EFFECT OF HUMAN CAPITAL DEVELOPMENT ON INCLUSIVE GROWTH IN NIGERIA, 1990-2021: EVIDENCE FROM THE ARDL APPROACH

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Abstract

This study investigates the effect of human capital development on inclusive growth in Nigeria from 1990 to 2021, employing the Autoregressive Distributed Lag (ARDL) approach. Using annualized dataset. The study employs the ARDL bounds testing approach to examine the long-run and short-run relationships between human capital development indicators and inclusive growth. The analysis also considers the presence of structural breaks and investigates both the long-run and short-run dynamic effects. The results indicate a positive and significant relationship between human capital development and inclusive growth in Nigeria. The results suggest that an increase in the labour force participation rate positively affects the country's GDP per capita growth. Similarly, higher levels of gross fixed capital formation, reflecting investment in physical capital, contribute to inclusive growth. Moreover, improved school enrolment at the primary level and increased government health expenditure as a ratio of GDP show significant positive effects on inclusive growth. The findings have important policy implications, emphasizing the significance of investing in human capital development to foster inclusive economic growth in Nigeria. Policymakers should prioritize initiatives aimed at increasing labour force participation, promoting education access and quality, and enhancing government health expenditure to sustainably improve the standard of living and reduce inequality.

Keywords: Human capital development; Inclusive growth; ARDL approach; Nigeria.

Introduction

Human capital development and inclusive growth are two crucial dimensions of economic development that have gained significant attention in recent years (Acemoglu and Robinson, 2012; World Bank, 2019). Human capital refers to the knowledge, skills, and capabilities embodied in individuals, acquired through education, training, and experience, which contribute to their productivity and potential for economic growth (Becker, 1964; Schultz, 1961). Inclusive growth, on the other hand, refers to a type of economic growth that is broad-based and encompasses the entire population, with the benefits of growth being equitably distributed (IMF, 2011).

Nigeria, as the largest economy in Africa, has experienced significant economic growth over the past few decades. However, this growth has not translated into inclusive development, as the country continues to grapple with high poverty rates, unemployment, and inequality (World Bank, 2021). Recognizing the importance of inclusive growth for sustainable development, the Nigerian government has placed increasing emphasis on human capital development as a means to foster inclusive economic growth (Federal Government of Nigeria, 2018).

The gross domestic product (GDP) per capita growth is commonly used as a proxy for measuring economic growth and living standards. It reflects the increase in the overall economic output per person in a country over a specific period. By investigating the relationship between human capital development and GDP per capita growth, this study aims to shed light on the extent to which investments in human capital contribute to inclusive growth in Nigeria.

Labour force participation (LFPR) rate is a key indicator that measures the proportion of working-age individuals who are actively engaged in the labour market. A higher LFPR signifies a greater proportion of the population contributing to economic activities, which can positively impact GDP per capita growth and inclusive development (World Bank, 2018). Therefore, the LFPR is included as an independent variable in this study to assess its effect on inclusive growth in Nigeria. Gross fixed capital formation is another important factor influencing economic growth. It represents the investment in physical capital, such as infrastructure, machinery, and equipment, which is essential for productivity enhancement and economic expansion (World Bank, 2014). The ratio of GFCF to GDP provides insights into the level of investment relative to the size of the economy. Including GFCF as an independent variable in this study allows for an examination of its impact on inclusive growth in Nigeria.

Education and health are critical components of human capital development. School enrolment at the primary level (PSE) reflects access to and participation in education, which contributes to the acquisition of knowledge and skills necessary for economic productivity (Barro, 2001). Government health expenditure as a ratio of GDP (GHEXP) indicates the extent to which the government invests in healthcare services, which directly influences the well-being and productivity of individuals (World Health Organization, 2021). Both PSE and GHEXP are incorporated as independent variables in this study to explore their effects on inclusive growth.

Previous studies have examined the relationship between human capital development and economic growth in various contexts. However, there is a dearth of empirical research

focusing specifically on the Nigerian context and the impact of human capital development on inclusive growth. Therefore, this study aims to fill this research gap by using the Autoregressive Distributed Lag (ARDL) approach to provide evidence on the effect of human capital development indicators, including LFPR, GFCF, PSE, and GHEXP, on GDP per capita growth as a proxy for inclusive growth in Nigeria from 1990 to 2021. Understanding the relationship between human capital development and inclusive growth in Nigeria is essential for policymakers and stakeholders to design effective strategies and policies that foster sustainable development and reduce inequality. By identifying the key determinants of inclusive growth, this study can contribute to evidence-based decision-making and facilitate targeted interventions to enhance human capital development and promote inclusive economic growth in Nigeria.

Literature Review

The literature on the relationship between human capital development and inclusive growth provides valuable insights into the importance of investing in human capital for achieving sustainable and equitable economic growth. This section reviews relevant studies that have examined the impact of various indicators of human capital development on inclusive growth, particularly in the context of Nigeria.

Several studies have highlighted the positive relationship between labour force participation and economic growth. Barro and Lee (1994) found that an increase in LFPR leads to higher economic growth rates. In the Nigerian context, Odozi and Agwu (2016) emphasized the significance of a higher LFPR in promoting inclusive growth and reducing poverty. They argued that policies aimed at improving labour market participation, such as skills development programs and gender equality initiatives, can contribute to inclusive economic growth.

A study by World Bank (2017) indicated that higher levels of GFCF are associated with increased productivity and economic expansion. In the Nigerian context, Ogunrinola et al. (2019) found a positive relationship between GFCF and economic growth, suggesting that investments in infrastructure and capital formation are crucial for inclusive development. Education is a fundamental component of human capital development. Numerous studies have demonstrated the positive impact of education on economic growth (Barro, 2001; Hanushek and Woessmann, 2012). In the Nigerian context, Adeyemi and Adejumo (2015) emphasized the importance of primary school enrolment in promoting inclusive growth and reducing income inequality. They argued that increasing access to quality education can enhance individuals' productivity and contribute to inclusive development.

Health is another crucial aspect of human capital development. Several studies have emphasized the positive relationship between health expenditure and economic growth

(Bloom et al., 2001; World Health Organization, 2017). In Nigeria, Okoye et al. (2018) found that increased government health expenditure positively influences economic growth and reduces poverty. They highlighted the importance of allocating adequate resources to healthcare to enhance the population's well-being and productivity.

Essentially, the literature review suggests that human capital development indicators, such as LFPR, GFCF, PSE, and GHEXP, play a significant role in fostering inclusive growth. Studies have consistently highlighted the positive relationship between labour force participation, investment in physical capital, education, and healthcare expenditure on economic growth. However, limited research has specifically examined the impact of these indicators on inclusive growth in Nigeria using the ARDL approach. Hence, this study aims to contribute to the existing literature by investigating the effect of human capital development on inclusive growth in Nigeria using the ARDL approach.

Data and Method

Data

This study utilizes annual time series data from 1990 to 2021 to examine the effect of human capital development on inclusive growth in Nigeria. The data for the dependent variable, gross domestic product per capita growth (INCGR). The independent variables include the labour force participation rate (LFPR), gross fixed capital formation as a ratio of GDP (GFCF), school enrolment at the primary level (PSE), and government health expenditure as a ratio of GDP (GHEXP). Data for these variables will be collected from official statistical publications, such as the World Bank's World Development Indicators database.

Method

The study employs the Autoregressive Distributed Lag (ARDL) approach to estimate the long-run and short-run relationships between human capital development indicators and inclusive growth in Nigeria. The ARDL approach is suitable for analysing time series data and allows for the investigation of both long-run and short-run dynamics. The ARDL bounds testing procedure will be applied to determine whether a long-run relationship exists among the variables. This approach is robust and suitable for small sample sizes and variables that may exhibit nonstationarity or cointegration. The bounds test will involve performing an F-test to check for the significance of the coefficients.

Model Specification

The model specification for the ARDL approach is as follows:

- **Long-Run Relationship**

The long-run relationship is examined by estimating a fully specified Autoregressive Distributed Lag (ARDL) model. The model specification includes the dependent variable

(GDP per capita growth) and the independent variables representing human capital development indicators, namely the labour force participation rate (LFPR), gross fixed capital formation as a ratio of GDP (GFCF), school enrolment at the primary level (PSE), and government health expenditure as a ratio of GDP (GHEXP). The long-run relationship is specified as:

$$INCGRt = \beta 0 + \beta 1LFPRt + \beta 2GFCFt + \beta 3PSEt + \beta 4GHEXPt + \mu t \quad 1$$

Where:

- INCGRt represents the gross domestic product per capita growth at time t.
- LFPRt represents the labour force participation rate at time t.
- GFCFt represents the gross fixed capital formation as a ratio of GDP at time t.
- PSEt represents the school enrolment at the primary level at time t.
- GHEXPt represents the government health expenditure as a ratio of GDP at time t.
- β0, β1, β2, β3, and β4 are the regression coefficients to be estimated.
- μt represents the error term.

- **Short-Run Dynamics**

The short-run dynamics are captured through the Error Correction Model (ECM), which measures the speed of adjustment towards the long-run equilibrium relationship. The ECM includes the lagged dependent variable and the first-differenced terms of the independent variables. The short-run dynamics are specified as:

$$\Delta INCGRt = \alpha 0 + \Sigma \delta i \Delta INCGRt - i + \Sigma \theta j \Delta LFPRt - j + \Sigma \varphi k \Delta GFCFt - k + \Sigma \lambda m \Delta PSEt - m + \Sigma \psi n \Delta GHEXPt - n + \theta \Delta ECMt - 1 + \varepsilon t \quad 2$$

Where:

- ΔINCGRt represents the first difference of the gross domestic product per capita growth at time t.
- ΔLFPRt, ΔGFCFt, ΔPSEt, and ΔGHEXPt represent the first differences of the labour force participation rate, gross fixed capital formation, school enrolment at the primary level, and government health expenditure as a ratio of GDP, respectively.
- ΔECMt-1 represents the lagged error correction term, calculated as the difference between the actual and predicted values of INCGRt-1 from the long-run relationship.
- α0, δi, θj, φk, λm, ψn, and θ are the regression coefficients to be estimated.

- εt represents the error term.

- **Cointegration**

To determine the presence of cointegration among the variables, the ARDL model employs the bounds testing approach. The bounds test involves estimating an unrestricted error correction model (UECM) and a restricted error correction model (RECM). The F-statistic is then calculated to determine whether the variables are cointegrated. If the F-statistic exceeds the critical values, it suggests the presence of a long-run relationship.

- **Diagnostic Tests**

The study will conduct diagnostic tests to ensure the validity and reliability of the regression results. These tests include assessing autocorrelation and heteroscedasticity. Corrective measures, such as the inclusion of lagged variables or transformations, will be implemented if these issues are detected.

By employing the ARDL approach and considering the long-run and short-run dynamics, this study aims to provide a comprehensive analysis of the relationship between human capital development indicators and inclusive growth in Nigeria.

1. Results and Discussion

1.1 Descriptive Statistics

Table 1. Descriptive statistics results

Variable	Mean	Max.	Min.	Std. Dev.	Skew-ness	Kurtosis	Jarque-Bera	Prob.	Obs.
INCGR	1.64	12.28	-4.51	3.85	0.45	3.38	1.28	0.53	32
LFPR	59.38	60.54	55.24	1.48	-1.46	3.97	12.59	0.00	32
GFCF	28.22	53.12	14.17	11.38	0.42	2.07	2.09	0.35	32
PSE	90.94	102.11	78.66	6.49	0.03	2.16	0.82	0.66	28
GHEXP	3.29	5.05	2.15	0.69	0.60	3.17	1.87	0.39	31

Table 1 presents the results associated with statistical description of the model variables as follows:

- INCGR (Gross Domestic Product Per capita Growth): The mean GDP per capita growth over the period is 1.64, indicating positive average growth in Nigeria's economic output per person. The maximum value of 12.28 suggests the highest recorded growth, while the minimum value of -4.51 indicates a contraction in economic output per capita. The standard deviation of 3.85 shows moderate variability in the growth rates. The skewness value of 0.45 indicates a slightly

positively skewed distribution, suggesting a tendency towards higher growth rates. The kurtosis value of 3.38 indicates a leptokurtic distribution, implying that the data has fatter tails and is more peaked around the mean. The Jarque-Bera test result of 1.28 and the associated probability of 0.53 suggest that the data distribution is not significantly different from a normal distribution at the 5% level. The total number of observations for this variable is 32.

- LFPR (Labour Force Participation Rate): The mean labour force participation rate is 59.38, indicating that, on average, approximately 59.38% of the working-age population in Nigeria is actively engaged in the labour market. The maximum value of 60.54 represents the highest recorded LFPR, while the minimum value of 55.24 indicates the lowest observed participation rate. The relatively small standard deviation of 1.48 suggests limited variability in LFPR over the period. The negative skewness value of -1.46 indicates a left-skewed distribution, meaning that LFPR tends to be lower than the mean. The kurtosis value of 3.97 indicates leptokurtosis, implying that LFPR data has fatter tails and is more peaked around the mean. The Jarque-Bera test result of 12.59 and a probability of 0.00 suggest that the distribution significantly deviates from normality at the 5% level. The total number of observations for this variable is 32.

- GFCF (Gross Fixed Capital Formation as a Ratio of GDP): The mean gross fixed capital formation is 28.22% of GDP, indicating the average investment in physical capital relative to the size of the economy. The maximum value of 53.12% represents the highest recorded GFCF ratio, while the minimum value of 14.17% indicates the lowest observed ratio. The standard deviation of 11.38 suggests considerable variability in GFCF over the period. The positive skewness value of 0.42 indicates a slightly right-skewed distribution, suggesting a tendency towards higher GFCF ratios. The kurtosis value of 2.07 indicates mesokurtosis, implying that the data is close to a normal distribution. The Jarque-Bera test result of 2.09 and a probability of 0.35 suggest that the data distribution is not significantly different from a normal distribution at the 5% level. The total number of observations for this variable is 32.

- PSE (School Enrolment at the Primary Level): The mean primary school enrolment rate is 90.94%, indicating relatively high participation in primary education in Nigeria. The maximum value of 102.11% suggests that there might be some outliers or data reporting issues. The minimum value of 78.66% represents the lowest recorded primary school enrolment rate. The standard deviation of 6.49 shows moderate variability in PSE over the period. The very small positive skewness value

of 0.03 suggests a nearly symmetric distribution. The kurtosis value of 2.16 indicates mesokurtosis, implying that the data is close to a normal distribution. The Jarque-Bera test result of 0.82 and a probability of 0.66 indicate that the data distribution is not significantly different from a normal distribution at the 5% level. However, it's important to investigate the outliers or data reporting issues related to the maximum value. The total number of observations for this variable is 28.

- GHEXP (Government Health Expenditure as a Ratio of GDP): The mean government health expenditure as a ratio of GDP is 3.29%, indicating the average portion of the national income spent on healthcare services. The maximum value of 5.05% represents the highest recorded GHEXP ratio, while the minimum value of 2.15% indicates the lowest observed ratio. The standard deviation of 0.69 suggests limited variability in GHEXP over the period. The positive skewness value of 0.60 indicates a slightly right-skewed distribution, suggesting a tendency towards higher GHEXP ratios. The kurtosis value of 3.17 indicates leptokurtosis, implying that the data has fatter tails and is more peaked around the mean. The Jarque-Bera test result of 1.87 and a probability of 0.39 suggest that the data distribution is not significantly different from a normal distribution at the 5% level. The total number of observations for this variable is 31.

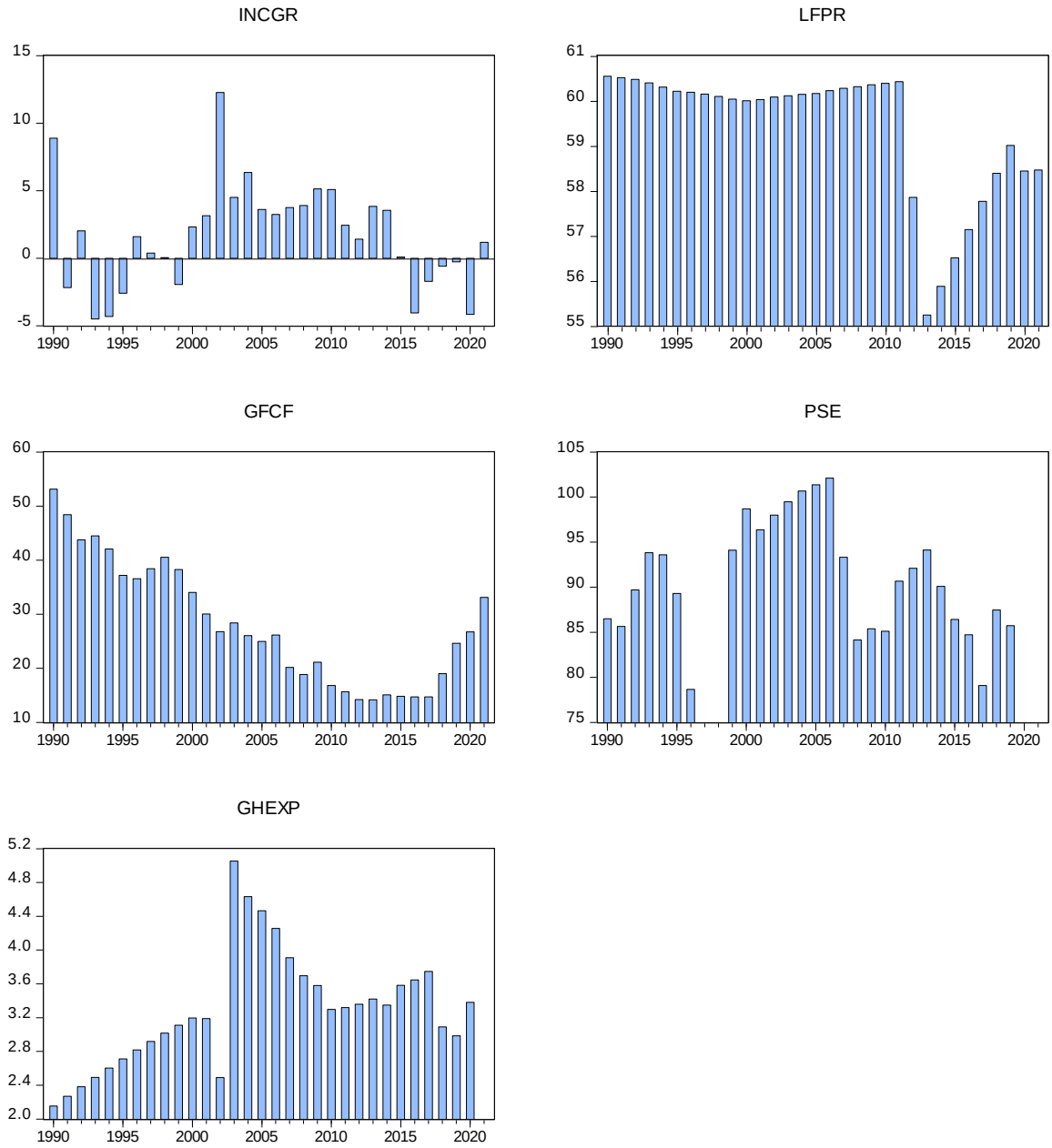

Figure 1. Graphical Representation of variable proxies

1.2 Stationarity Test

Table 2. Unit root test results

Variable	ADF Statistic (Level)	p-value (Level)	ADF Statistic (1st Difference)	p-value (1st Difference)
INCGR	-2.612	0.0901	-4.004	0.0019
LFPR	-0.245	0.9315	-5.246	0.0001
GFCF	-1.238	0.6586	-5.468	0.0001
GHEXP	-1.504	0.5305	-5.095	0.0001
PSE	-1.919	0.3232	-5.178	0.0001

Table 2 presents the results of the Augmented Dickey-Fuller (ADF) tests for the variables at their levels and first differences. For all variables, the ADF statistic and p-value are provided for both tests. In the first row, "INCGR" represents Gross Domestic Product Per capita Growth, "LFPR" is the Labour Force Participation Rate, "GFCF" denotes Gross Fixed Capital Formation, "GHEXP" represents Government Health Expenditure as a Ratio of GDP, and "PSE" stands for School Enrolment at the Primary Level.

The ADF test at the level indicates that all variables are non-stationary, as their p-values are greater than the significance level of 0.05. However, after differencing the variables once, they become stationary, as evidenced by the significantly low p-values in the "1st Difference" column (all less than 0.05). This suggests that the first differences of the variables exhibit stationarity and can be used in subsequent analyses. It is important to note that some observations might be missing for certain variables, leading to a reduced number of data points for those variables. Therefore, to analyse the relationships between these human capital development indicators and inclusive growth in Nigeria, it is recommended to use their first differences to ensure valid and reliable results.

1.3 Model Estimation

Table 3. ARDL Long and Short Run Test

Dependent Variable: D(INCGR)
Selected Model: ARDL(3, 2, 3, 0, 3)
Case 2: Restricted Constant and No Trend
Date: 07/21/23 Time: 19:21
Sample: 1990 2021
Included observations: 25

Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.

C	-53.95101	42.87771	-1.258253	0.2400
INCGR(-1)	-1.253867	0.323717	-3.873347	0.0038
LFPR(-1)	0.751327	0.745710	3.007533	0.0060
GFCF(-1)	0.197343	0.158886	-2.542045	0.0356
PSE	0.101826	0.122017	0.834526	0.0056
GHEXP(-1)	1.933222	1.737812	1.112446	0.0048
Short-run Estimations				
D(INCGR(-1))	0.842215	0.298911	2.817608	0.0201
D(INCGR(-2))	0.672979	0.179343	3.752467	0.0045
D(LFPR)	0.308379	1.138653	0.270827	0.7926
D(LFPR(-1))	-1.190962	0.847689	-1.404951	0.1936
D(GFCF)	-0.502571	0.233600	-2.151415	0.0599
D(GFCF(-1))	-0.232070	0.215168	-1.078551	0.3088
D(GFCF(-2))	-0.355568	0.246356	-1.443311	0.1828
D(GHEXP)	-1.234864	1.261095	-0.979200	0.3531
D(GHEXP(-1))	0.156793	1.377102	0.113857	0.9119
D(GHEXP(-2))	1.233247	1.157325	1.065601	0.3144

The ARDL results in Table 3 provide valuable insights into the complex relationship between human capital development and inclusive growth in Nigeria. In the long run, several key variables are identified as significant determinants of GDP per capita growth. First, the negative long-run relationship between past GDP per capita growth and current GDP per capita growth suggests the presence of a negative feedback mechanism, wherein a decline in previous economic performance tends to restrain the current growth rate. This finding underscores the importance of maintaining stable and robust economic growth over time to sustain inclusive development.

On the other hand, the positive coefficients for labour force participation rate (LFPR), gross fixed capital formation (GFCF), primary school enrolment (PSE), and government health expenditure (GHEXP) imply that investments in human capital development positively impact long-run economic growth. The significant positive effect of LFPR indicates that a higher participation of the labour force can enhance productivity and economic output. Similarly, the positive impact of GFCF reveals that increased investments in physical capital contribute to long-term economic expansion.

Moreover, the positive association between primary school enrolment and GDP per capita growth highlights the role of education as a crucial driver of inclusive development. A well-educated and skilled workforce can lead to higher productivity, technological

advancement, and improved economic performance. Additionally, the positive relationship between government health expenditure and GDP per capita growth indicates that investments in healthcare can contribute to better workforce productivity, reduced absenteeism, and improved overall health outcomes, thus fostering economic growth.

However, the mixed results in the short-run dynamics for GFCF and GHEXP suggest that the immediate effects of changes in these variables on GDP per capita growth may not be statistically significant. This could be due to factors like time lags or delays in the impact of investments in physical infrastructure and healthcare on economic growth. Policymakers need to be aware of the potential time dynamics and plan for sustainable human capital development initiatives that yield tangible results over time.

1.3.1 Long-run and Bound test results

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	3.197908	10%	2.2	3.09
k	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
			Finite Sample: n=30	
Actual Sample Size	25			
		10%	2.525	3.56
		5%	3.058	4.223
		1%	4.28	5.84

The bound test results indicate the presence of a long-run relationship, or cointegration, among the variables in the model. The F-statistic (3.197908) is higher than the asymptotic critical values at all significance levels (10%, 5%, 2.5%, and 1%) for k=4, implying that the null hypothesis of no long-run relationship can be rejected at any conventional significance level. This suggests that the variables move together in the long run, and any deviations from the long-run equilibrium relationship will be corrected in the long term. However, in the finite sample case (n=30), the F-statistic falls below the critical value at the 1% significance level, indicating that the null hypothesis cannot be rejected at this level.

Nevertheless, the overall findings still support the presence of cointegration among the variables.

The presence of cointegration in the model is crucial as it suggests that the long-term equilibrium relationship between the dependent and independent variables exists, and deviations from this equilibrium are corrected in the long run. It allows for meaningful interpretations of the relationships between the variables and provides a solid foundation for conducting further analysis.

Since the bound test has confirmed cointegration, the study can proceed with the error correction model (ECM) to examine the short-run dynamics and the speed of adjustment towards the long-run equilibrium. The ECM helps to understand the short-term impact of shocks on the system and how it converges back to the long-run equilibrium.

However, it is essential to note that the bound test is based on a specific sample size (n=30 in this case), and the results might vary with different sample sizes. Researchers should consider larger sample sizes to increase the reliability and robustness of the analysis.

Concluding Practical Implications

The results offer valuable practical implications for policymakers and stakeholders seeking to foster inclusive growth through human capital development in Nigeria. Firstly, the positive relationship between primary school enrolment and GDP per capita growth underscores the critical role of education in driving economic progress. Policymakers should prioritize efforts to improve access to quality education at all levels and focus on skill development programs to equip the workforce with relevant competencies. By investing in human capital through education, Nigeria can cultivate a more productive and adaptable labour force capable of driving innovation and economic diversification.

Secondly, the positive impact of gross fixed capital formation on long-run economic growth highlights the significance of infrastructure development and investment in physical assets. Policymakers should prioritize infrastructure projects, such as transportation, energy, and communication systems, to enhance productivity, attract investments, and create employment opportunities. This strategic approach to physical capital investment can lead to increased economic activity and contribute significantly to inclusive growth.

Thirdly, the positive association between government health expenditure and GDP per capita growth underscores the importance of investing in healthcare systems. Policymakers should prioritize healthcare infrastructure, access to essential medical services, and disease

prevention programs. A healthy population can lead to a more productive workforce, reduced absenteeism, and increased overall well-being, all of which positively impact economic growth.

Moreover, the mixed results in the short-run dynamics for investments in physical capital and healthcare suggest that the immediate impact may not be statistically significant. Policymakers need to recognize that human capital development initiatives often require time to yield measurable results. Long-term planning, consistency, and patience are essential to realizing the full potential of these investments and their contribution to inclusive growth.

Additionally, the negative long-run relationship between past and current GDP per capita growth underscores the importance of maintaining stable and consistent economic growth over time. Policymakers should implement measures to ensure economic stability, such as prudent fiscal and monetary policies, to avoid adverse effects on the economy and promote sustainable inclusive development. Continuous monitoring and evaluation of human capital development programs are crucial to gauge their effectiveness and identify areas for improvement. Policymakers should establish robust data collection mechanisms to track the impact of investments in education, healthcare, and infrastructure on economic growth. This data-driven approach will help inform evidence-based policy decisions and ensure that resources are allocated efficiently.

Furthermore, policymakers should adopt a targeted approach to human capital development interventions to address the specific needs and challenges faced by different regions and demographic groups in Nigeria. Tailored policies can help reduce inequalities, improve access to opportunities, and ensure that the benefits of economic growth are shared more inclusively among the population.

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