**Effect of Gendered Education Investment on Economic Growth in Nigeria**

**Abstract**

This study investigates the impact of gendered education investment on economic growth in Nigeria. Annual data spanning from 1990 to 2023 were sourced from the WDI and the Central Bank of Nigeria. Real GDP per capita is employed as the dependent variable, while the independent variables include government expenditure on education, female secondary school enrolment, and the Gender Parity Index (GPI) for primary school enrolment. The methodological framework comprises descriptive statistics, unit root testing, bounds cointegration analysis, residual diagnostics tests and the Autoregressive Distributed Lag (ARDL) estimation technique. The Augmented Dickey-Fuller (ADF) unit root test reveals a mixed order of integration comprising both I(0) and I(1) series, justifying the use of the ARDL model. Cointegration analysis confirms the existence of a long-run equilibrium relationship among the variables. The ARDL long-run estimates indicate that both government expenditure on education and female secondary school enrolment exert a positive and statistically significant effect on real GDP per capita. Conversely, the Gender Parity Index (GPI) for primary school enrolment exhibits a negative and statistically significant long-run effect on real GDP per capita. In light of these findings, the study recommends that the Nigerian government should institutionalize a long-term education financing framework. This should prioritize consistent, accountable, and outcome-driven investments to ensure that educational expenditure translates into sustainable economic growth. Additionally, the government should re-evaluate gender-targeted interventions at the primary level to ensure they are not only inclusive but also effective in improving learning outcomes and long-term economic contributions.

**Keywords:** Real GDP per capita, Gender Parity Index (GPI) for primary school enrolment, female secondary school enrolment, Gendered Education Investment, and economic growth.

**1 Introduction**

**Background to the study**

Education is universally acknowledged as a cornerstone of economic development, productivity, and inclusive growth. Within this framework, gendered education investment, particularly in favour of female inclusion, has emerged as a strategic imperative in fostering sustainable development in low and middle-income countries. According to Jorgenson and Fraumeni [1], human capital accumulation, through investments in education, is central to long-term economic growth. In countries like Nigeria, where gender disparities in education persist, the macroeconomic consequences are both structural and profound.

Nigeria, Africa’s most populous country and largest economy, continues to struggle with educational inequalities that significantly disadvantage females. As of 2021, the female literacy rate was estimated at 53%, compared to 74% for males World Bank [2]. This disparity is even more pronounced in Northern Nigeria, where early marriage, gender discrimination, poverty, and religious beliefs are major barriers to girls' enrolment and retention in schools [3,4]. Moreover, the Gender Parity Index (GPI) for primary school enrolment stood at 1.01 in 2019, indicating a substantial gender imbalance in favour of boys [5]. This gap restricts the pipeline of female human capital into the economy and impedes inclusive development.

Government expenditure on education in Nigeria remains consistently below international benchmarks. While the United Nations Educational, Scientific and Cultural Organisation (UNESCO) recommends allocating at least 15 to 20% of national budgets to education, Nigeria allocated only 4.31% in 2022 [6]. Such underinvestment undermines access, quality, and equity disproportionately affecting female education outcomes. Research consistently shows that gender inequality in education negatively impacts economic growth in developing countries. Multiple studies have found that increasing gender equality in education leads to higher GDP per capita [7,8,9,10]. For example, a 1% increase in the female-to-male educational attainment ratio is associated with a 0.848% increase in GDP per capita in Asian developing nations [8]. Sehar et al. [11] empirically demonstrated that increasing female education contributes significantly to GDP per capita.

**Statement of the Problem**

Despite decades of development planning, Nigeria continues to face chronic underperformance in human capital indices driven significantly by gender disparities in education. The disconnection between gendered educational investment and macroeconomic outcomes suggests structural inefficiencies and policy neglect. Although real GDP per capita grew at an annual average of only 0.7% between 2015 and 2023 [12], Nigeria ranks 164 out of 193 countries on the Human Development Index, with female education outcomes contributing to this dismal ranking [13].

One major issue is the persistently low female secondary school enrolment, which stunts long-term labour force readiness and innovation capacity. Studies have shown that countries with more equitable education systems achieve higher long-run economic growth [14]. However, in Nigeria, structural barriers such as poverty, early marriage, and insecurity continue to prevent girls from transitioning from primary to secondary education, resulting in over 7.6 million out-of-school girls as of June 2022 report [15]. Without urgent intervention, this education gap will translate into continued economic exclusion for nearly half of Nigeria’s population.

Additionally, government spending on education, a key instrument for human capital formation, remains grossly inadequate. Public investment in education has not only failed to meet global recommendations but has also shown weak targeting toward bridging gender disparities. Wodon et al. [16] assert that such fiscal misalignment not only depresses access to quality education but also undermines the productivity potential of the economy, particularly when female cohorts are undereducated and underemployed.

While the GPI for primary school enrolment remains slightly below parity, the real concern lies in its uneven regional distribution and lack of transition to secondary and tertiary education. According to Mohammed and Alhassan [17], fifteen (15) states in Northern Nigeria recorded are below average regarding the ratio of their girls in schools, while southern states approached or exceeded parity. This skew creates a bifurcated human capital structure where regional underdevelopment becomes self-reinforcing and limits aggregate economic performance.

The empirical literature provides limited country-specific insights into the simultaneous effects of gender-targeted education investments on Nigeria's economic trajectory. Most existing studies are either generalised or outdated, ignoring key disaggregated variables. Therefore, there is a critical need for empirical analysis that integrates female secondary school enrolment, government education spending, and gender parity into a coherent model of economic growth in Nigeria. This gap in both research and policy design justifies a focused econometric investigation.

Thus, the specific objectives of this study are to examine how female secondary school enrolment, government education expenditure, and GPI in primary enrolment influence real GDP per capita in Nigeria. By adopting a gendered lens in education-growth analysis, this study contributes to policy strategies that could break intergenerational poverty cycles, enhance productivity, and promote inclusive growth.

**2. Literature Review**

**Theoretical Framework**

The theoretical foundation of this study is grounded in Human Capital Theory, Endogenous Growth Theory, and Sen’s Capability Approach, all of which offer distinct yet complementary lenses through which the relationship between gendered education investment and economic growth can be understood.

Human Capital Theory, developed by Becker [18] and expanded by Mincer [19], posits that education is a form of investment that enhances individual productivity and national output. This theory asserts that individuals, when provided with education and training, accumulate knowledge and skills that increase their future earnings and efficiency. In the context of gendered education, investing in female secondary school enrolment yields both direct economic benefits and social returns, such as reduced fertility rates, improved child health, and expanded labour force participation [20]. Moreover, government expenditure on education reflects the state's commitment to building a productive workforce. When such expenditures are strategically targeted toward reducing gender disparities, they contribute to a more balanced and efficient allocation of human resources, which in turn raises national productivity and real income levels. The Gender Parity Index (GPI) in primary education further complements this framework, serving as a proxy for the equitable distribution of foundational learning opportunities.

Building on the human capital perspective, Endogenous Growth Theory offers a more dynamic explanation of how education contributes to long-run economic performance. As articulated by Romer [21] and Lucas [22], endogenous growth models emphasise that the accumulation of knowledge and human capital, particularly through education, is a primary driver of technological advancement and innovation within an economy. These models argue that public policies, such as increased government expenditure on education, can have sustained effects on growth by fostering environments that promote learning, innovation, and skill development. Importantly, when such policies are inclusive by ensuring equitable access to girls and boys, they create a more diversified and resilient base of human capital. Female secondary education plays a particularly critical role in this framework, as it equips women with the competencies needed to participate in high-value-added sectors of the economy. The presence of a near-equal GPI in primary education is a necessary condition for these benefits to materialise at later educational stages. When gender disparities persist, a significant portion of the population is excluded from the knowledge economy, thereby reducing the nation’s growth potential.

Complementing these economic models is theCapability Approach advanced by Amartya Sen [23], which expands the concept of development beyond income metrics to include human freedom, agency, and opportunity. Sen argues that true development occurs when individuals have the capabilities to live lives they value, and education is central to expanding those capabilities. In this context, gendered education investment is not only a tool for income generation but also a pathway to empowerment and social justice. When girls are denied access to education, particularly at the primary and secondary levels, their ability to participate meaningfully in economic and civic life is severely constrained. The Gender Parity Index for primary enrolment is therefore an early indicator of whether development is inclusive and equitable. Public spending that prioritises gender parity in education, especially in nations with historically low female enrolment, can unlock latent human capabilities and fuel sustained, broad-based economic growth.

**Empirical Review**

Kocevska [24] investigated the impact of public education investment on GDP per capita in North Macedonia from 1991 to 2020. The study found significant results using empirical computations, the study produced salient findings. In the short run, public spending on education had a negative and significant relationship with GDP per capita. In the long run, the relationship remained negative, though statistically insignificant. Based on these findings, the study concluded that policy interventions in the financing of the education sector were necessary to transform educational expenditures into productive human capital and thereby enhance national economic development.

Kenneth et al. [25] studied the effect of government education spending and school attainment on per capita income in Nigeria between 1990 and 2018. The study incorporated variables such as GDP per capita, literacy rate, and enrolment rates at the primary, secondary, and tertiary levels, applying the dynamic autoregressive distributed lag (ARDL) framework. Their findings indicated that gross fixed capital formation, capital expenditure on education, secondary and tertiary school enrolment, and adult literacy exerted significant positive effects on GDP per capita. In contrast, the labour force and primary school enrolment ratios showed negative associations. Furthermore, government recurrent expenditure had a negative impact on GDP per capita in the short run, but a positive link in the long term.

Using a system-generalized method of moments (SGMM) estimator to examine panel data from 35 Sub-Saharan African countries spanning 1980–2008, Ogundari and Awokuse [26] employed two proxies for human capital: health and education. The results showed that both variables positively influenced economic growth, with health having a more pronounced effect. Furthermore, while government expenditure on education contributed positively to growth, the effect was not statistically significant.

Using 237 estimates from 29 initial studies, Churchill et al. [27] performed a hierarchical meta-regression analysis to assess the connection between economic growth and government expenditures on education. According to the findings, education spending has a positive effect on growth in industrialised nations. On the other hand, the correlation was statistically insignificant for LDCs. The study further explored heterogeneity across findings and identified that variations in econometric methods, publication attributes, and data features accounted for differences in outcomes. Interestingly, no indication of publication bias was found.

Kouton [28] explored the long-term relationship between Côte d'Ivoire's economic growth and government spending on education from 1970 to 2015. The results showed that education investment has a long-term, statistically significant negative impact on economic growth. On the other hand, albeit statistically insignificant, the short-term relationship was positive. Additionally, a unidirectional causal relationship between economic growth and education spending was demonstrated.

Sehar et al. [11] used World Development Indicators panel data from 2000 to 2023 to examine the impact of gender equality on economic growth. The study examined major gender-related factors such as female labour force participation, secondary school enrolment, and women's representation in national parliaments, while controlling for gross capital formation. The results showed that female secondary education was the most influential factor, where a 1% increase was associated with a $269 rise in GDP per capita. Although female labour force participation and political representation had positive coefficients, the effects were statistically insignificant, pointing to underlying structural constraints. Gross capital formation remained a robust and positive driver of economic growth.

Keller [29] used global panel data regressions to investigate the effects of female and male enrolment rates in primary, secondary, and higher education on GDP per capita. The study also looked at how the gender parity index (GPI) affected different levels of schooling. The results were highly statistically significant, typically at the 1% level. Female enrolment was linked to a variety of economic and social benefits, including lower fertility and infant mortality rates, decreased poverty and inequality, and increased trade openness, investment (both domestic and international), R&D spending, savings rates, and political rights.

Fe [30] used panel data to examine gender parity in education and its impact on per capita income in 13 West African countries. The study focused on secondary and university education and found persistent educational inequality, typically favoring boys, with the exception of Cabo Verde. The findings suggested that eliminating gender gaps at both educational levels has a beneficial effect on GDP per capita across the region.

From 1980 to 2014, Assoumou-Ella [10] examined the direct and indirect effects of gender disparity in schooling on GDP per capita in CEMAC nations. Utilizing instrumental variable (IV) estimation in conjunction with the Blundell and Bond's (1998) system-GMM estimator, found that increases in gender equality at the primary-secondary and tertiary levels considerably increased GDP per capita. This highlights the critical role of equitable educational access in fostering economic development.

Carter et al. [31] presented empirical evidence on the relationship between government expenditure components and Barbados' economic growth. They used Dynamic Ordinary Least Squares (DOLS) and the Unrestricted Error Correction Model (UECM) to analyse time series data from 1976 to 2011. Their results indicated that total government expenditure had a contractionary influence on economic growth, particularly in the short run, with a more muted impact in the long run. More specifically, while government spending on health and social security had little or no effect on per capita economic growth, government spending on education had a consistently significant and negative impact on growth in both the short and long run.

Duwal and Suwal [32] investigated the relationship between educational attainment, government spending on education, and economic growth in Nepal from 1990 to 2022. They used the Autoregressive Distributed Lag (ARDL) model and the Error Correction Model (ECM) to examine both long-run and short-run dynamics. Their findings demonstrated that the educational index, gross capital formation, and population size all had a favourable and significant long-term impact on economic growth. Conversely, government spending on education, domestic loans to the private sector, and trade liberalisation all had negative and statistically negligible effects on long-run growth. In the short term, the educational index had a negative and considerable impact on economic growth.

**3.** **Methodology**

This study adopts the ex-post research design, while the data used were sourced from the World Development Indicators, and the CBN Statistical Bulletin from 1990-2023. The dependent variable for the study is real GDP per capita, expressed in constant 2015 US$, while the independent variables include government expenditure on education, female secondary school enrolment (% gross), and gender parity index (GPI) for primary school enrolment (% gross). To achieve the objective of this study, the study adopted the endogenous growth theory for model specifications.

**Functional Form of the Model:**

GDPPC= *f*(GEDU​, FSE, GPI) 1

**Econometric Form of the Model:**

GDPPC = 2

Where:

GDPPC​ Real GDP per capita (constant 2015 US$)

GEDU​ Government expenditure on education (% of GDP)

FSE​ Female secondary school enrolment (% gross)

GPIGender Parity Index (GPI) for primary school enrolment (% gross)

a0 = intercept term; α1 to α3​ = partial regression coefficients; εₜ = stochastic error term. t = time.

Note: GDPPC and GEDU variable is log-transformed to address scale differences and ensure linearity in the model estimation.

**ARDL Model Specification:**

3 3

Where:

= denotes first difference (short-run dynamics); , = short-run coefficients; , long-run coefficients; .

**A priori Expectation**

Based on the theories, it is anticipated that the will be positive.

**4. Results and Discussion**

**4.1 Descriptive Statistics**

The descriptive statistics presented in Table 1 offer a comprehensive overview of the distributional properties of the variables across the study period. Real GDP per capita (GDPPC) exhibited an average annual growth rate of 7.56%, with a relatively narrow range spanning from a minimum of 7.24% to a maximum of 7.86%. This indicates that Nigeria’s real per capita income experienced only modest fluctuations throughout the observed timeframe.

Government expenditure on education (GEDU) recorded a mean coverage rate of 4.34%, though it ranged from a high of 6.62% to a concerning low of -1.24%, suggesting episodes of budgetary contraction in the sector.

Female secondary school enrolment (FSE) averaged 32.76%, with values ranging between 21.32% and 52.23%, reflecting significant variation in access over time. Meanwhile, the Gender Parity Index (GPI) for primary school enrolment maintained a mean of 0.89, with values fluctuating within a relatively narrow band of 0.79 to 1.01, indicating progress toward parity, though not without volatility.

The standard deviations across all variables are lower than their respective means, signalling low dispersion and suggesting that these time series are relatively stable over the study period.

Finally, the probability values associated with the Jarque-Bera statistics indicate that all variables are normally distributed at the 5% level of significance, affirming the appropriateness of parametric methods in subsequent econometric analysis.

**Table 1: Summary of descriptive Statistics for the variables**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | GDPPC | GEDU | FSE | GPI |
| Mean | 7.559864 | 4.340677 | 32.76088 | 0.893824 |
| Median | 7.593209 | 4.850074 | 31.38500 | 0.870000 |
| Maximum | 7.857763 | 6.624039 | 52.23000 | 1.010000 |
| Minimum | 7.237397 | -1.237874 | 21.32000 | 0.790000 |
| Std. Dev. | 0.232508 | 1.981637 | 10.25876 | 0.074305 |
| Skewness | -0.166151 | -0.989533 | 0.215673 | 0.343012 |
| Kurtosis | 1.349076 | 3.352476 | 1.528359 | 1.663184 |
|  |  |  |  |  |
| Jarque-Bera | 4.017633 | 5.724668 | 3.331699 | 3.198417 |
| Probability | 0.134147 | 0.057135 | 0.189030 | 0.202056 |
|  |  |  |  |  |
| Sum | 257.0354 | 147.5830 | 1113.870 | 30.39000 |
| Sum Sq. Dev. | 1.783980 | 129.5872 | 3472.992 | 0.182203 |
|  |  |  |  |  |
| Observations | 34 | 34 | 34 | 34 |

Source: *Researcher’s computation using E-views 12.*

**4.2 Unit Root Test**

To mitigate the risk of spurious regression results, the second stage of our empirical analysis involved testing the stationarity properties of the time series variables. The test specification included an individual intercept, and we employed the Augmented Dickey-Fuller Fisher (ADF-Fisher) method, under the null hypothesis that each series possesses a unit root (i.e., is non-stationary).

The outcomes of the unit root test, presented in Table 2, reveal that only government expenditure on education (GEDU) is stationary in its level form. The ADF test statistic for GEDU is -6.137666, which exceeds the 5% critical value in absolute terms, implying that the null hypothesis of a unit root is rejected at conventional significance levels. Thus, GEDU is integrated of order zero, I(0), and does not require differencing to attain stationarity.

In contrast, the remaining variables: real GDP per capita (GDPPC), female secondary school enrolment (FSE), and the Gender Parity Index (GPI) for primary school enrolment were found to be non-stationary at levels but stationary after first differencing. Specifically, their ADF test statistics are -3.055924, -6.840476, and -5.192283, respectively, all exceeding the 5% critical threshold in magnitude at first difference. These findings suggest that GDPPC, FSE, and GPI are integrated of order one, I(1), and thus contain a unit root in levels but become stationary in their differenced forms.

Given this mixture of I(0) and I(1) variables, it is appropriate to proceed with a bound testing approach to examine the existence of a long-run equilibrium relationship among the variables, in line with the methodology outlined by Aninwagu and Momodu [33].

**Table 2: ADF Unit Root Test**

|  |  |  |  |
| --- | --- | --- | --- |
| **Variables** | **ADF (SIC)** | | **Order of Integration** |
|  | Level | First Difference |  |
| GDPPC | -0.890977 | -3.055924 | 1(1) |
| FSE | -0.662196 | -6.840476 | 1(1) |
| GEDU | -6.137666 | NA | 1(0) |
| GPI | -0.585743 | -5.192283 | 1(1) |

*Source: Researcher’s computation using Eviews 12*

Note: The study used a 5% level of significance, NA sign indicates that the variable is stationary at level.

**4.3 Cointegration Test Result**

Given the mixed order of integration comprising both I(0) and I(1) variables, the Autoregressive Distributed Lag (ARDL) bounds testing approach was employed to investigate the existence of a long-run equilibrium relationship between the dependent and independent variables.

As reported in Table 3, the calculated F-statistic from the bounds test is 12.58254. This value exceeds the upper critical bound (I(1)) at the 5% significance level, thereby providing robust statistical evidence against the null hypothesis of no cointegration. Accordingly, we conclude that a stable long-run relationship exists among the variables in the model.

**Table 3: Bounds Cointegration Test Results**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | 10% |  | 5% |  | 1% |  |
| Model | K | F-stat | Lower Bound | Upper Bound | Lower Bound | Upper Bound | Lower Bound | Upper Bound |
| GDPPC | 3 | 12.58254 | 2.37 | 3.2 | 2.79 | 3.67 | 3.65 | 4.66 |

*Source: Authors computations using Eviews 12*

Note: K denotes number of independent variables

**4.4 Model Estimation**

The ARDL model analysis presented in Table 4 examines both the short-run and long-run dynamics of real GDP per capita (GDPPC) in Nigeria, as influenced by government expenditure on education (GEDU), female secondary school enrolment (FSE), and the Gender Parity Index (GPI) for primary school enrolment.

In the short run, the coefficient estimate for government expenditure on education in the immediate year exhibits a negative and statistically insignificant impact on real GDP per capita. Specifically, a 1 percent increase in government expenditure on education is associated with 0.007 percent change in real GDP per capita. However, at lag 1 and lag 2, the coefficient becomes negative and statistically significant, suggesting that a 1 percent increase in government expenditure on education leads to a 0.609 and 0.269 percent change in real GDP per capita. These findings are consistent with the results reported by Kocevska [24]. In contrast, the long-run coefficient estimates reveal a positive and statistically significant effect, where a 1 percent increase in government expenditure on education corresponds to a 0.133 increase in real GDP per capita. These results do not align with previous findings by [26, 32], but they are in line with the study’s a priori expectations and the findings of Kenneth et al. [25].

Regarding female secondary school enrolment, the short-run coefficient is positive and statistically significant, indicating that a one unit increase in female secondary school enrolment leads to a 0.002 percent increase in real GDP per capita. This suggests that female secondary school enrolment positively contributes to GDP per capita in the short term, likely through improvements in human capital or increased labour force participation. In the long run, the coefficient remains positive and statistically significant, with a one unit increase in female secondary school enrolment associated with a 0.026 percent increase in real GDP per capita. These results support the study’s a priori expectations and align with prior empirical finding from Sehar et al. [11] as well as with human capital theory.

In the case of the Gender Parity Index (GPI) for primary school enrolment, the short-run results indicate that the immediate year coefficient is negative and statistically insignificant, with a one unit increase in GPI associated with a 0.112 percent decrease in real GDP per capita. However, at lags 1 and 2, the coefficients turn positive, though statistical significance is observed only at lag 1, where a unit increase in GPI results in a 0.609 percent increase in real GDP per capita. At lag 2, a 0.269 percent increase is observed, albeit without confirmed statistical significance. Conversely, the long-run coefficient for GPI reveals a negative and statistically significant effect on real GDP per capita, where a one unit increase in GPI leads to a 4.331 percent decrease in GDP per capita. These long-run results are inconsistent with the study’s a priori expectations and do not conform to the theoretical assumptions underpinning Sen’s Capability Approach.

The error correction term (CointEq (-1)) with the negative sign of a coefficient -0. 190338 indicates that the system corrects approximately 19.03% of deviations from the long-run equilibrium annually, demonstrating a strong tendency towards equilibrium restoration.

Finally, the model exhibits strong explanatory power, with an R-squared value of 0.789199 and an adjusted R-squared of 0.725042. These statistics imply that approximately 78.92% of the variation in real GDP per capita is explained by the model, with the adjusted R-squared of 72.50% confirming the robustness of the model after accounting for degrees of freedom.

**Table 4: ARDL short and long run results for the model**

**Short run results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| D(GEDU) | -0.007070 | 0.005328 | -1.326890 | 0.2003 |
| D(GEDU(-1)) | -0.027204 | 0.005951 | -4.571530 | 0.0002 |
| D(GEDU(-2)) | -0.015199 | 0.005497 | -2.765018 | 0.0123 |
| D(FSE) | 0.002618 | 0.001178 | 2.222071 | 0.0386 |
| D(GPI) | -0.112922 | 0.194236 | -0.581362 | 0.5678 |
| D(GPI(-1)) | 0.609385 | 0.209492 | 2.908870 | 0.0090 |
| D(GPI(-2)) | 0.269189 | 0.172794 | 1.557865 | 0.1358 |
| CointEq(-1)\* | -0.190338 | 0.021811 | -8.726825 | 0.0000 |

**Long run results**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
| GEDU | 0.132692 | 0.051258 | 2.588685 | 0.0180 |
| FSE | 0.026404 | 0.008098 | 3.260458 | 0.0041 |
| GPI | -4.331708 | 1.491000 | -2.905237 | 0.0091 |
| C | 10.06399 | 1.089795 | 9.234759 | 0.0000 |

R-squared 0.789199; Adjusted R-squared 0.725042

*Source: Researcher’s computation using Eviews 12.*

**4.5 Residual Diagnostic Tests**

**4.5.1 Breusch-Godfrey Serial Correlation LM Test**

The results of Breusch-Godfrey Serial Correlation LM Test in table 5 shows F-statistic value of 0.078311, with a corresponding probability value (Prob. F) of 0.9250. Since the p-value exceeds the conventional significance threshold of 0.05, we fail to reject the null hypothesis of no serial correlation. Similarly, the Obs\*R-squared statistic is 0.282998, with an associated p-value of 0.8681, which further supports the absence of serial correlation in the residuals. These results indicate that the model does not suffer from serial correlation issues, thereby enhancing the reliability of the estimated coefficients and supporting the model’s validity over time.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 5: Breusch-Godfrey Serial Correlation LM Test:** | | | |  |
|  | |  |  |  |  |
|  | |  |  |  |  |
| F-statistic | | 0.078311 | Prob. F(2,17) | | 0.9250 |
| Obs\*R-squared | | 0.282998 | Prob. Chi-Square(2) | | 0.8681 |
|  | |  |  |  |  |
|  | |  |  |  |  |

*Source: Researcher’s computation using Eviews 12*

**4.5.2 Heteroskedasticity Test**

The Heteroskedasticity in table 6 shows F-statistic value of 0.657308, with an associated Prob. F of 0.7597, which is well above the conventional 0.05 significance threshold. The Obs\*R-squared statistic is 0.545126, with a p-value of 0.6638, while the Scaled Explained Sum of Squares (SS) yields a p-value of 0.9439. As all p-values exceed 0.05, we fail to reject the null hypothesis (H₀) of homoskedasticity. This outcome suggests that the residuals exhibit constant variance, indicating the absence of heteroskedasticity. Consequently, the parameter estimates are considered efficient and unbiased, thereby supporting the robustness of the model’s inferential results.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Table 6: Heteroskedasticity Test: Breusch-Pagan-Godfrey** | | | | |
|  | |  |  |  |  |
|  | |  |  |  |  |
| F-statistic | | 0.657308 | Prob. F(11,19) | | 0.7597 |
| Obs\*R-squared | | 8.545126 | Prob. Chi-Square(11) | | 0.6638 |
| Scaled explained SS | | 4.721882 | Prob. Chi-Square(11) | | 0.9439 |
|  | |  |  |  |  |

*Source: Researcher’s computation using Eviews 12*

**4.5.3 Normality Test**

The Jarque-Bera test, as presented in Figure 1, assesses whether the residuals follow a normal distribution. The test yields a Jarque-Bera statistic of 2.040958, with a corresponding p-value of 0.360422. Since the p-value exceeds the conventional 0.05 significance threshold, we fail to reject the null hypothesis that the residuals are normally distributed. This supports the statistical reliability and validity of the model's inference framework.

**Figure 1: Jarque-Bera test**



*Source: Author’s computation using Eviews 12*

**5. Conclusion and Policy Recommendations**

**5.1 Conclusion**

There has been an ongoing debate in economic literature on the role of gendered education investment on economic growth. This study used real GDP pe capita as indicator for economic growth, while government expenditure on education, female secondary school enrolment, and Gender Parity Index (GPI) for primary school enrolment was used as gendered education investment. Using the ARDL econometric analysis, the study concludes that government expenditure on education and female secondary school enrolment significantly contribute to the Nigerian economic growth in the long term. On the other hand, Gender Parity Index (GPI) for primary school enrolment does not improve economic growth in Nigeria in the long run.

**5.2 Policy Recommendations**

Based on the findings, the authors recommend that:

1. The Nigerian government should institutionalize a long-term education financing framework. This should prioritize consistent, accountable, and outcome-driven investments to ensure that educational spending translates into sustainable economic growth.
2. Government policies should focus on removing socio-economic barriers to girls’ education by providing scholarships, enforcing anti-child marriage laws, and expanding school networks in rural areas to maximize labour force participation and productivity.
3. The government should re-evaluate gender-targeted interventions at the primary level to ensure they are not only inclusive but also effective in improving learning outcomes and long-term economic contributions.

**Disclaimer**

The products used in this research are commonly and predominantly used in our area of research and country. There is absolutely no conflict of interest between the authors and the producers of these products, as we do not intend to use them for any form of litigation but solely for the advancement of knowledge. Additionally, this research was not funded by the producing companies; it was entirely supported through the personal efforts of the authors.

**Competing Interests**

Authors have declared that no competing interests exist.

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