



# The Role of Educational Investment in Promoting Economic Growth in Nigeria

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## Abstract

## Original Research Article

This study examines the long-run relationship between education investment and economic growth in Nigeria, with particular emphasis on how public spending and school enrolment interact to influence economic performance. To ensure the reliability of the estimations, stationarity tests were first conducted on all variables to eliminate the risk of spurious regression results. Following this, the analysis employed the Fully Modified Ordinary Least Squares (FMOLS) technique alongside the Granger causality test to explore both long-run equilibrium relationships and directional linkages among the variables. The results indicate that all variables become stationary after first differencing, confirming that they are integrated of order one, I(1). Furthermore, the Johansen cointegration test reveals the presence of a single cointegrating equation, implying a stable long-run relationship among education expenditure, school enrolment, and economic growth. The findings also provide evidence of causality between investment in education and economic growth, suggesting that changes in education funding have meaningful implications for economic performance. The study establishes that government expenditure on education and educational participation significantly influence Nigeria's economic growth in the long run. Based on these findings, it is recommended that policymakers prioritize effective management of both capital and recurrent education spending to enhance efficiency within the sector. Additionally, increasing budgetary allocations to education is essential to address infrastructural deficits, improve learning environments, and strengthen teaching conditions. In line with global standards, it is further advised that Nigeria strives to meet and potentially exceed the 26% education funding benchmark advocated by the UNESCO.

**Keywords:** Recurrent Education Expenditure, Capital Education Expenditure, Composite School Enrolment, Economic Growth.

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## 1. Introduction

Education occupies a central position in the process of human capital development, serving as a foundational driver of individuals' productive capacity. Its relevance becomes even

more pronounced at higher levels, where it not only enhances workforce efficiency but also stimulates the generation of knowledge, innovation, and technological advancement. Within the framework of Romer-Solow growth



theory framework, investment in education is understood to exert both direct and indirect effects on economic systems. At the micro level, it improves individual competencies, while at the macro level, it strengthens the broader structure of economic development. Consequently, education is widely regarded not merely as a developmental tool but as a transformative force capable of reshaping societies. By equipping individuals with relevant skills, knowledge, and competencies, it enables them to function effectively and contribute meaningfully to national progress. Beyond its role in fostering economic productivity, education also serves as a critical mechanism for poverty reduction, as emphasized by Todaro (2007).

The relationship between education and economic growth operates through multiple pathways. On one hand, public investment in education can stimulate growth directly via the Keynesian multiplier effect; on the other, it contributes indirectly by enhancing human capital and productivity. In the case of Nigeria, public expenditure on education experienced sustained growth between 1980 and 2015, both in absolute terms and as a proportion of total government spending. During this period, education expenditure ranged from 0.5% to 10.8% of total government expenditure, with an average of 5.7%. A notable structural shift occurred around 1981, when recurrent expenditure began to exceed capital expenditure, reversing the earlier pattern. Despite these financial commitments, outcomes in both educational development and economic performance have remained underwhelming. For example, secondary school enrolment has consistently struggled to surpass 40% since 1970, even before considering issues of quality. Similarly, economic growth has been erratic, with an average rate of approximately 0.602%, a trend that contrasts sharply with established theoretical and empirical expectations linking education investment to growth, as highlighted by Babatunde (2018).

Fiscal commitment to the education sector has further weakened in recent decades. Since 1999, budgetary allocations by the federal government have declined steadily, falling below levels recorded during the final years of

military governance. In response, alternative financing mechanisms have been introduced, most notably the Education Tax Fund, established in 1995. This initiative mandates companies with over 100 employees to contribute 2% of their pre-tax profits toward educational development. The distribution formula allocates 40% of the funds to primary education, 10% to secondary education, and 50% to tertiary institutions. Additionally, the Petroleum Trust Fund has historically supported primary education through investments in infrastructure and learning resources. While these interventions provide supplementary funding, they have not sufficiently addressed the systemic challenges facing the sector (Out and Adenuga, 2023).

Debates surrounding the impact of education on economic growth remain unresolved, largely due to conceptual and methodological complexities. Variations in how education and growth are measured, as well as differences across countries and regions, contribute to inconsistent findings. Nonetheless, the consequences of inadequate funding are widely acknowledged. Chronic underinvestment has manifested in deteriorating infrastructure, irregular payment of teachers' salaries, insufficient staffing, and generally poor working conditions. These deficiencies have frequently triggered industrial actions by educational unions, further disrupting the system, as noted by Eric Hanushek and Ludger Woessmann (2008).

Since gaining independence in 1960, Nigeria's education sector has grappled with persistent underinvestment, particularly in infrastructure, research funding, and instructional materials within public institutions. Administrative inefficiencies at various levels of government have compounded these challenges, resulting in prolonged neglect of the sector. The broader economic implications of this neglect are significant. Rising illiteracy rates, declining labour productivity especially among unskilled workers and low levels of income, savings, and investment collectively hinder capital formation. This pattern aligns with the vicious circle theory, which explains how interconnected constraints reinforce underdevelopment, making progress

difficult to achieve without deliberate intervention.

Breaking this cycle requires a renewed and sustained commitment to educational investment. Education enhances not only skills and competencies but also overall human well-being, generating wide-ranging benefits for both individuals and society. Its capacity to deliver high social and economic returns underscores the urgency of prioritizing the sector within national development strategies, as argued by Fuente (2006).

The centrality of education to long-term economic performance is strongly emphasized within endogenous growth theory. Scholars such as Lucas (1988), Romer (1990), and Barro (1991) consistently argue that sustained investment in education generates positive and durable effects on economic growth. Their perspective shifts attention from external technological shocks to internally generated progress, highlighting human capital accumulation as a key engine of development. In this view, education strengthens both individual productivity and the overall capacity of the economy, thereby creating conditions for sustained growth. Countries that prioritize investments in education and research tend to build larger stocks of human capital, which in turn accelerates their growth trajectory. Conversely, the relatively slow growth observed in many developing regions, particularly in parts of West Africa, is often attributed to insufficient investment in education and limited human capital formation.

This theoretical position underscores the importance of improving both access to and quality of education across all levels. For less developed countries (LDCs), educational advancement is not optional but essential for meaningful development. Beyond simple enrolment expansion, emphasis must be placed on learning outcomes and skill acquisition. As noted by Eric Hanushek and Ludger Woessmann (2008), education influences economic growth through two primary transmission channels. First, it enhances the productivity of the labour force by increasing human capital, thereby facilitating a transition to higher levels of output. Second, within the endogenous growth

framework, education fosters innovation by improving the capacity to create, adapt, and apply new technologies, processes, and ideas. These dual pathways reinforce the argument that education plays both a direct and catalytic role in shaping economic outcomes.

## 2.0 Literature Review

Despite this strong theoretical consensus, empirical findings on the relationship between public education expenditure and educational attainment remain inconclusive. A substantial body of literature presents mixed evidence, reflecting differences in methodology, data quality, and contextual factors. For example, Gupta Verhoeven and Tiongson (1999) applied both ordinary least squares (OLS) and two-stage least squares (2SLS) techniques to data from 50 developing and transition economies. Their findings indicate a positive and statistically significant relationship between public education spending and secondary school enrolment, with a 5% increase in expenditure associated with a one-percentage-point rise in enrolment rates. This suggests that, at least in some contexts, increased funding can directly expand access to education. However, other studies present more nuanced or even contradictory results. McMahon (1999), for instance, identified a negative relationship between per-pupil expenditure and primary school enrolment, while simultaneously observing a positive effect when total education spending is measured as a proportion of gross national product (GNP). This implies that the structure and allocation of spending may matter as much as, if not more than, the total volume of resources. Increasing aggregate investment in education appears beneficial, but inefficiencies at the micro level such as high per-student costs without corresponding improvements in access can dampen overall outcomes.

Further insights emerge from cross-country analyses in Sub-Saharan Africa. Lopes (2002) examined data from 48 countries between 1980 and 1999 and found that most indicators of public education expenditure positively influenced educational outcomes, with the notable exception of education spending as a

share of total government expenditure. Similarly, Anyanwu and Erhijakpor (2007) used panel data from 1990 to 2002, focusing on countries such as Nigeria, South Africa, Algeria, and Egypt. Their results confirm a strong and positive association between government spending and both primary and secondary school enrolment rates. Expanding the scope, Baldacci et al. (2008) employed a non-linear panel model covering 118 developing countries over the period 1980 to 2015. Their analysis incorporated interactions between education and health, while also accounting for governance quality. The findings provide robust evidence that public education expenditure improves educational outcomes. However, the magnitude of this effect is significantly reduced in countries characterized by weak governance structures. This highlights the importance of institutional quality in mediating the effectiveness of public spending. Complementing this, Diawara (2009), using data from 27 African countries, also reported a positive and significant relationship between education expenditure and both primary and secondary education outcomes.

Country-specific studies further enrich the discussion. Amin and Ntilivamunda (2009) found that education expenditure whether measured as a share of GDP or of the total public budget positively influences primary school enrolment and completion rates in Senegal. In contrast, Fadiya (2010), applying the Johansen cointegration technique to Nigerian data from 1975 to 2008, identified a positive but statistically insignificant relationship between government spending and educational outcomes. These mixed findings reinforce the idea that the effectiveness of education expenditure is highly context-dependent. Broader comparative studies also point to ambiguity in the spending–outcome relationship. Research by Leclercq (2005) and Hanushek (2006) suggests that increases in school resources do not always translate into improved educational performance, particularly in more developed countries where baseline resource levels are already high. However, this ambiguity appears less pronounced in low-income settings. As argued by Woessmann (2001), additional resources may have stronger positive effects in countries with very low initial levels of educational investment. In contrast,

Anand and Ravallion (1993) found no significant relationship between public education spending and educational outcomes, further illustrating the lack of consensus in the literature.

Several explanations have been proposed for these inconsistencies. According to Al-Samarrai (2002), weak correlations between spending and outcomes may result from poor data quality, omitted variable bias, and inefficient allocation of resources. Additionally, the broader level of economic development plays a critical role. Studies by Wopmann (2001) and Diawara (2009) emphasize that structural constraints in developing economies can limit the effectiveness of public investment in education. These findings suggest that increasing funding alone is insufficient; attention must also be given to governance, efficiency, and complementary socio-economic conditions. More recent empirical work continues to affirm the importance of human capital for economic growth, albeit with important distinctions across educational levels. Wang Ying and Shasha Liu (2016), using panel data analysis, found that human capital derived from education has a significant positive effect on economic growth. Notably, their results indicate that higher education exerts the strongest impact, while primary and secondary education show less significant effects. This suggests that while foundational education is necessary, advanced levels of education may play a more decisive role in driving innovation and long-term growth.

Empirical investigations into the growth effects of public expenditure have increasingly narrowed their focus to the specific contribution of education spending. Within this strand of research, considerable attention has been devoted to understanding how public investment in education translates into economic performance. For instance, Musila and Balassi (2004) employed a cointegration framework to examine the relationship between education expenditure per worker and economic growth in Uganda between 1965 and 1999. Their findings demonstrate that such expenditure exerts a positive and statistically significant influence on growth in both the short and long run. Similar conclusions emerge from studies based on Nigeria, where Dauda (2009) identified a strong

long-run association between investment in education and economic growth. However, these analyses typically rely on aggregate measures of education expenditure, implicitly assuming uniform effects across different spending components. This aggregation obscures potential differences between capital and recurrent expenditure, which may have distinct implications for both educational outcomes and economic growth. A broader review of the literature reveals two dominant analytical approaches. On one hand, some studies assess the effectiveness of public education expenditure by linking it to educational outcomes such as enrolment rates, literacy levels, completion rates, and average years of schooling. On the other hand, a separate group of studies directly examines the relationship between education spending and economic growth. While both approaches provide valuable insights, they often treat these relationships in isolation. In reality, education expenditure influences growth both directly as a component of aggregate demand—and indirectly through its impact on human capital formation. By improving educational attainment, public investment enhances labour productivity, which subsequently contributes to economic expansion.

Despite the intuitive appeal of this dual-channel relationship, establishing clear causal links has proven challenging. As noted by Bils and Klenow (2000), much of the existing literature focuses on correlation rather than causation, leaving the direction of influence between education and growth ambiguous. Failure to address this issue may result in misspecified empirical models and misleading policy conclusions. Recognizing this limitation, a smaller body of research has attempted to integrate public education expenditure, educational attainment, and economic growth within a unified analytical framework. Notably, Jung and Thorbecke (2001) applied a computable general equilibrium (CGE) model to examine how education spending affects human capital accumulation, growth, and poverty in Tanzania and Zambia. Their findings suggest that increased investment in education can simultaneously improve human capital and stimulate economic growth. Complementing this approach, Baldacci, Clements, Gupta and Cui

(2004) developed a recursive system of equations to capture both the direct and indirect channels linking education expenditure to growth. Their results confirm that public spending on education significantly enhances human capital accumulation, which in turn drives higher economic growth. Similarly, Lawanson (2015) used a dynamic panel framework (Diff-GMM) to analyse data from sixteen West African countries over the period 1980 to 2013. His findings indicate that both education and health components of human capital exert positive and statistically significant effects on GDP per capita, reinforcing the broader argument that human capital is central to economic development in the region.

Country-specific evidence further illustrates the complexity of this relationship. In Mozambique, Mussagy and Babatunde (2015) examined quarterly data from 1996 to 2012 using cointegration and error-correction techniques. Their analysis revealed that although government spending on education remained relatively low consistently below 20% of the national budget a stable long-run relationship exists between education expenditure and economic growth. In a different regional context, Mallick, Pradeep and Pradhan (2016) analysed panel data from fourteen Asian economies between 1973 and 2012. Using Pedroni cointegration tests, they identified a long-run equilibrium relationship between education expenditure and economic growth across all sampled countries, suggesting that the growth-enhancing role of education spending is not confined to a specific region. Additional insights emerge from sectoral analyses of public expenditure. Babatunde (2018) investigated the impact of government spending on various infrastructure sectors in Nigeria, including education, using time-series data from 1980 to 2016. Employing techniques such as the Augmented Dickey–Fuller and Phillips–Perron tests alongside a vector error correction model, the study found that expenditure on education, health, and transport infrastructure positively influences economic growth. In contrast, spending on agriculture and natural resources infrastructure exhibited a negative relationship with growth, highlighting the importance of

sectoral allocation in determining the effectiveness of public expenditure.

Methodological considerations also play a crucial role in shaping empirical outcomes. As emphasized by Gujarati and Porter (2009), the use of inappropriate estimation techniques such as applying ordinary least squares (OLS) to simultaneous equation models can lead to biased and inconsistent estimates. This underscores the need for robust modelling strategies that accurately capture the interdependencies among variables. Given that empirical findings often inform policy decisions, ensuring the reliability and validity of results is of paramount importance. Nevertheless, the empirical literature remains divided. While several studies, including those by Lawal and Wahab (2011), Chude and Chude (2013), and Sefa Siew and Mehmet (2015), report a positive relationship between education expenditure and economic growth in Nigeria, others present contrasting evidence. For example, Abu and Abdullahi (2010) found that government spending on education has a negative effect on economic growth. Such conflicting results highlight the sensitivity of outcomes to differences in data, methodology, and model specification.

A critical limitation shared by many of these studies is the reliance on aggregate measures of education expenditure. By treating total spending as a homogeneous variable, researchers implicitly assume that capital and recurrent expenditures are equally efficient and yield similar returns. This assumption is problematic, as these components often serve different purposes—capital expenditure typically funds infrastructure and long-term investments, while recurrent expenditure covers salaries and operational costs. Ignoring this distinction may distort empirical estimates and obscure important policy insights. Moreover, many studies that examine the relationship between education and economic growth do so without explicitly accounting for the intermediary role of educational attainment. Others that incorporate all three variables education expenditure, educational outcomes, and economic growth frequently fail to disaggregate spending into its constituent parts. These gaps suggest that existing models may not

fully capture the complexity of the education growth nexus.

A critical gap in the existing literature lies in the limited recognition of the interdependent relationship among public education expenditure, educational attainment, and economic growth. Rather than treating these variables as part of a unified system, most empirical studies isolate them, adopting fragmented analytical approaches. In many cases, attention is restricted either to the direct effect of government spending on economic growth or to the contribution of education to growth outcomes, without adequately accounting for the intermediary role of educational attainment. As a result, the transmission mechanism through which public investment in education translates into economic performance is often incompletely specified. Even among studies that attempt a more integrated analysis, an important distinction is frequently overlooked. Public education expenditure is typically treated as a single aggregate, despite the fact that its major components capital and recurrent expenditure serve fundamentally different purposes. Capital expenditure is largely directed toward infrastructure development and long-term investments, whereas recurrent expenditure supports operational needs such as salaries and administrative costs. Assuming uniform efficiency across these categories may therefore obscure their distinct contributions to both educational outcomes and economic growth. This methodological simplification contributes to the persistent inconsistency observed in empirical findings. Indeed, the broader body of evidence on the relationship between public education expenditure and economic growth remains inconclusive. While some studies report positive and statistically significant effects, others identify weak, insignificant, or even negative relationships. These conflicting results are particularly evident in the context of Nigeria, where variations in data, model specification, and estimation techniques have produced divergent conclusions. Such inconsistencies raise an important empirical question: what is the true causal and dynamic relationship between government expenditure on education and economic growth? Addressing this question

requires a more coherent conceptual framework that explicitly captures the interactions among education spending, educational attainment, and economic performance. The inconsistencies in prior findings may, to a large extent, stem from weaknesses in the underlying conceptualization of these relationships. By failing to model the dynamic links among key variables, earlier studies risk omitting critical pathways through which education expenditure influences growth. Recognizing this limitation, the present study adopts a more integrated perspective, focusing on the long-run relationship between investment in education and economic growth in Nigeria.

**3. Methodology**  
**Model Specification**

Drawing on the framework proposed by Ifionu and Nteegah (2013), the study specifies a functional relationship in which economic growth is influenced by components of education expenditure and educational participation. For this study, the model is linearized as follows:

$$GDP = F(CEDU, REDU, CSE) \dots \dots \dots (3.1)$$

Linearized thus;

$$GDP_t = \beta_0 + \beta_1 CEDU_t + \beta_2 REDU_t + \beta_3 CSE_t + \mu_t \dots \dots \dots (3.2)$$

**Where:**

- RGDP** = Real Gross Domestic Product
- CEDU** = Capital Expenditure on Education
- REDU** = Recurrent Expenditure on Education
- CSE** = Composite School enrolments
- β<sub>0</sub>** = Constant term
- β<sub>1</sub>-β<sub>3</sub>** = The estimated parameters
- μ** = Disturbance or stochastic term.

**A Priori Expectation**

The expected signs of the model parameters are guided by standard economic theory. Both capital and recurrent expenditure on education are anticipated to exert positive effects on economic growth, reflecting their roles in enhancing infrastructure, human capital, and

institutional capacity. Similarly, higher levels of school enrolment are expected to contribute positively to growth by expanding the stock of educated labour. Formally, the expectations are expressed as:

$$\frac{\partial GDP}{\partial CEDU_t} > = 0, \quad \frac{\partial GDP}{\partial REDU_t} > = 0, \quad \frac{\partial GDP}{\partial CSE_t} > = 0$$

**Estimation Technique**

To examine the long-run relationship among the variables, the study employs the Fully Modified Ordinary Least Squares (FMOLS) technique, which is well-suited for estimating cointegrating relationships among non-stationary time series variables. FMOLS corrects for potential endogeneity and serial correlation, thereby providing consistent and efficient parameter estimates, particularly when variables are integrated of order one, I(1), as noted by Bashier and Siam (2014). Prior to estimation, the time-series properties of the data are assessed using the Augmented Dickey–Fuller (ADF) test. This procedure determines whether the variables are stationary or contain unit roots, a necessary step to avoid spurious regression results. All econometric analyses are conducted using the EViews package, which facilitates testing for stationarity, cointegration, and causality.

**Testing for Unit Roots**

Testing for unit roots is a fundamental step in time-series analysis because it determines whether the data are stationary or not. This distinction is crucial since many econometric techniques assume stationarity. In practical terms, the test helps establish whether a variable returns to its long-run equilibrium after a shock or instead follows a random walk, indicating the presence of a unit root. When variables exhibit random walk behaviour, any regression results derived from them may be misleading or spurious, as noted by Amiruddin, Nor, and Ismail (2007). In such situations, the assumptions underlying classical regression particularly those linked to the Gauss–Markov theorem—are violated, especially the requirement of constant variance.

A stationary time series is characterized by stability in its statistical properties over time. Specifically, its mean and variance remain constant, and its covariance depends only on the lag between observations rather than the time period itself. In contrast, non-stationary series display changing statistical properties, making them unsuitable for standard regression analysis unless transformed. To determine the order of integration, unit root tests are conducted at different levels of transformation, including the level (original data), first difference, and second difference. A variable that is stationary at level is said to be integrated of order zero,  $I(0)$ . If it becomes stationary after first differencing, it is integrated of order one,  $I(1)$ , and if stationarity is achieved after second differencing, it is classified as  $I(2)$ . In this study, the Augmented Dickey–Fuller test is employed to assess stationarity. The test is based on the hypothesis below:

**Hypothesis:**

- Null hypothesis ( $H_0$ ): The series is non-stationary (contains a unit root)
- Alternative hypothesis ( $H_1$ ): The series is stationary

The decision rule is based on the p-value: if it is less than 0.05, the null hypothesis is rejected, indicating stationarity.

**Cointegration and Granger Causality test**

When variables are non-stationary but integrated of the same order, it becomes possible to test for cointegration that is, the existence of a stable long-run relationship among them. As highlighted by Mukherjee et al. (1998), regressions involving non-stationary variables can yield misleading results unless cointegration is established. If the residuals from a long-run regression are stationary, the variables are

considered cointegrated, implying that they move together over time despite short-run fluctuations. To further explore the dynamics among the variables, the study employs both Granger causality tests and an error correction model (ECM). While cointegration analysis identifies long-run equilibrium relationships, Granger causality examines the direction of influence among variables in the short run. The ECM, in turn, captures the speed at which deviations from long-run equilibrium are corrected over time.

The Granger causality test provides a framework for examining predictive relationships among variables by estimating each variable as a function of its own past values and those of other variables. In essence, the technique evaluates whether past values of one variable contain information that improves the prediction of another. As explained by Godwin and William (2010), causality in this context does not imply true cause-and-effect but rather predictive precedence. Accordingly, a variable (X) is said to Granger-cause (Y) if the lagged values of (X) significantly contribute to explaining variations in (Y). The literature identifies several possible causal patterns. These include unidirectional causality from X to Y ( $X \rightarrow Y$ ), Y to X ( $Y \rightarrow X$ ) or bidirectional causality ( $X \leftrightarrow Y$ ) and independence case, where neither variable significantly predicts the other. This classification enables a more nuanced understanding of the dynamic interactions among variables.

In this study, the test is applied to examine the predictive relationships among real gross domestic product (GDP), capital expenditure on education (CEDU), recurrent expenditure on education (REDU), and composite school enrolment (CSE). Specifically, the analysis investigates whether these variables influence GDP, or whether GDP itself predicts changes in education-related indicators. The estimation framework is specified as follows:

$$GDP_t = \beta_0 + \sum_{j=1}^k \beta_{1j} GDP_{t-j} + \sum_{j=1}^k \beta_{2j} CEDU_{t-j} + \sum_{j=1}^k \beta_{3j} REDU_{t-j} + \sum_{j=1}^k \beta_{4j} CSE_{t-j} + \mu_t$$

where  $\mu_t$  represents a white noise error term and (k) denotes the optimal lag length required to ensure well-behaved residuals.

**Sources of Data**

The data utilized for the analysis are secondary in nature, drawn from publications of the Central Bank of Nigeria and the National Bureau of Statistics. The study employs annual time-series data spanning the period from 1981 to 2018.

**4. Results and Discussion**

**4.1 Introduction**

This section focuses mainly on the analysis and interpretation of the empirical results. Furthermore, the section provides an empirical platform for accepting or rejecting the hypothesis formulated for the purpose of achieving the objectives in this research work.

**4.2 Descriptive Statistics**

**Table 4.1: Descriptive Statistics**

Test	GDP	CEDU	REDU	CSE
Mean	25445.11	426.2266	1286.983	121.3605
Median	5696.390	289.3350	455.6300	123.6443
Maximum	127762.6	1682.100	5675.190	138.5729
Minimum	94.33000	4.100000	4.750000	98.35267
Std. Dev.	37813.88	441.8908	1637.924	10.37105
Skewness	1.430597	0.901350	1.119586	-0.316523
Kurtosis	3.605835	2.989325	2.981864	2.344065
Jarque-Bera	13.54299	5.145580	7.939183	1.315748
Probability	0.001146	0.076322	0.018881	0.517951
Sum	966914.0	16196.61	48905.35	4611.699
Sum Sq. Dev.	5.29E+10	7224895.	99263368	3979.668
Observations	38	38	38	38

Source: Author’s Computations

Table 4.1 presents the descriptive statistics of the variables, offering initial insights into their distributional properties. Among the variables, recurrent expenditure on education (REDU) records the highest mean value, whereas composite school enrolment (CSE) exhibits the lowest mean. In terms of variability, CSE shows the smallest standard deviation,

indicating relatively stable behaviour over time. By contrast, REDU displays the largest standard deviation, suggesting substantial fluctuations across the study period. The results of the Jarque–Bera test further confirm that the residuals of all variables are normally distributed, supporting the validity of subsequent econometric analyses.

### 4.3 Unit Root Tests

To ensure the appropriateness of the time-series data for estimation, the Augmented Dickey–Fuller (ADF) unit root test, developed

by Dickey and Fuller (1979), is employed. The results, reported in Table 4.2, are used to determine whether the variables are stationary and to identify their respective orders of integration.

**Table 4.2.** Unit Root Test Results

Variable	ADF Test Statistic	95% Critical ADF Value	Order of Integration	Remark
$\Delta$ GDP	5.566**	3.540	<i>I</i> (1)	Stationary
$\Delta$ CEDU	5.743**	3.581	<i>I</i> (1)	Stationary
$\Delta$ REDU	4.012**	3.563	<i>I</i> (1)	Stationary
$\Delta$ CSE	4.265**	3.540	<i>I</i> (1)	Stationary

**Source:** Author’s Computations

**Note:** \*\* = 5 percent significance.

The results presented in Table 4.2 indicate that the Augmented Dickey–Fuller (ADF) test statistics for all variables are lower than their respective critical values at levels, leading to the acceptance of the null hypothesis of unit roots. This implies that the series are non-stationary in their level form. However, upon

first differencing, all variables become stationary, confirming that they are integrated of order one, *I*(1). Given this common order of integration, it becomes appropriate to proceed with cointegration analysis to determine whether a stable long-run relationship exists among the variables.

### 4.4 Result of Cointegration Test

**Table 4.3.** Test for Johansen Co-Integration Results

Hypothesis (Number of Cointegrating Equations)	Eigenvalue	Trace Statistic	5% Critical Value	p-value	Decision
None	0.601888	60.51864	47.85613	0.0021	Reject $H_0$
At most 1	0.340506	27.36186	29.79707	0.0931	Do not reject $H_0$
At most 2	0.245072	12.37571	15.49471	0.1398	Do not reject $H_0$

At most 3	0.060715	2.254924	3.841466	0.1332	Do not reject H <sub>0</sub>
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Source: Author’s Computations

The Johansen cointegration test results reveal the presence of one cointegrating equation, as indicated by the trace statistic. This finding confirms the existence of a long-run equilibrium relationship among the variables, suggesting that they move together over time despite short-run fluctuations. The stationarity of the residuals, as verified by the ADF test, further supports the conclusion that the variables are cointegrated. On this basis, the study

**Table 4.4: The Fully Modified Least Squares (FMOLS) Long Run Result**

Having established the long-run co-movement among the variables, we proceed to estimate the long-run parameters using the Fully Modified Ordinary Least Squares (FMOLS) technique, which is suitable for handling cointegrated series as shown in table 4.4 below:

Response variable: GDP				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CEDU	-37.84547	6.449268	-5.868181	0.0000
REDU	33.03825	1.762839	18.74150	0.0000
CSE	-305.7569	115.1375	-2.655581	0.0121
C	36621.10	13798.19	2.654050	0.0121
<b>R-squared</b>	0.981014			
<b>Adjusted R-squared</b>	0.979288			

Source: Author’s Computations

Table 4.4 reports the long-run FMOLS estimates, with real gross domestic product (GDP) specified as the dependent variable. The overall model exhibits a high explanatory power, as indicated by an adjusted R-squared value of approximately 0.98. This suggests that about 98% of the variations in Nigeria’s economic growth are explained by the included explanatory variables, reflecting a strong model fit. Examining the individual coefficients, capital expenditure on education (CEDU) is found to have a negative and statistically significant effect on economic growth at the 5% level. The

estimated coefficient of -37.84547 implies that a one percent increase in capital expenditure on education is associated with a substantial decline in GDP. This result contradicts theoretical expectations, which posit a positive relationship between education investment and economic growth. The negative outcome may reflect inefficiencies in the allocation and utilization of capital spending, as well as the relatively low budgetary priority given to the education sector compared to other sectors such as defense. It may also point to persistent challenges in the quality

of educational infrastructure and investment outcomes in Nigeria.

In contrast, recurrent expenditure on education (REDU) exhibits a positive and statistically significant relationship with economic growth. The estimated coefficient of 33.038 indicates that increases in recurrent spending—such as salaries, administration, and operational costs—are associated with improvements in economic performance. This suggests that consistent funding for the day-to-day functioning of the education system plays a crucial role in enhancing productivity and supporting growth. The coefficient of composite school enrolment (CSE), although statistically significant, is negatively signed. This implies

that increases in enrolment are associated with declines in economic growth, a finding that deviates from theoretical expectations. This counterintuitive result may be attributed to issues related to the quality of education, under-resourced institutions, or a mismatch between educational output and labour market demands.

#### 4.5 Test of Statistical Significance

The statistical significance of the estimated parameters is further confirmed using the t-test at the 5% level of significance. A parameter is considered statistically significant if its calculated t-value exceeds the critical value.

**Table 4.5: T-statistics**

Variable	Calculated t*	Prob. Value	Decision
B <sub>1</sub>	-5.868181	0.0000	significant
β <sub>2</sub>	18.74150	0.0000	Significant
β <sub>3</sub>	-2.655581	0.0121	Significant
β <sub>0</sub>	2.654050	0.0121	Significant

**Source:** Author's Computations

The results presented in Table 4.5 indicate that all explanatory variables are statistically significant, thereby affirming their relevance in explaining

variations in economic growth of Nigeria under the year reviewed.

**Table 4.6: The Empirical Results of Pair-Wise Granger Causality Test**

Variable Pair	Direction of Causality Tested	Observations	F-Statistic	p-value	Decision (5% Level)
CSE ↔ CEDU	CSE → CEDU	36	0.25089	0.7797	No causality
	CEDU → CSE	36	2.36378	0.1108	No causality

<b>GDP ↔ CEDU</b>	GDP → CEDU	36	2.41291	0.1062	No causality
	CEDU → GDP	36	7.79883	0.0018	Causality exists
<b>REDU ↔ CEDU</b>	REDU → CEDU	36	3.28266	0.0509	Weak/Borderline causality
	CEDU → REDU	36	1.52884	0.2327	No causality
<b>GDP ↔ CSE</b>	GDP → CSE	36	1.15362	0.3287	No causality
	CSE → GDP	36	0.12580	0.8822	No causality
<b>REDU ↔ CSE</b>	REDU → CSE	36	0.99434	0.3815	No causality
	CSE → REDU	36	0.05183	0.9496	No causality
<b>REDU ↔ GDP</b>	REDU → GDP	36	8.35472	0.0013	Causality exists
	GDP → REDU	36	0.84023	0.4412	No causality

**Source:** Author's Computations

The Granger causality test provides additional insights into the directional relationships among the variables. The results indicate a bidirectional relationship between GDP and capital expenditure on education (CEDU), although more precisely, causality appears to run from CEDU to GDP, with no evidence that GDP predicts changes in CEDU. Between GDP and composite school enrolment (CSE), no causal relationship is observed, indicating independence. However, a bidirectional causality is identified between GDP and recurrent expenditure on education (REDU), suggesting mutual reinforcement between these variables over time. Overall, the findings reveal a combination of unidirectional, bidirectional, and independent causal relationships among the variables.

#### 4.6 Discussion of Findings

The empirical results highlight important dynamics in the relationship between education

expenditure and economic growth in Nigeria. Notably, capital expenditure on education does not conform to theoretical expectations, as its negative coefficient suggests that it does not contribute meaningfully to economic growth. This finding aligns with the conclusions of Abu and Abdullahi (2010) who also reported a negative relationship between education spending and growth in the short run. However, it contrasts with the findings of Diawara (2009), who identified a positive and significant impact of capital expenditure on economic growth. On the other hand, the positive relationship between recurrent expenditure and economic growth underscores the importance of sustaining operational funding within the education sector. This suggests that immediate, functional aspects of education such as teacher remuneration and institutional management may have a more direct impact on productivity and growth than long-term capital investments, particularly in contexts where infrastructure investments are inefficiently managed.

## 5. Conclusion and Policy Recommendations

In light of the findings, it is evident that the composition and management of education expenditure are critical to achieving positive economic outcomes. Policymakers should prioritize increased and sustained funding for the education sector, with particular attention to recurrent expenditure, which has demonstrated a significant positive impact on growth. At the same time, efforts must be made to improve the efficiency and effectiveness of capital expenditure to ensure that investments in infrastructure yield meaningful returns.

Furthermore, government should enhance overall budgetary allocation to education in order to address pressing challenges such as inadequate facilities, poor learning environments, and suboptimal teaching conditions. Strengthening these areas will improve both the quality and outcomes of education, thereby contributing more effectively to economic growth. In line with international best practices, it is recommended that Nigeria strive to meet—and where possible exceed—the 26% budgetary allocation benchmark for education advocated by the UNESCO.

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