignificant effects on education in the short and long run, suggesting that the interaction does not significantly affect education access in Nigeria (H3 is not rejected). This finding implies that the activities in the financial markets and financial institutions have no effect on the direction at which remittances influence education and are independent of each other. This may be due to market imperfections and the absence of the necessary infrastructure needed as an outlet to invest the remitted funds. Additionally, the non-significance may be linked to the high financial exclusion and informal remittance channels that have lower transaction costs. This outcome contrasts with the findings of Ali Bare et al. (2022) and Akcay (2020) where remittances were shown to improve education access through the influence of financial development. It was argued that financial development lowers the cost of sending remittance income which enables diasporans remit funds to their home country to finance education.

Furthermore, inflation has a negative and statistically insignificant relationship with education in the long run in both the baseline and interaction models in Table 6. The implication is that as the price level increases, the level of education access decreases but does not meaningfully influence education access in Nigeria. This is in line with the expectation that a rising inflation rate will erode purchasing power thereby reducing possible spending on education but contradicts the findings of Ali Bare et al. (2022) that inflation has a positive relationship with educational enrollment. Per capita income has a negative and statistically insignificant relationship with education in the long run in Nigeria, implying that per capita income does not contribute to access to education in Nigeria. This result conforms with the findings of Udoh (2025) that low per capita income leads to unaffordability of education expenses such as costs of books, uniforms, and transportation, which lead to low access to education. In the short run, however, per capita income had positive and statistically significant coefficients. Education spending (% of GDP) showed both positive and statistically significant relationship with education in Nigeria in the short and

long run of the baseline and interaction models. In the long run, a unit increase in education spending (% of GDP) will improve access to education in Nigeria by 5.53% and 5.55%, in Nigeria. This implies that government spending on education vis-a-vis current, capital, and transfers kindles the passion for education and thus improves education access at all levels. This result aligns with the findings of Ali Bare et al. (2022) that government spending on education positively affects human capital investment in education and thus increases access to education.

The coefficients of the error correction term (ECT) in the short run for the baseline and interactive models are statistically significant and negative at the 1% level of significance confirming the existence of a long-run equilibrium relationship among the variables. This implies that the adjustment speed at which deviations from the long-run equilibrium is corrected is monotonic, i.e. the speed of adjustment to reach the long run from the short run does not fluctuate.

For robustness of the findings in Eq. (2) and (3), the dynamic ordinary least squares (DOLS) regression which estimate long-run relationships among variables that are co-integrated indicates similar a result with the long run result from the ARDL model. This suggests consistency across both models and reinforces the discussion and reliability of the findings as presented in Columns 3 and 4 of Table 6.

5. Conclusion

Financial infrastructure, resources, and an enabling environment are key components that permit an equitable and affordable access to quality education. However, imperfections in financial systems and other socioeconomic challenges act as barriers to the attainment of an enduring education for all. Consequently, this study uses the ARDL estimator to investigate the effects of financial development and remittances on access to education in Nigeria for the period 1980-2021 using annual time series data. The findings reveal that remittances play a more prominent role than financial development in enhancing access to education in Nigeria by providing the necessary financial resources needed to fund education. However, financial development was seen to be insignificant in enabling educational access. This may be due to the inefficiencies inherent in the sector that limit available financial resources and the development of innovative instruments needed to fund education. Furthermore, interacting financial development with remittances had a negative and insignificant effect on access to education in a lower-middle income country such as Nigeria. Government expenditure was seen to positively improve access to education in Nigeria reflecting the positive measures taken by the federal government to increase the literacy levels.

The findings from our study have several policy implications for Nigeria to achieve the UN Sustainable Development Goal- Four (SDG-4) objective of providing quality education to all. First, given that remittances were shown to positively influence access to education in Nigeria, it is important that policymakers continue to facilitate and improve the use of remittances for educational purposes and provide incentives for households to invest in education. This would ensure a relaxation of financial constraints, and help pay for school fees, supplies, and other school related expenses, significantly increasing enrolment. Second, the nonsignificant effect of financial development may be ascribed to the non-accessibility of formal financial services which should have a positive effect on access to education. It is thus recommended that financial sector regulators enhance financial inclusion measures to improve access to financial services and innovative products tailored towards funding education at lower costs. One such measure is the introduction of FinTech related education products. Third, the findings indicate that increased public spending on education enhances access to education at all levels. Consequently,

this study recommends that increased budgetary allocations be made to the educational sector to sustain the positive impact both at the national and sub-national levels.

Our study is not free from limitations on which future studies can build. First, it does not investigate private sector spending on education as well as a disaggregation analysis by gender or region. Second, due to data limitations, we were unable to carry out a threshold investigation. Third, the impact of the COVID-19 pandemic was not investigated to determine whether it had any effect on school enrolment. These limitations may provide interesting answers that will expand the literature.

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