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Does Exchange Rate Matters to Educational Development in Nigeria?

[1]Mathias Anebamine Chuba*[2]Bernard Olagboyega Muse

[1] Institutional Affiliation: Achievers University, Owo
Postal Address: Department of Economics, College of Social and Management Sciences, Achievers University, Km. 1, Idasen-Ute Road, P. M. B. 1030 Owo, Ondo State, Nigeria

[2] Institutional Affiliation: Bamidele Olumilua University of Education, Science and Technology, Ikere-Ekiti
Orcid Id: 0000-0003-4029-0519
Postal Address: Department of Economics, School of Social and Management Sciences, Bamidele Olumilua University of Education, Science and Technology, P. M. B. 250, Igbara Odo Road, Ikere-Ekiti, Ekiti State, Nigeria

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Abstract

The educational backwardness of Nigeria has been attributed to exchange rate depreciation. The objective of this study is to ascertain the nature and extent to which exchange rate is related to educational development in Nigeria from 1986 to 2022 using autoregressive distributed lag (ARDL) bounds test approach. The theoretical framework of the study is the dependency theory. Literacy rate is a proxy of educational development and the data of literacy rate was obtained from macrotrends.net. The data of exchange rate and the control variables were obtained from World Development Indicators. The domestic credit to private sector by banks, exchange rate, GDP per capita growth and lending interest rate had no relationship with educational development in Nigeria in both the short run and long run. Exchange rate does not matter to educational development in Nigeria. Exchange rate policy cannot be used to improve educational development in Nigeria. The dependency theory cannot explain educational development in Nigeria.

Key Words: Exchange Rate, Educational Development, ARDL Model, Nigeria

JEL Classification: E42, I21, C01

1. Introduction

Literacy rate is a proxy of educational development. Literacy rate in 2024 as obtained in data.worldbank.org is 98% for Bahrain, 95% for Brazil, 95% for Colombia, 94% for Dominican Republic, 100% for Georgia, 90% for Lesotho, 96% for Mexico, 70% for Nigeria, 95% for Paraguay, 98% for Saudi Arabia, 91% for South Africa, 99% for United Arab Emirates, 99% for Uruguay, 78% for South Asia and 69% for Sub-Saharan Africa. Nigeria lags behind most of the countries of the world for educational development.

The educational development backwardness of Nigeria has been linked to the dependency theory. The dependency theory posits that developing countries are often dependent on developed nations for capital and technology, and this dependency impedes their development. In the context of Nigeria, exchange rate depreciation plays a significant role in reinforcing this dependency. This is because when exchange rate depreciates, the cost of importing essential educational materials and technology such as textbooks, laboratory equipments, and computer software rises. This makes it difficult for Nigerian educational institutions to import the necessary materials needed for effective teaching and learning.

However, educational development does not depend on exchange rate alone. Educational development also depends on internal factors such as domestic credit to private sector by banks, GDP per capita growth, lending interest rate, domestic funding, curriculum design, teacher training and retention, infrastructural development, and policy implementation. Therefore, the objective of this study is to ascertain the nature and extent to which exchange rate is related to educational development in Nigeria in both the short run and long run.

2. Literature Review

The exchange rate is the unit of local currency that can be exchanged with one unit of foreign currency. In this study, the exchange rate is the units of naira that can be exchanged with one unit of US dollar. The proxy for educational development is expenditure on education or school enrolment or educational attainment. Human capital development index or literacy rate is used as proxy of educational attainment. In this study, literacy rate is used as a proxy of educational development.

The dependency theory explains the relationship between exchange rate and educational development. The dependency theory posits that developing countries are often dependent on developed

nations for capital and technology, and this dependency impedes their development. In the context of Nigeria, exchange rate depreciation plays a significant role in reinforcing this dependency. This is because when exchange rate depreciates, the cost of importing essential educational materials and technology such as textbooks, laboratory equipments, and computer software rises. This makes it difficult for Nigerian educational institutions to import the necessary tools and materials needed for effective teaching and learning.

There were previous studies on exchange rate and educational development in Nigeria. The impact of naira depreciation on access to higher education in Nigeria from 2010 to 2020 was examined utilizing a quantitative research approach [1]. They found that naira depreciation resulted in increased tuition fees in private universities, making higher education less affordable for many Nigerians. This led to a decline in enrollment rates, particularly among low- and middle-income families. They also found that universities were increasingly relying on local content development to reduce dependence on foreign resources. They recommended that universities should adopt cost-saving strategies and government should provide more financial aid and scholarship programs to mitigate the impact of exchange rate depreciation on educational development.

The impact of exchange rate volatility on human capital development in Nigerian universities from 1995 to 2020 was investigated employing quantitative data analysis on university staff retention and qualitative interviews with university administrators and faculty members [2]. The study found that exchange rate volatility contributed to the inability of universities to attract and retain qualified faculty due to increased costs for training materials, international collaborations, and faculty development programs. This also limited research output and the overall development of human capital in the educational sector. The authors recommended that Nigerian universities and government should provide buffer against exchange rate risks, including investing in local faculty development programs and fostering stronger international research collaborations.

The impact of exchange rate depreciation and government budget allocation on education development in Nigeria from 1986 to 2017 was examined using a quantitative approach [3]. They found that exchange rate depreciation weakens the financial capacity of the educational sector and called for strategic fiscal policies to hedge against exchange rate risks. They recommended that Nigerian government should allocate foreign exchange reserves specifically for educational purposes to mitigate the impact of exchange rate depreciation on educational development.

The proxy for educational development is expenditure on education or school enrolment rate or educational attainment. Human capital development index or literacy rate is used as a proxy of educational attainment. Most previous studies used expenditure on education or school enrolment rate as a proxy of educational development. A better measure of educational development is educational attainment and literacy rate is a proxy of educational attainment. In this study, literacy rate is used as a proxy of educational development.

Moreover, most previous studies focused on the effect of exchange rate depreciation on higher institutions, particularly the universities in Nigeria. While the impact of exchange rate depreciation on tertiary institutions is undoubtedly important, the experiences of primary and secondary schools have received relatively less attention. Focusing on literacy rate that encompasses the progress made over time by all levels of education would provide a more holistic knowledge on the relationship between exchange rate and educational development.

3. Methodology

3.1 Theoretical Framework of the Study

The theoretical framework of this study is the dependency theory. Dependency theory posits that developing countries are often dependent on developed nations for capital and technology, and this dependency reduces their level of development. Exchange rate depreciation plays a significant role in reinforcing this dependency. This is because when exchange rate depreciates, the cost of importing essential educational materials such as textbooks, laboratory equipments, and computer software rises. This makes it difficult for educational institutions to import the necessary materials that are needed for effective teaching and learning.

3.2 Method of Data Analysis

This study employs ARDL bounds test proposed by [4] to examine the cointegration relationship between educational development, domestic credit to private sector by banks, exchange rate, GDP per capita growth and lending interest rate from 1986 to 2022. The choice of this technique is due to the advantages it has over other methods of cointegration. Approach of ARDL is utilized irrespective of the characteristics of stationarity pertaining variables that are series whether purely I(0) 0r I(1) hence testing unit root are only conducted to check variables stationary beyond I(1). This means that the problem of non-stationarity is addressed which is associated in time series data. Modeling the approach with the recommended lags number also addresses challenges of autocorrelation and endogeneity. These advantages have led to its wide application in numerous studies recently [5]. Application of the ARDL method techniques derives estimates that are not biased of the model in the long period [6]. The method is also simple to apply and also allows the associations of cointegration to be regressed by OLS upon identification of the order of lagging the model. Cointegration also considers both long run and short run effects [7].

3.3 Model Specification

This study adopts the model employed by [4] with substitution of variables to determine the relationship between exchange rate and educational development in Nigeria. The functional form of the model for this study is given by an expression in equation (1) below.

EDD=f (DCB, EXR, GDP, LIR) (1)

Where EDD is educational development, DCB is domestic credit to private sector by banks (% of GDP), EXR is exchange rate, GDP is GDP per capita growth, LIR is lending interest rate and f is functional notation. The following autoregressive distributed lag, ARDL (m, n, r, s, u) model in equation (2) is estimated in order to test the cointegration relationship between educational development and exchange rate as well as three control variables, namely: domestic credit to private sector by banks, GDP per capita growth and lending interest rate.

$$\Delta EDD_t = B_0 + \sum_{i=1}^{m} B_{1i}\,\Delta EDD_{t-i} + \sum_{i=0}^{n} B_{2i}\,\Delta DCB_{t-i} + \sum_{i=0}^{r} B_{3i}\,\Delta EXR_{t-i} + \sum_{i=0}^{s} B_{4i}\,\Delta GDP_{t-i} + \sum_{i=0}^{u} B_{5i}\,\Delta LIR_{t-i} + \lambda_1 DCB_{t-1} + \lambda_2 EXR_{t-1} + \lambda_3 GDP_{t-1} + \lambda_4 LIR_{t-1} + \mu_t \quad (2)$$

Where Δ is first difference operator, B_0 is constant term, B_1i is lagged value of error correction model (ECMt-1), B_2i - B_5i are the regression coefficients of the explanatory variables in the short run, λ_1 - λ_4 are the regression coefficients of the explanatory

variables in the long run, and μ_t is white noise error term. The m, n, r, s, and u are the autoregressive lag orders of the variables EDD, DCB, EXR, GDP and LIR respectively.

3.4 Estimation Techniques

The descriptive statistics are computed to check for the normal distribution of the data and to make a preliminary analysis of the relationship between exchange rate and educational development in Nigeria. The unit root test is conducted to check variables stationary beyond I(1). The VAR lag order selection criteria are analyzed in order to determine the appropriate lag length for the estimation of ARDL model. The ARDL model is estimated by OLS technique and ARDL bounds test was conducted in order to examine the cointegration relationship between educational development and its explanatory variables. Since the variables are of different orders of cointegration, I(0) and I(1), and there is a long run relationship among them, the ARDL model is estimated in order to determine the short run and long run relationships between exchange rate and educational development in Nigeria.

3.5 Expected Results

The exchange rate is expected to have a negative relationship with educational development. This is because exchange rate depreciation leads to rising cost of educational materials imported from foreign countries. The rising cost of educational materials due to exchange rate depreciation reduces the capacity of schools to import the necessary materials needed for effective teaching and learning. The domestic credit to private sector by banks and GDP per capita growth are expected to have a positive relationship with educational development. This is because individuals have more ability to go to schools for studies and schools are able to buy more educational materials for effective teaching of students when there is an increase in GDP per capita and domestic credit provided to private sector by banks. The lending interest rate is expected to have a negative relationship with educational development because the increase in lending interest rate discourages individuals and schools from obtaining loans from banks to buy essential materials that are needed for effective teaching and learning.

3.6 Data Sources and Description

The empirical analysis is conducted using annual data. The time span covered is 1986 to 2022. The data of educational development and exchange rate; and three control variables, namely: lending interest rate, domestic credit to private sector by banks (% of GDP) and GDP per capita growth (annual %) are used in this study. Literacy rate is the percentage of the adult population 15 years and above that are literate. The literacy rate is a proxy of educational development. All the data except the data of exchange rate are in percentages. The exchange rate is the units of naira per unit of US dollar. The data of literacy rate was obtained from https://www.macrotrends.net/global-metrics/countries/nga/Nigeria/literacy-rate. The data of other variables were obtained from World Development Indicators.

4. Results

4.1 Descriptive statistics

Table 1 presents the results of descriptive statistics. The minimum exchange rate is N1.75/$ and the maximum exchange rate is N425.98/$. The mean exchange rate is N131.19/$. The minimum exchange rate was in 1986 and the maximum exchange rate was in 2022. The results of the descriptive statistics show that exchange rate has depreciated in Nigeria over time.

The minimum literacy rate (a proxy of educational development) is 48.62 percent and the maximum literacy rate is 64.98 percent. The mean literacy rate is 56.77 percent. The minimum literacy rate was in 1986 and the maximum literacy rate was in 2022. The results of the descriptive statistics show that educational development has increased in Nigeria over time.

The results of the descriptive statistics suggest that educational development increases in Nigeria when exchange rate depreciates. This result is contrary to a priori economic criterion and it indicates that exchange rate depreciation has no relationship with educational development in Nigeria.

Table 1: Results of Descriptive Statistics

Variable	Mean	Minimum	Maximum	Skewness	Kurtosis	Jarque-Bera	Prob.
EDD	56.7689	48.6200	64.9800	0.2237	2.1567	1.4048	0.4954
DCB	9.7964	4.9480	19.6035	0.8991	3.5795	5.5027	0.0638
EXR	131.185	1.7545	425.9792	0.9109	3.0341	5.1180	0.0774
GDP	1.4894	-4.5071	12.2761	0.5256	3.5432	2.1586	0.3398
LIR	18.3653	9.9592	31.6500	0.7891	4.6580	8.0776	0.0176

Source: Source: Authors' Computation Using E-view 10

4.2 Unit Root Test

The results of Augmented Dickey-Fuller unit root test are presented in table 2. Approach to unit root test is conducted to check variables stationary beyond I(1) [8]. The GDP per capita growth is integrated at level and other variables are integrated at first differences. Since the variables are of different order of integration, I(0) and I(1), the ARDL technique is applied to determine the short run and long run relationship between exchange rate and educational development in Nigeria.

Table 2: Results of Augmented Dickey-Fuller Unit Root Test

Variables	Levels		First Differences		Order of Integration
	ADF-Statistic	Prob*	ADF-Statistic	Prob*	
EDD	-0.739301	0.8239	-7.199311	0.0000	I(1)
DCB	-2.389486	0.1519	-5.455660	0.0005	I(1)
EXR	2.371951	0.9999	-4.608127	0.0040	I(1)
GDP	-4.129323	0.0027	-	-	I(0)
LIR	-2.792849	0.0693	-7.8045	0.0000	I(1)

Test critical values: 1% level -4.284580

5% level -3.562882

10% level -3.215267

*Mackinnon (1996) one sided p-values

Source: Authors' Computation Using E-view 10

4.3 Lag Length Selection

The results of VAR lag order selection criteria are presented in Table 3. The sequential modified LR test statistic (LR), Final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SC) and Hannan-Quinn information criterion (HQ) indicate a maximum lag length 1 at 5 percent level of significance. Since the value of AIC (26.82873) at lag 1 is the smallest out of the values indicated by these five criteria, the ARDL model is estimated at a maximum lag length 1 based on Akaike information criterion.

Table 3: Results of VAR Lag Order Selection Criteria

Lag	LR	FPE	AIC	SC	HQ
0	NA	30429010	31.42021	31.64467	31.49676
1	169.7379*	314270.7*	26.82873*	28.17552*	27.28802*
2	29.72564	415840.8	27.00690	29.47601	27.84893
3	29.08528	476691.0	26.86164	30.45307	28.08642

*Indicates Lag Order Selected by the Criterion

Source: Author's Computation Using E-view 10

4.4 Cointegration Test

The results of ARDL bounds test are presented in Table 4. The computed F-statistics (4.280363) is greater than upper bound critical value at 5% level of significance. Therefore, the null hypothesis of no co-integration is rejected and the alternative hypothesis of the existence of a co-integrating relationship among the variables is accepted at 5% level of significance. The rejection of the null hypothesis implies that there exists a long run relationship between educational development and all the explanatory variables that are included in the model. Since there is a proof of a long run relationship between educational development and its explanatory variables, the ARDL model is estimated.

Table 4: Results of ARDL Bounds Test

F-Bounds Test Null Hypothesis: No levels relationship				
Test Statistic	Value	Significance	I(0)	I(1)
F-statistic	4.280363	10%	2.68	3.53
		5%	3.05	3.97
		2.5%	3.4	4.36
		1%	3.81	4.92

Source: Author's Computation Using E-view10

4.5 ARDL Cointegrating Form

The ARDL error correction regression results of EDD are presented in Table 5. The regression coefficients of domestic credit to private sector by banks, exchange rate, GDP per capita growth, and lending interest rate are -0.2827, 0.0228, -0.0002 and 0.0054 respectively. The domestic credit to private sector by banks, exchange rate, GDP per capita growth and lending interest rate do not meet economic a priori criteria in the short run. Therefore, the domestic credit to private sector by banks, exchange rate, GDP per capita growth and lending interest rate do not have any relationship with educational development in Nigeria in the short run.

The lagged value of error correction model (ECMt-1) is -0.733331. It is less than one, negative and statistically significant because its p-value is less than 5 percent. The negative sign of the error correction term indicates a backward movement toward long run equilibrium from short run disequilibrium. Table 5 reveals that the deviation of the model in the short run from long run equilibrium is corrected by 73.33% in one year.

The coefficient of determination, F-statistic and Prob(F-statistic) are 94 percent, 102.56 and zero percent respectively. Although the statistical criterion is satisfactory, it is meaningless since economic a priori criteria are not obtained. The Durbin-Watson statistic is 2.28 which is approximately equals to 2. This shows that the estimated regression model is free from autocorrelation.

Table 5: ARDL Error Correction Regression Results of EDD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	38.455616	7.262940	5.294773	0.0000
D(DCB)	-0.282741	0.072662	-3.891179	0.0006
D(EXR)	0.022782	0.007712	2.953929	0.0064
D(GDP)	-0.000230	0.035555	-0.006465	0.9949
D(LIR)	0.005391	0.046788	0.115228	0.9091
CointEq(-1)	-0.733331	0.139901	-5.241798	0.0000

R-squared: 0.94 F-statistic: 102.56 Prob(F-statistic): 0.00 Durbin-Watson stat: 2.28

Source: Author's Computation Using E-view10

4.6 ARDL Long Run Form

The ARDL long run regression results of EDD are presented in Table 6. The regression coefficients of domestic credit to private sector by banks, exchange rate, GDP per capita growth and lending interest rate are -0.5851, -0.0001, -0.0332 and 0.0516 respectively. The domestic credit to private sector by banks, GDP per capita growth and lending interest rate do not meet economic a priori criteria in the long run. Exchange rate had an insignificant negative relationship with educational development in Nigeria in the long-run. Therefore,

the domestic credit to private sector by banks, exchange rate, GDP per capita growth and lending interest rate do not have any relationship with educational development in Nigeria in the long run.

Table 6: ARDL Long Run Regression Results of EDD

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DCB	-0.5851	0.1122	-5.2139	0.0000
EXR	-0.0001	0.0064	-0.0192	0.9849
GDP	-0.0332	0.0652	-0.5098	0.6144
LIR	0.0516	0.0705	0.7317	0.4707
@TREND	0.5259	0.0791	6.6496	0.0000

Source: Author's Computation Using E-view10

4.7 Post-Estimation Tests

The results of post-estimation test are presented in table 7. To test for the normal distribution of residuals, histogram normality test is conducted. The Jarque-Bera statistic is 1.9976. The p-value of Jarque-Bera statistic of 0.3683 (greater than 0.05) indicates that the null hypothesis that the residuals are normally distributed is accepted.

To test for serial correlation among the residuals, Breusch-Godfrey Serial Correlation LM test is conducted. The F-statistic is 2.5661. The p-value of F-statistic of 0.0782 (greater than 0.05) indicates that there is no significant serial correlation among the residuals. The null hypothesis that there is no serial correlation among the residuals is accepted.

To test for constant variance of residuals which is known as homoscedasticity, Breusch-Pagan-Godfrey heteroskedasticity test is conducted. The F-statistic is 2.0168. The p-value of F-statistic of 0.0828 (greater than 0.05) indicates that there is no significant heteroskedasticity among the residuals. The null hypothesis that there is presence of homoscedasticity, meaning the variance of the residuals is constant across all levels of the independent variables is accepted.

To test for model misspecification, Ramsey RESET test is conducted. The F-statistic is 0.3222. The p-value of F-statistic of 0.5751 (greater than 0.05) indicates that the F-statistic is not statistically significant. The null hypothesis that the model is correctly specified is accepted.

To test for multicollinearity among the independent variables, the variance inflation factors is computed. The centered average variance inflation factor is 1.4525 which is approximately equal to 1. A variance inflation factor of 1 indicates that there is no correlation among the independent variables. So, the null hypothesis that there is no multicollinearity among the independent variables in a regression model is accepted.

To verify whether the ARDL regression model is stable, CUSUM test is conducted. The CUSUM test indicates that the ARDL model is stable at 5 percent level of significance. The null hypothesis that the process is in control, stable, or random, with no significant deviation from the target or mean is accepted. In a nut-shell, the ARDL model has passed all the diagnostic tests. So, the model is useful in predicting the extent at which exchange rate influences educational development in Nigeria

Table 7: Results of Post-Estimation Tests

Test Conducted	Technique	Stat.	P-value	Conclusion
Normality test	Jarque-Bera	1.9976	0.3683	Residuals are normally distributed
Autocorrelation test	Breusch-Godfrey Serial Correlation LM Test	2.5661	0.0782	No serial correlation among the residuals
Heteroskedasticity Test	Heteroskedasticity Test: Breusch-Pagan-Godfrey	2.0168	0.0828	There is constant variance of residuals
Model misspecification test	Ramsey RESET Test	0.3222	0.5751	Model is correctly specified
Multicollinearity Test	Variance Inflation Factors	1.4525		Independent variables are not correlated
Stability Test	CUSUM		0.05	Model is stable

Source: Author's Computation Using E-view 10

5. Discussion

Most previous studies such as [1], [3], [9], [10] indicate that exchange rate depreciation had a significant negative relationship with educational development in Nigeria. Naira depreciation resulted to increased tuition fees in private universities, making higher education less affordable for many Nigerians [1]. Exchange rate volatility contributed to the inability of universities to attract and retain qualified faculty due to increased costs for training materials, international collaborations, and faculty development programmes [2]. Exchange rate depreciation erodes the purchasing power of government allocations to education, resulting in underfunding and inefficiencies in resource allocation across the sector [3]. Currency depreciation reduces the real value of education budgets and burdens families with higher education-related expenses [9]. Exchange rate depreciation often translates to reduced government funding, deterioration in educational infrastructure, and limited international academic collaboration [10].

However, an insignificant or no relationship between exchange rate and educational development as found in this study may exist because of the following reasons.

i. Insulation of Domestic Funding: Educational development is primarily funded through national budgets and domestic tax revenues. These domestic resources are allocated based on government priorities and internal political decisions, which are largely independent of exchange rate depreciation.

ii. Focus on Internal Factors: The quality of education is heavily reliant on internal factors such as curriculum design, teacher training and retention, infrastructural development, and policy implementation. The improvements in these areas are driven by effective governance and domestic reforms, not the exchange rate.
iii. Purchasing Power Parity in the Long Run: Economic theories suggest that exchange rates should, in the long run, move towards purchasing power parity, meaning the actual exchange rate fluctuations eventually balance out. From this perspective short-term volatility of exchange rates would have no lasting effect on long-term educational development.
iv. Availability of Local Resources: If an educational system relies predominantly on locally sourced materials, infrastructure, and human capital, the impact of exchange rate depreciation on the cost of imported goods such as foreign textbooks and technology might be negligible. The focus would be on utilizing and managing indigenous resources efficiently.
v. Political Prioritization: A government committed to educational development will shield this sector from external economic shocks, such as exchange rate depreciation, by ring-fencing its budget or seeking alternative funding, thereby breaking any direct causal link with the exchange rate.
vi. Empirical Ambiguity: While most studies show a link, some empirical findings on the relationship between exchange rate volatility and educational development are mixed or inconclusive, varying by country and specific economic conditions. Therefore, a universal and predictable relationship between exchange rate and educational development does not exist.

6. Conclusions

Exchange rate had no relationship with educational development in Nigeria in both the short run and long run. Exchange rate does not matter to educational development in Nigeria. Exchange rate policy cannot be used to improve educational development in Nigeria. The dependency theory cannot explain educational development in Nigeria.

7. Limitations of the Study

This study did not investigate the transmission mechanism from exchange rate to educational development and it is not even necessary to investigate it because exchange rate had no relationship with educational development in Nigeria. This study also did not investigate the extent to which internal factors such as domestic funding, curriculum design, teacher training and retention, infrastructural development, and policy implementation have affected educational development in Nigeria because they are not part and parcel of the research objective. These issues are left for further studies.

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