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Original Paper

Does Nigeria's Growth in Education Increase with Expansionary Monetary Policy?

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Abstract

This study investigated whether expansionary monetary policy contributed to Nigeria's educational growth through cointegration using the auto-regressive distributed lag (ARDL) method for the years 1981–2021. The bounds tests indicate that the variables of interest are long-term correlated. The corresponding equilibrium correction supported the existence of a long-term relationship. The findings also show that, in the short run, there is no Granger causality between interest rates, inflation, and education growth. Empirical analysis reveals a highly significant relationship between these macroeconomic variables and the growth of education. Furthermore, the findings show that the high interest rate won't have a significant impact on low-income Nigerians because Nigeria's private sector receives relatively little domestic credit. The paper recommends that the government develop and implement policies that ensure favourable interest rates for financing education. This could entail offering grants, scholarships, or low-interest student loans in order to increase the accessibility and affordability of education.

Keywords

interest rate, inflation, money supply, education growth, ARDL

1. Introduction

In the context of a country, "growth in education" usually refers to the progress, improvement, or expansion of the education sector over time. Many indicators reflecting the nation's educational status can be used to measure and evaluate this growth. They include enrollment rates, access to higher education, school infrastructure index, gender parity, percentage of GDP spent on education, contribution to GDP, research output, community and stakeholder involvement, etc.

The quality of education in Nigeria remains a concern due to infrastructure issues, a shortage of qualified teachers, and an outdated curriculum. The country has made progress in improving primary school enrollment rates, but challenges like regional disparities, gender gaps, and high dropout rates persist, especially in the northern part of the country. According to UNICEF (2023), eleven million Nigerian children between the ages of five and fourteen do not attend school. Just 35.6% of children between the ages of 36 and 59 months receive early childhood education, and only 61% of children aged 6 to 11 regularly attend primary school. Access to higher education has expanded, with an increasing number of universities and other tertiary institutions. However, there are still challenges related to limited spaces in universities, leading to intense competition for admission. The government has implemented initiatives like the Universal Basic Education programme, additional universities, and teacher training. Security issues, such as Boko Haram attacks and bandits, have disrupted educational activities.

Expansionary monetary policy is characterized by measures that increase the money supply and lower interest rates to stimulate economic activity (Mehar, 2023). The relationship between expansionary monetary policy and education growth can be observed through reducing interest rates. Lower interest rates make borrowing cheaper, which can benefit educational institutions, students, and families seeking to finance education through loans. This can lead to increased investment in education, including spending on infrastructure, research, and student loans.

Lower interest rates and a more accommodating monetary policy environment can make it easier for students to access loans for education and also attract more international students to pursue education in a country. This can contribute to higher enrollment rates, as students may face lower borrowing costs, reducing financial barriers to education. However, Nigeria's low domestic credit to the private sector and low credit allocation to individuals and households make it difficult for many Nigerians to obtain loans, leading to the use of loan sharks.

Expansionary monetary policy is often implemented to boost employment and economic output. As the economy expands, job opportunities may increase (Iyoha, 2004). This can have a positive impact on education growth, as individuals with employment prospects are more likely to invest in education and skills development. A more robust and growing economy resulting from expansionary monetary policy can lead to increased demand for a skilled workforce. This can incentivize individuals to pursue education and training to meet the demands of a growing job market.

According to CFI (2023), expansionary monetary policy can also promote increased investment in research and development (R&D). This can benefit educational institutions, particularly universities, as they are often involved in cutting-edge research. A supportive monetary policy environment can foster innovation and contribute to educational growth. Lower interest rates and a growing economy can attract more international students to pursue education in a country. This can contribute to the growth of educational institutions and the overall education sector.

To the best of our knowledge, no study has studied the relationship between expansionary monetary policy and education growth. Therefore, we offer explanations on the role of expansionary monetary policy in the economic growth of Nigeria by investigating the education sector, which is one of the most critical sectors of any economy. Moreover, we calculate the major CBN policy that affects the commercial bank interest rate (minimum rediscount rate and later monetary policy rate) and other variables such as the broad money supply and inflation rate. The study will provide a holistic understanding of the interconnectedness between monetary policy and the education sector. The findings and recommendations will help policymakers design effective policies that foster sustainable economic and educational growth.

The paper is organized as follows: After this introduction, in Section 2, we present the theoretical and empirical literature. In Section 3, we present the methodology. The results are presented and discussed in Section 4. In Section 5, we conclude the paper.

2. Literature Review

2.1 Theoretical Framework

Keynesian economics, developed by Keynes (1936), emphasizes the role of aggregate demand in determining economic activity. Keynes introduced the concept of liquidity preference, which suggests individuals prefer holding liquid assets when interest rates are low. Expansionary monetary policy influences liquidity preference by lowering interest rates, encouraging spending, and stimulating economic activity. According to Keynes, a reduction in interest rates due to expansionary monetary policy reduces the cost of borrowing, which, in turn, encourages investment by businesses and consumption by households. This leads to an increase in overall demand for goods and services. The theory also incorporates the multiplier effect, suggesting that initial spending increases overall income and output. Expansionary monetary policy, by stimulating spending, sets off a chain reaction of increased economic activity.

Monetarism, a theory by economist Friedman (1969), suggests that changes in the money supply lead to proportional changes in price and nominal income. It also acknowledges the impact of monetary policy on the economy, which can take time and may not be immediately apparent. It also considers rational expectations and the neutrality of money in the long run, suggesting that changes in the money supply primarily affect nominal variables (prices and wages) rather than real variables (output and employment). However, in the short run, expansionary monetary policy can impact real economic activity.

In summary, the theoretical framework of expansionary monetary policy draws on Keynesian and monetarist perspectives. While Keynesian economics emphasizes the role of aggregate demand and the multiplier effect, monetarism focuses on the quantity theory of money and the neutrality of money in the long run.

2.2 Empirical Literature Review

The reviews of empirical literature offer a clear understanding of the work and findings of other researchers and critically evaluate the possibility of grasping current published data on monetary policy. Economists have long debated the idea of raising the money supply in order to promote growth. For some of them, an increase in the money supply won't make a difference when interest rates are nearly zero. Titus and Titus (2022), Mwange (2022), Francis et al. (2020), Lhuissier et al. (2020), and Mitchell (2020) have recently examined this, which has been known as a liquidity trap since Keynes (1936). In such a scenario, agents favour liquidity over debt during economic downturns; that is, businesses and households would rather hoard cash than take out credit to use for purchases or investments. Improving monetary policies and strategies to achieve reasonable stability in goods prices, lowering the rate of inflation, maximizing employment, and addressing the challenges of monetary policy posed by a Federal Reserve System (2022) that maintains low interest rates are the long-term economic goals of the American Federal Reserve and Federal Open Market Committees.

Amaral et al. (2022), in their study on the relationship between monetary policy and GDP in the USA Using statistical methods, it was found that the Federal Reserve (FED) plays a crucial role in providing liquidity through expansionary monetary policy, which can generate debt due to money being a liability rather than an asset. Although excess market liquidity can lead to artificial growth, an increase in the money supply (M2) can have short-term effects on GDP growth. The IRF test showed that money supply affects CPI in the short and long run, but the VAR test is not statistically significant. The study found a sharp rise in M2 after 2019 due to the FED's bond purchase scheme, but CPI has not increased accordingly. This could be due to uncertainty during financial crises, where households and firms avoid consumption and investments, leading to low aggregate demand. The VAR test for interest rate showed a negative relationship with GDP growth and a negative relationship with the consumer price index. The study found no relationship between unemployment and inflation, and future work will use machine learning network algorithms to model economic applications.

Shaibu and Enofe (2021) examined the relationship between monetary policy instruments in Nigeria, including the crude oil price, exchange rate, inflation rate, interest rate, broad money supply, and economic growth. It uses data from 1986 to 2018 and an autoregressive distributed-lag model to analyze the effects of these instruments on economic growth. The study found that the interest rate has a positive short-term impact on economic growth, while the previous gross domestic product and broad money supply have negative long-term impacts. The findings suggest that the current interest rate has a positive (10%) impact on economic growth, while the previous value of economic growth has a negative (-0.72) and significant (5%) impact. The study recommends government transparency in monetary policy implementation and massive expansionary monetary policy money to increase aggregate demand and economic growth. Using data from 2000 to 2016, Tule, Ogundele, and Apinran (2018) investigated "the effect of monetary policy instruments in Nigeria." The vector error correction mechanism (VECM) and the Johansen multivariate cointegration approach were used in the study. The

cointegration test established the existence of a long-term relationship between monetary policy tools and economic growth. The findings indicated that the monetary policy tools that drove economic growth in Nigeria during the period under review had significant relationships with inflation, the real exchange rate (RER), the broad money supply (M2), and the interest rate (INT).

John and Udoye (2018) used information from the Central Bank of Nigeria from 1995 to 2016 to evaluate "the effect of monetary policy on the Nigerian economy." GDP growth rate was the dependent variable, and the interest rate, exchange rate, inflation rate, and ratio of the broad money supply (BMS) to GDP were the independent variables. The results of the ordinary least squares (OLS) regression showed that while interest rates, exchange rates, and the broad money supply had a negative but not statistically significant impact on economic growth in Nigeria, inflation had a significant positive influence. In the investigation of "the effect of monetary policy on economic growth in Nigeria from 1986 to 2016" by Ufoeze et al. (2018), the money supply, lending rate, exchange rate, monetary policy rate, and investment were the independent monetary policy variables, while the gross domestic product (GDP) served as the dependent variable. They conducted the unit root and co-integration tests in addition to using the ordinary least squares method. The study's conclusions showed that investment, interest rates, and the monetary policy rate all marginally boosted Nigeria's economic growth. On the other hand, the money supply significantly boosted growth in Nigeria. Nigeria's GDP was significantly negatively impacted by the exchange rate.

3. Methodology

3.1 Data Sources

The data employed in this study are yearly time series data of education growth (EDG), interest rates (ITR), inflation rates (INF), money supply (MS) and capital expenditure on education (CEXP). The World Bank's and the Nigerian Central Bank's statistical databases are the sources of all data. All the variables, aside from interest rates and inflation rates are displayed as natural logarithms.

Table 1. Measurement of Variables and Data Sources

S/No	Variables	Measurement	Expected sign	Sources of Data
1.	Education growth (EDG)	This captures Nigeria's degree of societal advancement, personal growth, and overall well-being. The GDP contribution from education serves as a representation of it.		Central bank of Nigeria (CBN) statistical bulletin volume 33, December 2022. **C.1.1**
2.	Interest rates (ITR)	It is represented as a percentage of the principal amount that the bank	Negative	Central bank of Nigeria (CBN) statistical bulletin volume 33,

		charges a borrower for the use of assets. It covers a range of financial transactions, such as certificates of deposit (CDs), savings accounts, and loans. It is measured by the minimum rediscount rate and, later (2006), the monetary policy rate.		December 2022. **A.11**
3.	Inflation rate (INF)	Annual percentages of average consumer prices a year-on-year changes	Negative	https://data.worldbank.org/indicator/FP.CPI.TOTL.ZG?locations=NG
	Money supply (MS).	The total amount of money available in the Nigerian economy for spending or saving. The amount of money in circulation, bank deposits, and reserve balances are the indicators here. Changes in the money supply can affect education growth.	Positive	Central bank of Nigeria (CBN) statistical bulletin volume 33, December 2022. **A.24.2**
4.	Capital expenditure on education (CEXP)	It is used to capture the fiscal policy instruments. It measures the payments for the acquisition of fixed capital assets, stock, land, or intangible assets in the social and community services sectors, which include education, health, and other service sectors.	Positive	Central bank of Nigeria (CBN) statistical bulletin volume 33, December 2022. **B.1.3**

Source: Compilation of Researchers, 2023.

3.2 Method of Data Analysis

The ARDL model was used in this paper to estimate the correlation between expansionary monetary policy and growth in education. Applying this methodology is useful for testing combinations of level variables with varying orders of integration, such as I(0) or I(1). It is inapplicable to regressors with an I(2) order of integration. According to Pesaran, Shin, and Smith (1999), the serial correlation and endogenous regressor issues could be simultaneously resolved by reversing the order. The Granger causality test analyzed if a one-time series Granger causes the other or whether a time series can be used to predict the others. The general model used to estimate the output determinants is as follows:

3.3 Model Specification

The general model is specified as follows in order to estimate the determinants of growth:

$$EDG = f(ITR, INF, MS, CEXP) \quad (1)$$

The following lists the economic expectations for each explanatory variable parameter in respect to the dependent variable:

$$f_1 < 0,\ f_2 < 0,\ f_3 > f_4 > 0;$$

This means that interest rate and inflation have a negative relationship with education growth, while the money supply and education capital expenditure is expected to exert a positive influence on education growth. According to the equation, the interest rate (ITR), inflation rate (INF), money supply (MS), and capital expenditure on education (CEXP) all affect education growth (EDG). Equation (1)'s ARDL framework can be written as:

$$\Delta LEDG_t = \beta_0 + \beta_1 LEDG_{1t-1} + \beta_2 ITR_{2t-1} + \beta_3 INF_{3t-1} + \beta_4 LMS_{4t-1} + \beta_5 LCEXP_{5t-1} + \sum_{j=0}^{p} \delta_j \Delta LEDG_{1t-j} + \sum_{1=0}^{q} \varphi_1 \Delta ITR_{2t-1} + \sum_{m=0}^{q} \delta_m \Delta INF_{3t-m} + \sum_{n=0}^{q} \eta_n \Delta LMS_{4t-n} + \sum_{a=0}^{q} \mu_a \Delta LCEXP_{5t-a} + \varepsilon_t \quad (2)$$

Where p, q, and r denote the ideal lag length employed in the model, and Δ stands for the first-difference operator. To determine whether cointegration exists between the variables, there are two steps involved. The ordinary least squares (OLS) method will first be used to estimate Equation (2). Afterward, the joint significance of the lagged levels of the variables will be tested using the F-test. After that, it sets all lagged-level variables to zero in order to display the long-run relationship. Equation (1) has two hypotheses: the alternative, cointegration, is H0: β1≠ β2≠ 0, and the null hypothesis, no cointegration, is H0: β1 = β2 = 0. The test result is then examined using the Wald test (F-statistic). Under the null hypothesis that there is no co-integration between the variables, the F-test is non-standard. Whether an intercept and/or trend is I(0) or I(1), the number of explanatory variables, and the sample size are the determining factors. The two critical values given by Pesaran and Shin (1998) and Pesaran, Shin, and Smith (2001) are the lower critical bound and upper critical bound. If the F-statistics exceed the upper level bound, the null hypothesis is rejected. This means that, over the long term, all of the variables are cointegrated. The short- and long-run dynamic relationships can be estimated after implementing the ARDL method. As a result, Equation (3) can be rewritten as follows by adding the error correction term:

$$\sum_{j=0}^{p} \delta_j \Delta LEDG_{1t-j} + \sum_{1=0}^{q} \varphi_1 \Delta ITR_{2t-1} + \sum_{m=0}^{q} \delta_m \Delta INF_{3t-m} + \sum_{n=0}^{q} \eta_n \Delta LMS_{4t-n} + \sum_{a=0}^{q} \mu_a \Delta LCEXP_{5t-a} + \varepsilon_{t-1} \quad (3)$$

Where the error correction model term ECTt−1 denotes the rate at which the long-run equilibrium adjusts after a short-run shock. For there to be evidence that the variables were brought into long-term

equilibrium, the change must be statistically significant and negative (Ihugba, 2023).

4. Empirical Results

4.1 Preliminary Analysis

Table 2 presents the findings from the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests conducted on all the variables included in the estimation. According to the result, the series under study is integrated into order 1 or lower. This demonstrates that the ARDL is a suitable estimation technique to investigate whether a long-term relationship exists between the variables.

Table 2. Unit Root Tests Result

Variables	ADF Test Statistic				PP Test Statistic			
	Constant	Constant & Trend	None	First Difference	Constant	Constant & Trend	None	First Difference
LEDG	-1.15	0.62	2.13	-4.87*	-1.09	-0.90	2.89	-4.87*
ITR	-3.39*	-3.36	-0.15	-8.63*	-3.34*	-3.28	-0.42	-8.74*
INF	-3.05*	-4.12*	-1.91	-6.64*	-2.91	-2.97	-1.79	-10.67*
LMS	-1.05	-0.09	2.07	-4.09*	-0.88	-0.80	4.23	-4.06*
LCEXP	-3.61*	-3.93*	0.02	-10.41*	-3.87*	-4.01*	-0.37	-10.86*

Source: Researcher's calculations from Eviews 9, 2023.

Notes (ADF): Test critical values at 5% (At level: constant = -2.94, Constant and trend = -3.53, none = -2.63 while at First difference = -2.95); P-value= Probability value, * signifies stationarity.

Notes (PP): Test critical values at 5% (At level: constant = -2.94, Constant and trend = -3.53, none = -2.63 while at First difference = -2.94); P-value= Probability value, * signifies stationarity.

The PP test corrects for serial correlation and heteroscedasticity in the error terms, which gives it an advantage over the ADF test. Furthermore, PP tests are based on a serially correlated regression error term and do not require lag selection (Ihugba, 2023). The PP null is likewise predicated on the hypothesis that the series are non-stationary, just like the ADF test. The ADF and PP test results are displayed in Table 2 above. The findings show that money supply and education growth are stationary at first difference (constant and trend), but interest rates, inflation, and capital expenditures on education are stationary at level. This outcome supports the estimation process by using the ARDL model.

4.2 Optimal Lag order Check

The issue of determining the proper lag length for each of the underlying variables in the ARDL model is critical because we want Gaussian error terms (i.e., standard normal error terms that do not suffer from non-normality and non-stability). Dickey & Fuller (1981) state that the optimum lag length (k)

must be ascertained using suitable model order selection criteria, such as the Akaike Information Criterion (AIC), Schwarz Information Criterion (SIC), or Hannan-Quinn Criterion (HQC), when choosing the right model for the long-run underlying equation. Table 3 below displays the suitable lag length for each variable:

Table 3. VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	10.52962	NA	0.043833	-0.291033	-0.075561	-0.214369
1	19.06307	14.37213*	0.029518*	-0.687530*	-0.428964*	-0.595534*
2	19.22401	0.262586	0.030900	-0.643369	-0.341708	-0.536041
3	20.52192	2.049325	0.030485	-0.659048	-0.314293	-0.536387

Source: Researcher's calculations from Eviews 9, 2023.

According to Table 3, lag 1 has the lowest AIC value, which is also less than the SIC value at lag 1. As a result, the model (Lag 1) is chosen to estimate Equation (1). The cointegration outcome is shown below.

4.3 Tests for Cointegration

We use the autoregressive distributed lag (ARDL) cointegration technique to empirically analyse the long-run relationships and short-run dynamic interactions among the variables of expansionary monetary policy (interest rate, inflation, money supply, and capital expenditure on education). Pesaran and Shin (1999) and Pesaran et al. (2001) were responsible for developing the ARDL cointegration approach. When compared to other established and conventional cointegration techniques, it offers three benefits. First, the ARDL can be applied when the underlying variables are integrated in order one, order zero, or fractionally integrated; it is not necessary for all the variables under study to be integrated in the same order. The second benefit is that, when dealing with small and finite sample sizes, the ARDL test is comparatively more efficient. The third and final benefit is that we can get objective estimates of the long-run model by using the ARDL approach (Harris and Sollis, 2003). This study's ARDL model is expressed in Equation 2.

Table 3. The Estimation Results of the Cointegration (Long Run) Equation (Ordinary Least Squares Technique)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.117250	0.255994	0.458019	0.6504
D(LEDG(-1))	0.110153	0.140553	0.783711	0.4396
D(ITR(-1))	-0.011820	0.006858	-1.723502	0.0954

D(INF(-1))	0.004295	0.001768	2.429310	0.0216
D(LMS(-1))	0.352198	0.199730	1.763366	0.0884
D(LCEXP(-1))	0.031469	0.047642	0.660523	0.5141
LEDG(-1)	-0.437200	0.115575	-3.782833	0.0007
ITR(-1)	0.016377	0.007998	2.047698	0.0497
INF(-1)	-0.006646	0.001504	-4.418311	0.0001
LMS(-1)	0.364914	0.099331	3.673711	0.0010
LCEXP(-1)	-0.211979	0.057869	-3.663101	0.0010

R-squared=0.70; Adjusted R-squared=0.60; Prob. (F-statistic) =0.000; DW=2.1

Source: Researcher's calculations from Eviews 9, 2023.

The above result indicates that some macroeconomic variables' lags have a considerable impact on the growth of education. The first lag of both the inflation rate and the interest rate has a big impact on the growth of education. Additionally, the first lag in the money supply has a major impact on the growth of education. This suggests that the current money supply will continue to have an impact on education growth in the following year, as will the current interest rate and inflation rate, while the current capital expenditure on education will not.

4.4 Model Stability Check/Diagnosis

The model passes every diagnostic test for heteroscedasticity (ARCH Heteroskedasticity Test), normality of errors (Jarque-Bera Test), and serial correlation (Durbin Watson and Breusch-Godfrey Tests). Table 4 displays all of the test outcomes. The short-run dynamics test the stability of the long-run coefficient. After equation (3) provides an estimation of the ECM model, Pesaran and Pesaran (1997) use the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares (CUSUMSQ) tests to assess the parameter stability. The CUSUM and CUSUMSQ test results are plotted in Graphs 1 and 2. Because the plots of the CUSUM and CUSUMSQ statistics lie inside the critical bands of the 5% confidence interval for parameter stability, the results show that there is no instability of the coefficients.

Table 4. Results of Diagnostic Tests

	X^2 **Statistic**	**Probability**
ARCH Heteroskedasticity test	0.4148	0.4015
Breusch-Godfrey Serial Correlation LM Test	0.6241	0.5555
Heteroskedasticity Test: Breusch-Pagan-Godfrey	0.6343	0,3284
Jarque-Bera test	1.158682	0.560267

Source: Researcher's calculations from Eviews 9, 2023.

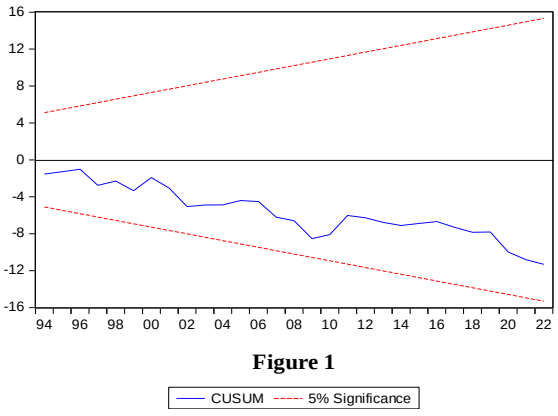

Figure 1

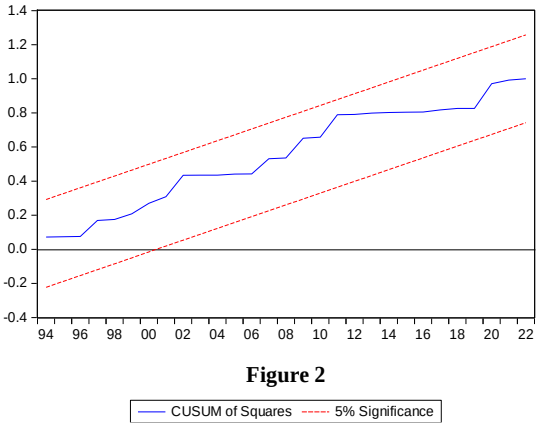

Figure 2

The hypothesis that there isn't a long-term relationship between the stationary series in Equation (1) will be tested using the ARDL technique for cointegration analysis, which was first introduced by Pesaran et al. (2001). Using the OLS estimation technique, the main objective is to ascertain the range of the Wald test-computed F-statistic for the long-run model. The computed F-statistics for the "bounds" tests are displayed in Table 5, along with the Pesaran et al. (2001) critical values for the upper and lower bounds. With no intercept and no trend, the computed F-statistic of 8.381432 exceeds the critical values for both the upper and lower bounds at the 5% and 10% significance levels. This indicates that there is a long-term correlation between expansionary monetary policy and the growth of education and that the null hypothesis that there is no co-integration can be rejected. This test result implies that ITR, INF, LMS, LCEXP, and LEDG have a long-term relationship**.**

Table 5. Bounds Test for Co-integration Analysis

Test Statistic	Value	df	Probability
F-statistic	8.381432	(5, 29)	0.0001
Chi-square	41.90716	5	0.0000

Source: Researcher's calculations from Eviews 9, 2023.

	I0 Bound	I1 Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: J. Appl. Econ. 16: 289–326 (2001).

4.5 The Error Correction Model

The model is specified in Equation 3 as follows:

$$\sum_{j=0}^{p}\delta_j \Delta LEDG_{1t-j} + \sum_{1=0}^{q}\varphi_1 \Delta ITR_{2t-1} + \sum_{m=0}^{q}\delta_m \Delta INF_{3t-m} + \sum_{n=0}^{q}\eta_n \Delta LMS_{4t-n} + \sum_{a=0}^{q}\mu_a \Delta LCEXP_{5t-a} + \varepsilon_{t-1}$$

The ECM coefficient shows how quickly variables converge to equilibrium and it should have a statistically significant coefficient with a negative sign. According to Bannerjee et al. (1998), the highly significant error correction term further confirms the existence of a stable long-run relationship. The annual result (table 6 below) for education growth shows that the expected negative sign of ECT is highly significant. This confirms the existence of the long run relationship among the variables with their various significant lags. The coefficient of ECT = -0.86, imply that deviation from the long-term growth rate in education is corrected by 86% by the following year.

Table 6. Error Correction Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.035203	0.054499	-0.645930	0.5229
D(LEDG(-1))	0.542381	0.206689	2.624136	0.0132
D(ITR(-1))	-0.004660	0.007591	-0.613862	0.5436
D(INF(-1))	-0.002902	0.002022	-1.435291	0.1609
D(LMS(-1))	0.563410	0.237172	2.375530	0.0237
D(LCEXP(-1))	-0.127223	0.050157	-2.536506	0.0163
ECT(-1)	-0.860335	0.321961	-2.672174	0.0118

Source: Researcher's calculations from Eviews 9, 2023.

Table 6 presents the equilibrium over the long term as well as the short-term dynamics of several economic variables in Nigeria. A one percentage point decrease in interest rate corresponds to a 0.001% increase in education growth, according to the long-run coefficients, although not significant, which demonstrate that the coefficient of interest rate has no significant long-term impact on education growth [sig. = 0.5436]. An increase of one percent in the inflation rate results in a 0.21 reduction in education growth, which is also not significant. This suggests that inflation has little bearing on education growth in Nigeria. This result can be linked to the fact that the Nigerian inflation rate averaged 18.9% during the period of study. Furthermore, at the five percentiles, the coefficient of money supply is statistically significant. A one percentage point increase in the money supply corresponds to a 0.56% increase in education growth. A one percentage point decrease in capital expenditure on education corresponds to a 0.12% increase in education growth.

Short Run Granger Causality Tests

Table 7. Short Run Granger Causality Tests (Wald Tests)

Dependent Variable: DLEDG			
Variables	Chi-square test	Prob.	Relationship
ITR	0.38	0.54	No Short-run causality
INF	2.06	0.15	No Short-run causality
LMS	5.64	0.02	Short-run causality
CEXP	6.43	0.01	Short-run causality
ALL	21.03	0.00	Short-run causality

Source: Researcher's calculations from Eviews 9, 2023.

Table 7: The Chi-square joint statistics probability values support our findings that there is a short-run relationship between the independent variable and the explanatory variables. The null hypothesis ($H0$): $\beta 5=0$ will be rejected if the p-value of the chi-square test for the interest rate (ITR), inflation (INF), money supply (LMS), and capital expenditure on education (LCEXP) is less than 0.05 As a result, all the variables cause LEDG in the short run.

4.6 Discussions

An error correction mechanism was employed in order to analyse the parameter estimates. Regressing the interest rate (ITR), money supply (MS), inflation (INF), and capital expenditure on education (CEXP) against education growth (EDG) was done to test this hypothesis. The results of the regression analysis were compiled, and they demonstrate the validity of the model predicting how the money supply and inflation rate would affect the growth of education. The long-run equation's results are shown in Table 3. The empirical findings demonstrate that, with the exception of interest rate, all of the explanatory variable coefficients are correctly signed, suggesting that some apriori expectations are not satisfied. Additionally, according to the coefficient of determination (R2) of 0.70, changes in independent variables can account for 70% of the dependent variable (LEDG) variation between 1981 and 2022. This suggests that two of the target variables, money supply and inflation rate, are statistically significant and have the correct sign.

In Nigeria, an increase of 1% in interest rates results in a 16% increase in EDG. Although conventional economic theory generally suggests that lower interest rates are associated with increased economic activity, including investments in education, the positive relationship between interest rates and education growth may initially seem counterintuitive. This relationship demonstrates that borrowing costs, government spending, investments in human capital, student loan affordability, and Nigeria's overall economic growth are all unaffected by interest rates. Nigerian educational institutions stand to gain from lower interest rates since they make borrowing less expensive. But the results show that the

high interest rate won't have a significant impact on the majority of low-income Nigerians. Nigeria's private sector receives relatively little domestic credit. In 2020, it accounted for just 12% of GDP, while sub-Saharan Africa's average was 40%. Nigeria is among the approximately 20 nations worldwide where the ratio of domestic credit to the private sector is less than 15% of GDP (theconversation, 2022). There is also little credit available to households and individuals. This is due to the fact that banks frequently place onerous requirements on loans, making them practically impossible for many Nigerians to obtain. For example, as of May 2021, consumer credit made up just 10.2% of all credit extended to the private sector (theconversation, 2022). Many Nigerians turn to loan sharks since they can't get credit from banks. Many Nigerians will not have to worry about paying higher rates on student loans, etc., because they are unable to obtain bank loans. Furthermore, the rate increase won't have an impact on the costs of education goods and services that low-income Nigerians typically purchase. Increases in the cost of education are due to inadequate infrastructure and worries about insecurity. Nigeria does not, however, fit the Keynes (1936) hypothesis that a rise in interest rates increases the cost of borrowing, which in turn lowers employment, investment, and output. The export of gas and oil is what drives a large portion of its economic growth, not the manufacturing of goods. Oil produces most of the foreign exchange and government revenue required to support other economic sectors, despite making up a small portion of the GDP. The rate increase won't have a significant effect on real-sector employment and production because credit to the private sector in Nigeria is extremely low in comparison to GDP. Our findings are in line with those of Shaibu and Enofe's (2021) study, which examined the connections between Nigeria's economic growth, the price of crude oil, the exchange rate, the rate of inflation, the interest rate, and the broad money supply. According to their research, interest rates have a short-term beneficial effect on economic expansion.

Additionally, money supply had a negative (-36) and significant (1%) impact on education growth in Nigeria. This finding is consistent with the theoretical expectation that suggests a positive relationship. The findings means that there was a correlation or connection between expansionary monetary measures and the growth of the education sector in Nigeria during the period of study, and that this correlation is positive. In other words, as expansionary monetary policy is implemented, there is an associated positive impact on education growth. A positive relationship implies that the government is more likely to allocate additional funds to education, leading to increased investment in infrastructure, teacher training, and educational programs. The findings is in line with the study of Friedman (1969); Tule, et. al, (2018) and Amaral et al. (2022), that government plays a crucial role in providing liquidity through expansionary monetary policy and an increase in the money supply (M2) can have short-term effects on GDP growth, but disagrees with them that expansionary monetary policy generates debt due to money being a liability rather than an asset. The Short Run Granger Causality Test also show that money supply cause education growth in the short-run**.**

It was found that the inflation rate had a negative (0.01) and significant (1%) impact on economic growth in Nigeria. This finding suggests that an increase in the inflation rate is associated with adverse

effects on the growth or development of the education sector, and it is consistent with the theoretical expectation that suggests a negative relationship. The findings indicate that inflation can have a significant impact on education growth, as it reduces purchasing power, contributes to economic uncertainty, and reduces real incomes. This can lead to individuals prioritizing basic needs over education, negatively impacting education growth. Governments may also face budget constraints due to the increased cost of public services. High inflation rates can affect education affordability, particularly for lower-income individuals. Additionally, inflation can distort resource allocation, leading to reduced investment in research and development. Inflation can also have a negative impact on loan affordability because higher nominal interest rates can discourage borrowing and make it more difficult to obtain financing for education. Tule et. al. (2028)

An increase in CEXP tends to limit the growth of education, according to the coefficients of capital expenditure on education. It implies that there is a negative correlation between capital spending on education and educational growth, meaning that raising capital spending in the education sector may have unfavourable consequences or make it more difficult to achieve significant growth or development. Unfavourable relationships can be caused by misallocating resources, prioritising maintenance over innovation, lacking thorough planning, paying little attention to human capital, integrating technology inadequately, limiting accessibility and inclusivity, mismanaging finances, and relying too much on physical infrastructure. Ineffective use of capital funds could lead to stagnation rather than improvement in the standard of education. Instead of improving quality, maintenance rather than innovation may cause stagnation. A lack of thorough planning may also be the cause of ineffective capital spending. Other factors that may impede the expansion of the education sector include a lack of focus on human capital, poor technology integration, restricted accessibility and inclusivity, and poor financial management.

5. Conclusion and Recommendations

The main goal of this study is to examine how expansionary monetary policy affected Nigeria's education growth between 1981 and 2022. The contribution of education to GDP is considered a dependent variable, and capital expenditure on education is considered a control variable. Interest rates, money supply, and inflation rate are considered independent variables. ADF and PP were used to verify the stationarity of the data. The findings demonstrated that under both ADF and PP, the interest rate and growth in education became stationary when they were transformed into the first difference. On the other hand, capital spending on education, the money supply, and inflation all remained stationary at level. The study also discovered a criterion for selecting lag orders, and the findings showed that this criterion was 1. At the 1% level, the model is globally significant, and the regression for the underlying ARDL equation (2) fits very well. Additionally, it passes every diagnostic test for heteroscedasticity, normality of errors, and serial correlation (including the Durbin Watson and Breusch-Godfrey tests) (Jarque-Bera test). Table 4 displays all of the test outcomes.

The short-run dynamics test the stability of the long-run coefficient. After equation (3) provides an estimation of the ECM model, Pesaran and Pesaran (1998) use the cumulative sum of recursive residuals (CUSUM) and cumulative sum of squares (CUSUMSQ) tests to assess the parameter stability. The CUSUM and CUSUMSQ test results are plotted in Figures 1 and 2. Because the plots of the CUSUM and CUSUMSQ statistics lie inside the critical bands of the 5% confidence interval for parameter stability, the results show that there is no instability of the coefficients. Table 7 displays the short-run Granger causality test results. Our results that the independent variable and the explanatory variables have a short-term relationship are supported in the short run by the Chi-square joint statistics probability values. There is no Granger causal relationship between inflation, interest rates, and the growth of education.

To make an expansionary monetary policy more effective in encouraging education growth, governments can ensure favorable interest rates for education financing, direct government investment in education, create incentives for private sector investment, foster public-private partnerships, implement targeted programs for skills development, promote technology integration, implement financial literacy programs, and allocate funds for research and development initiatives. It also emphasizes the importance of transparent policy communication, robust monitoring and evaluation mechanisms, inclusive education policies, and long-term planning for education growth. These strategies aim to make education more accessible, affordable, and contribute to economic growth. The paper also emphasizes the need for transparent communication, robust monitoring and evaluation mechanisms, inclusive education policies, and long-term planning for education growth.

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Summary of Data Used

Year	A	B	C	D	E
1981	3.4	20.81	6.00	19.78	14.47
1982	4.31	7.70	8.00	15.09	15.79
1983	4.53	23.21	8.00	21.01	17.69
1984	4.76	17.82	10.00	5.79	20.11
1985	5	7.44	10.00	21.12	22.30
1986	5.25	5.72	10.00	7.69	23.81
1987	5.49	11.29	12.75	9.72	27.57
1988	6.73	54.51	12.75	20.70	38.36
1989	7.49	50.47	18.50	12.27	45.90
1990	8.29	7.36	18.50	8.72	47.42
1991	9.89	13.01	15.50	5.26	75.40
1992	25.48	44.59	17.50	5.36	111.11
1993	37.09	57.17	26.00	6.56	165.34
1994	42.97	57.03	13.50	7.04	230.29
1995	49.65	72.84	13.50	7.61	289.09
1996	51.13	29.27	13.50	4.07	345.85
1997	55.38	8.53	13.50	2.56	413.28
1998	90.78	10.00	13.50	7.56	488.15
1999	104.15	6.62	18.00	3.46	628.95
2000	205.95	6.93	14.00	11.68	878.46
2001	260.17	18.87	20.50	12.16	1,269.32
2002	273.22	12.88	16.50	10.10	1,505.96

2003	300.57	14.03	15.00	23.06	1,952.92
2004	336.66	15.00	15.00	8.56	2,131.82
2005	383.82	17.86	13.00	13.74	2,637.91
2006	437.57	8.23	10.00	14.24	3,797.91
2007	491.61	5.39	9.50	19.87	5,127.40
2008	580.59	11.58	9.75	15.84	8,643.43
2009	694.1	12.54	6.00	12.57	9,687.51
2010	826.67	13.74	6.25	17.17	11,101.46
2011	1,110.72	10.83	12.00	10.11	12,628.32
2012	1,252.72	12.22	12.00	11.14	15,503.41
2013	1,549.93	8.50	12.00	13.96	18,743.07
2014	1,804.40	8.05	13.00	14.21	20,415.61
2015	2,116.35	9.01	11.00	10.14	20,885.52
2016	2,445.95	15.70	14.00	10.53	24,259.00
2017	2,590.86	16.50	14.00	13.50	28,604.47
2018	2,734.53	12.10	14.00	12.09	29,774.43
2019	2,969.32	11.40	13.50	11.56	34,257.90
2020	2,707.44	13.25	11.50	11.56	36,038.01
2021	2,804.97	16.95	11.50	12.04	40,370.41
2022	3,023.74	18.85	16.50	63.18	48,462.07

Source: As earlier defined

A: Education contribution to GDP in billions as a proxy for education growth; **B:** Inflation rate; **C:** Monetary policy rate proxy for interest rate; **D:** Capital expenditure on social and community services in billions as a proxy for capital expenditure on education; **E:** Money supply in billions.