ASSESSING THE DRIVERS OF ECONOMIC GROWTH: EMPIRICAL EVIDENCE FROM NIGERIA

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ABSTRACT

Since gaining independence in 1960, Nigeria has grappled with the challenge of achieving stable economic growth to address critical issues like poverty and political stability. Despite existing research on economic growth drivers, there remains a notable gap in understanding how specific macroeconomic factors shape Nigeria's economic trajectory. This study addresses this gap by adopting a unique approach, exploring factor input variables comprehensively. Utilizing time series data from 1970 to 2022 and employing Augmented Dickey-Fuller (ADF), Phillips-Perron, and Bai-Perron Structural Break Unit Root tests as stationarity tests, while ARDL analyzes the time series data. The findings identify Capital Accumulation and Technology Adoption as significant stimulants for economic growth, whereas Human Capital shows an insignificant negative impact. The study found an R-squared value of 0.9992, implying that 99% of the variations in GDP were explained by the independent variables. Therefore, the study recommends the importance of investing in infrastructure and technology and reassessing education and training programs to better align with market demands, thus driving sustainable economic growth.

Keywords: *Nigeria, Economic Growth, Factor Input Drivers, Stationarity Tests, ARDL Models,*

1. Introduction

Stable economic growth is a key goal for all nations, including Nigeria, as it is vital for economic development. Since gaining independence in 1960, Nigeria's government has focused on policies to transform its economic sectors. However, inadequate investment and domestic savings remain major barriers to achieving this goal (Imoughele & Imimole 2012). Nigeria's GDP growth, which averaged 7% from 2000 to 2014 (CBN, 2016), experienced significant fluctuations in subsequent years. The fall to -1.6% in 2016 was due to declining oil prices, attacks on oil infrastructure, and foreign exchange shortages (CBN, 2016). However, GDP growth improved to 2.2% in 2019 due to rising oil prices, increased production (IMF, 2019), and government efforts to diversify the economy. In 2021 and 2022, growth continued moderately at 1.5% and 2.9%, respectively, aided by recovery from the COVID-19 pandemic and supportive fiscal and monetary policies (Nigeria Development Update, 2022).

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Despite these efforts, Nigeria has consistently struggled with stable economic growth to address critical issues such as poverty, political instability, infrastructure, education, and healthcare. Existing research has provided some insights, but there remains a significant gap in understanding how specific factors input drivers influence growth. This study filled this gap by analyzing variables such as human capital, capital accumulation, and technology. By exploring these factors, the study provided a comprehensive understanding of Nigeria's economic development over five decades.

The primary objectives of this study is to examine the factor input drivers of economic growth. Understanding these drivers is crucial for several reasons. Firstly, it adds to the body of economic knowledge by revealing what drives growth in developing countries like Nigeria. This can guide future research and help in the development of more effective policies for sustainable growth. Secondly, understanding these drivers helps policymakers prioritize key areas such as Human Capita, Capital Accumulation and Technology Adoption rate. Lastly, the findings of this study will be valuable to international organizations and investors, aiding them in making informed decisions about financial assistance and investments in Nigeria.

In conclusion, investigating the drivers of economic growth in Nigeria is essential for fostering a favorable business environment and achieving long-term economic development. By leveraging these drivers effectively, Nigeria can achieve sustained economic growth, improve the standard of living for its citizens, and realize its economic development goals. The paper is organized into five sections. The introduction is covered in the first section, followed by the conceptual review and empirical studies in the second section. The third, fourth, and fifth sections present the methodology, results and discussion, and the conclusion along with recommendations, respectively.

2.1 Conceptual Review and Empirical Studies

The study combines a conceptual review and empirical studies to explore economic growth. The conceptual review defines key growth factors, while empirical studies provide real-world evidence and analysis.

2.1.1 Concept of Economic Growth

Economic growth is the increase in an economy’s capacity to produce goods and services, improving citizens' welfare (Balami, 2006). It involves a steady rise in output, like the gross domestic product (GDP) (Mankiw et al., 1992). Economic growth means more goods and services per person, enhancing living standards. It can be positive, negative, or zero, depending on population growth and production rates. Factors affecting growth include resource use, infrastructure, and government policies. Efficient resource use boosts production capacity, reduces unemployment, and raises living standards (Petronella, 2012). Economic growth also involves managing economic fluctuations and policies to sustain development (CFI, 2022).

2.1.2 Drivers of Economic Growth

Drivers of economic growth are factors essential for long-term growth. These include physical and human capital, natural resources, technology, and institutions (Mankwi, 2014). Physical capital consists of infrastructure and equipment, while human capital involves the skills and knowledge of the workforce.

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Natural resources, such as land and minerals, are vital inputs for production. Technology and innovation boost productivity and create new products.

Capital includes financial assets and resources for wealth creation. Human capital, the collective skills and knowledge of people, drives innovation. Technology encompasses tools and systems that enhance efficiency and progress.

However, examining economic growth reveals a complex interplay of factors. From public investment to human capital, various drivers contribute to a nation's prosperity. Understanding these dynamics offers insights into fostering sustainable development and prosperity on a global scale.

Teixeira and Dore (2023) examined the role of human capital, institutional quality and structural change on brazil's economic growth over the last two hundred years 1822-2019, the study use autoregressive distributive lag model (ARDL), the results suggests that years of schooling (human capital) have a positive and long-lasting effect on brazil's economic growth while institutional quality does not found over the very long-run.

Wacker and Koopman (2023) investigated the derivers of growth acceleration on the role of capital accumulation the study utilized the use of descriptive statistics, the results shows that physical capital accumulation accounts on average for 9% of the rise in the growth rate through acceleration, with heterogeneity across regions, time periods, and the economies capital-output ratio. The study further suggests that physical capital accumulation is a significant factor for the sustainability of acceleration.

Widarni and Bawono (2020) examined the effect of human capital and technology on economic growth using annual series data from 1984-2019, the study uses an autoregressive distribution lag to the cointegration approach to understanding the relationship between technology, human capital and economic growth, the result revealed that the increase in human capital using education mechanism affects economic growth, this shows that the role of human capital investment is very important in economic growth while technology shows a positive effect on economic growth, the result shows that increasing human capital and technology are important factors in efforts to increase economic growth.

Obayori et al (2020) examined the financial inclusion and economic growth in Nigeria from 1981 to 2018. The study uses of autoregressive distributed lags models for the analysis. The results show that both lung-run and short-run access and effective usage of financial services bring about a significant increase in economic growth.

Mohammad et al (2019) investigated the impact of external debt on economic growth in Jordan using annual data for the period of 2010 to 2017. The study reveals that there is a negative and significant impact of external debt on economic growth.

Nkoro and Uko (2019) investigated the sources of economic growth in Nigeria from 1960 to 2017 using growth accounting approach. The study concentrated on the contribution of factor productivity, capital and labour to economic growth. The result shows a positive correlation between the growth and capital, labour

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and factor productivity. Furthermore, the results from accounting growth framework shows that capital was the major driver of economic growth in Nigeria from 1961-1980.

Looking at the study at a wider scope, Saidu et al (2017), studies the determinants of the lung-run economic growth in Nigeria from 1981 to 2014 using population growth, inflation, government consumption expenditure and real gross domestic product. The study employs autoregressive distributed lags model as the tool of analysis. It was found that there exits cointegrated relationship between the variables.

Emeka et al (2017) studies the link existing among capital formation, domestic investment and economic growth in Nigeria. The study employs co-integration test and granger causality test. The results show that there is long run significant relationship existing between capital formation and domestic savings furthermore. Additionally, both gross fixed capital formation and domestic investment granger cause economic growth in Nigeria.

Udeaja (2015), examined the determinants of economic growth in Nigeria: evidence from error correction model approach. The study utilized the used of Johannes co-integration and vector error correction methodology. It was found that co-integration has a long-run relationship among expenditure of education and health, domestic savings, trade openness, foreign direct investment, financial deepening and public infrastructure. The result shows that determinants of economic growth have impact on the economic growth of Nigeria.

Suaibu et al (2011), estimated a monetary growth model for Nigeria using error correction mechanism using bounds test approach to co-integration within ARDL framework. The empirical estimates reveal a significant and positive relationship between capital stock and money supply while a negative relationship was found between growth and inflation.

Azolibe (2021) examined the impact of public capital expenditure, foreign direct investment on economic growth of Nigeria from 1986 to2018. The study employs error correction model, variance decomposition and Granger causality test. The result shows that capital expenditure impacted positive and significant effect on FDI.

In another study by Oyegoke and Nuri (2021), they investigated the impact of foreign direct investment on economic growth in Nigeria from 1970 to 2020. The study employs ordinary least square method as tool of analysis. The result shows that FDI inflow has a positive impact on the economy.

Adamu and musa (2021) examined the impact of government expenditure on economic growth in Nigeria using auto regressive distributed lag model for the period of 1970-2019. The study shows that capital expenditure has positive and significant impact on economic growth both in the short run and long run while recurrent expenditure does not have significant impact on economic growth both in the short run and long run.

Samuel and Lawrence (2021) conducted a study on government expenditure and economic growth in Nigeria. The study adopts the error correction model and granger causality test. The study concludes that the Nigerian economy is on the wrong path to sustainable growth and development.

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Kolapo et al (2021) examined the impact of government expenditure on economic growth in sub-Saharan Africa: A validity of Wagner's law between 1986-2018 using the panel first generation tests as well as panel auto-regressive distributed lag and pairwise causality techniques. The result shows that government expenditure causes economic growth rendering the Wagner's law invalid in the sub-Saharan region.

Didit and Asturi (2020) examined the determinants of economic growth in four (4) Asian countries; Thailand, Philippines, Malaysia and Indonesia from 1st quarter of 2008 to 4th Quarter of 2019. The study uses panel data analysis. The result shows that monetary policy with the instrument of interest rate policy has a negative effect on economic growth, while international trade is not driving economic growth in the four Asian countries.

Uchenna (2020) Investigated the effect of external debt on economic growth in Nigeria using its major determinants like gross fixed capital formation, exchange rate and inflation rate. The study employs OLS & GLS as tools of analysis. The results indicate that there is a positive and significant correlation between the explanatory variables and economic growth which are: exchange rate, external debt and inflation rate.

John et al (2019), studies the deficit financing and economic growth in Nigeria from 1987 to 2017. The study employs vector auto-regressive model in the analysis. The result shows that, deficit financing has positive but insignificant effect on Nigerian economic growth.

Kolline (2018) examined the determinants of economic growth in Liberia from 1980 to 2015. The study employs ARDL approach in the analysis. The result indicates that a rise in international trade openness and official exchange rate have negative effects on GDP growth rate in the short-run, the effect are positive in the long- run.

Odhiambo et al (2017), investigated the relationship between economic growth and public debt using panel ARDL approach from 10 European countries. The study indicates that public debt, real exchange rate and government expenditure are negatively associated with economic growth in both long run and short run while on the other hand, real interest rate and investment found to be positively associated with economic growth,

Favour (2017), empirically examined the relationship between economic growth and public debt in Nigeria from 1980-2015. The study employs VECM methods. The result shows that both external and domestic debt has significant negative impact on economic growth within the period of the study.

Muhammad and Ehikioya (2015), examined the macroeconomic determinants of economic growth in Nigeria for a period of 26years from 1986-2012. The study employs Johnson's co-integration, the test stated six-co-integrating equations which establish the existence of long run relationship among the variables, OLS was used to assess the degree of influence the variable have on each other, the result indicates that total government expenditure, foreign direct investment and gross fixed capital formation are the main determinants of Nigeria's economic output under a stable inflationary rate

Doguwa (2012) re-examined the issue of inflation and economic growth in Nigeria from the angle of threshold level. The study uses three different approaches: sreal's 1996 approach, senhadi (2001) approach

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and Drukker et al 2005 approach. The results of the study shows that the threshold level of inflation above which inflation is inimical to growth is estimated at 10.5 to 12 per cent for Nigeria.

Furthermore, Olarewaju (2016), examined the relationship between government spending, corruption and output growth in Nigeria. It employed aggregated data from 1980 to 2011 using the Johasen maximum likelihood procedure and error correction mechanism. The result of the study shows that the estimates of money supply, capital formation, openness to trade and innovation system positively influenced output growth while unemployment and domestic debt affected output negatively.

Agostino, Dune and Pieroni (2016), examined a study on government spending, corruption and economic growth. The result of the findings shows that the interactions between corruption and investment and corruption and military spending have strong negative impacts on the economic growth.

Jay Pee (2021), conducted a study on government expenditure and economic dimensions over the period of 1999-2019 using the fixed regression technique. The study contributes to the economic undertakings of various countries to plan and implement their strategic economic directions.

Samuel and Lawrence (2021), conducted a study on government expenditure and economic growth in Nigeria. The study adopted the error correction model and granger causality test. The study concludes that the Nigerian economy is on the wrong path to sustainable growth and development.

Kolapo etal (2021), examined the impact of government expenditure on economic growth in sub-Saharan Africa: A validity of Wagner's law between 1986-2018 using the panel first generation tests as well as panel auto-regressive distributed lag and pairwise causality techniques. The result shows that government expenditure causes economic growth rendering the Wagner's law invalid in the sub-Saharan region.

3.0 Methodology

3.1 Types and Sources of Data Collection

Secondary data were utilized for this study. The time series data were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin and the World Development Indicators (WDI) of the World Bank. The data span fifty-three years (1970-2022) and were initially in real terms before being converted to log-linear forms. These sources were selected for their reliability and efficiency in providing useful information for this research.

3.2 Variable Measurement

This study examines the determinants of Nigeria's economic growth using variables such as GDP, Human Capital (HCA), Technology (TECH) and Capital (CA). Capital (CA) includes financial assets, Human capital (HCA) measures education, skills, and productivity of the workforce. Technology (TECH) is assessed through R&D investment, patents, and technological adoption.

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3.3 Model Specification

The study has adopted the Solow growth model for the factor input drivers. Capital (CA) (proxy for capital accumulation), Human Capital (HCA) (proxy for population ages 15-64 years) and Technology (TECH) (proxy for farm machineries, tractors) are taken as independent variables, while Gross Domestic Product (GDP) as dependent variable.

The model is presented below:

$$GDP = F(CA, HCA, TECH)\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(1)$$

The econometric version of the model is expressed as follows:

$$GDP = \beta_0 + \beta_1 CA + \beta_2 HCA + \beta_3 TECH + \varepsilon\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(2)$$

The log linear specification of the equation is as follows

$$LogGDP_t = \beta_0 + \beta_1 LogCA_t + \beta_2 LogHCA_t + \beta_3 LogTECH_t + \varepsilon\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(3)$$

In the above regression model, βo represents the intercept or constant term, β_1 signifies the coefficient of capital, β_2 denotes the coefficient of human capital, and β_3 indicates the coefficient of technology. μ_t stands for the error term, capturing unexplained variation in the model's predictions, while t represents the time dimension or period of observation. These components collectively define the relationships and dynamics within the regression framework.

3.4 Cointegration Testing

After determining that some variables have the {I(1)} and {I(0)} order of integration, a cointegration test was applied to check the long-run associations among the different variables. This study employed the ARDL Bounds cointegration test proposed by Pesaran et al. (2001). The ARDL Bounds test is considered more suitable for small sample sizes and can be applied regardless of whether the underlying variables are I(0), I(1), or a mix of both. This flexibility makes it particularly appropriate for this study. The ARDL Bounds test provides two statistics: the F-statistic and t-statistic. The null hypothesis states that H0: There is no cointegration among the variables, while the alternative hypothesis is the opposite.

3.5 Autoregressive Distributed Lag (ARDL)

Autoregressive Distributed Lag (ARDL) models are used to analyze both short-term dynamics and long-run relationships among variables in econometrics. They combine autoregressive and distributed lag components, making them suitable for datasets with mixed integration levels (I(0) and I(1)). ARDL models are particularly valuable for handling non-stationary data, providing robust estimates of coefficients and insights into how variables adjust in the short term while also establishing long-term equilibrium

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relationships. This approach is well-regarded for its effectiveness with small sample sizes in economic research.

$$\Delta GDP_t = \alpha_0 + \alpha_1 \Delta GDP_{t-1} + \beta_1 \Delta CA_{t-1} + \beta_2 \Delta HCA_{t-1} + \beta_3 \Delta TECH_{t-1} + \varepsilon_t \qquad (4)$$

$$GDP_t = \alpha_0 + \alpha_1 GDP_{t-1} + \beta_1 CA_{t-1} + \beta_2 HCA_{t-1} + \beta_3 TECH_{t-1} + \varepsilon_t \qquad (5)$$

4.0 Results and Discussion

Stationarity tests are conducted to determine if a time series data set's statistical properties, such as mean and variance, remain constant over time. This study used the Augmented Dickey-Fuller (ADF), Phillips-Perron, and Bai-Perron Structural Break Unit Root tests. These tests are crucial because non-stationary data can lead to misleading regression results, making it essential to verify stationarity before further analysis.

ADF and Phillips-Peron Stationarity Test at Level

Table 1. Augmented Dickey-Fuller (ADF) Unit Root Test Result.

Variables	**T-Statistics**	**Critical Values** 5%	**Remarks**
GDP	-8.661892	-3.933158	I(0)
LCA	-2.980152	-3.533083	---
LHCA	-3.405130	-3.520787	---
LTECH	-16.5192	-3.536601	I(0)
DM	-6.480741	-2.933158	I(0)

Author's calculation using Eviews 10

Table 2. Phillips-Peron Stationarity (PP) Unit Root Test Result

Variables	**T-Statistics**	**Critical Values** 5%	**Remarks**
GDP	-2.035638	-2.918778	---
LCA	4.704390	-1.949097	---
LHCA	-1.163131	-1.947381	---
LTECH	-38.00393	-3.536601	I(0)
DM	0.0000	-1.948686	----

Author's calculation using Eviews 10

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ADF and Phillips-Peron Stationarity Test at First Difference

Table 3. Augmented Dickey-Fuller (ADF) Unit Root Test Result

Variables	T-Statistics	Critical Values 5%	Remarks
GDP	---	---	---
LCA	-4.108877	-3.526609	I(1)
LHCA	-3.683896	-3.520787	I(1)
LTECH	---	---	---

Author's calculation using Eviews 10

Table 4. Phillips-Peron Stationarity (PP) Unit Root Test Result

Variables	T-Statistics	Critical Values 5%	Remarks
GDP	-7.087201	-2.919952	I(1)
LCA	-2.421657	-1.949319	I(1)
LHCA	-2.114722	-1.947520	I(1)
LTECH	---	---	--
DM	-6.403124	-1.948886	I(1)

Author's Computation Using E- Views 10 software.

According to the ADF test results, GDP is classified as stationary (I(0)), signifying that it maintains a stable mean and unchanging variance, making it suitable for time series analysis without further adjustments. On the other hand, both LCA and LHCA are stationary at (I(1)),. In contrast, LTECH and DM are established as stationary (I(0), ensuring its stability and suitability for analysis.

The Phillips-Perron test shows that GDP, LCA, LHCA, and DM are stationary at first difference (I(1)). In contrast, LTECH remains stationary (I(0), displaying a stable mean and variance.

Table 5 Bai-Peron Structural Break Unit Root Test

	F-statistic	Scaled F- Statistics	Critical Values
0 vs. 1 *	34.06235	102.1871	13.98
1 vs. 2 *	7.086911	21.26073	15.72
2 vs. 3 *	9.614469	28.84341	16.83
3 vs. 4	2.696093	8.088278	17.61
Schwarz criterion selected breaks: (3)			
LWZ criterion selected breaks: (3)			
Break dates:	Sequential	Repartition	
1	2000	1987	
2	1987	2001	
3	2013	2013	

Author's Computation Using E- Views 10 software.

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The Bai-Peron Structural Break Unit Root Test indicates the presence of statistically significant structural breaks in the time series data. The test "0 vs. 1", "1 vs. 2", and "2 vs. 3" all shows strong evidence of structural breaks, as denoted by their F-statistics being significant at the 5% level. However, the specific breaks dates are identified as shown in the table, providing information on when these structural changes occurred within the data.

Table 6. ARDL Short-run Relationship

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LGDP(-1)	0.586175	0.250507	2.339953	0.0346
LGDP(-2)	-0.811494	0.253044	-3.206934	0.0063
LHCA	-5.224735	3.992180	-1.308742	0.2117
LCA	0.686889	0.145376	4.724915	0.0003
LCA(-1)	-0.187831	0.218435	-0.859894	0.4043
LCA(-2)	0.630485	0.246019	2.562745	0.0226
DM1	0.150272	0.129901	1.156815	0.2667
DM1(-1)	-0.125724	0.109305	-1.150212	0.2693
DM1(-2)	-0.163882	0.091174	-1.797468	0.0939
LTECH	2.344963	0.732100	3.203066	0.0064
C	-23.59821	17.92481	-1.316511	0.2091

R-squared	0.999215	Mean dependent var	7.648011
Adjusted R-squared	0.998654	S.D. dependent var	1.801874
S.E. of regression	0.066112	Akaike info criterion	-2.294757
Sum squared resid	0.061191	Schwarz criterion	-1.758452
Log likelihood	39.68447	Hannan-Quinn criter.	-2.146009
F-statistic	1781.397	Durbin-Watson stat	2.449037
Prob (F-Statistic)	0.000000		

Researcher's computation using E views 10 Software.

In the ARDL short-run analysis, the positive coefficient for LGDP(-1) suggests that past GDP performance positively influences current growth, while the negative coefficient for LGDP(-2) indicates that the influence diminishes with a two-period lag.

However, the variables LHCA (Human Capital) do not exhibit statistical significance, while LCA (Capital) exhibits statistically significant coefficients, with p-values less than 0.05 level.

Conversely, the lagged value of LCA at periods (-1) shows insignificant negative short-run effect, while the lagged value of LCA at period (-2) shows statistically positive significant effect in the short-run. This implies that capital's influence on the dependent variable has short-term dynamics, with past capital level significantly affecting the current state.

The binary variable DM (Dummy Variable) and its lags display non-significant coefficients, suggesting limited short-term influence.

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On the other hand, LTECH (Technology) demonstrates a significant positive coefficient, indicating a higher short-term effect on the dependent variable. This suggests that changes in technology levels have an immediate impact on the outcome under consideration.

Lastly, the model overall exhibits a high R-squared value of 0.999215, signifying a strong fit to the data and explaining a substantial portion of the variation. The Durbin-Watson statistic (2.449037) hints at the absence of autocorrelation. The highly significant F-statistic (1781.397) implies the overall model's validity and strength.

Table 7. Bounds Test Co-integration

F-Statistic	Significance Level	Bound Critical Values		K
		I(0) Bound	I(1) Bound	
6.419219	1%	3.29	4.37	4
	2.5%	2.88	3.87	
	5%	2.56	2.08	
	10%	1.8	2.8	

Researcher's computation using E views 10 Software.

The ARDL Bounds Test for co-integration assesses whether there is a long-term relationship between the variables in the study's model. It helps determine whether the variables move together in the long run. In this concise yet comprehensive interpretation: The F-Statistic, with a value of 6.419219, indicates the strength of the relationship between the variables in the study's model, since the F-Statistics value of 6.419219 is higher than I(0) and (1) value of 3.49 at 5% level of significance..

Table 8. ARDL long-run Relationship

Variables	Coefficient	Std. Error	t-Statistic	Prob.
LHCA	-4.263980	3.215729	-1.325976	0.2061
LCA	0.921835	0.081317	11.33633	0.0000
DM1	-0.113712	0.099908	-1.138173	0.2742
LTECH	1.913757	0.400561	4.777691	0.0003
C	-19.25883	13.64106	-1.411828	0.1798

Source: Researcher's computation using E views 10 Software.

In the long-run impacts, LHCA (Human Capital) displays a negative coefficient of -4.263980, indicating a potential negative impact on the dependent variable. However, this coefficient is not statistically significant at the 0.05 level (p = 0.2061), suggesting limited explanatory power.

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LCA (Capital) exhibits a strong positive coefficient of 0.921835, signifying a substantial positive influence on the dependent variable. This coefficient is highly significant (p = 0.0000), indicating that capital has a significant long-term effect.

The binary variable DM1 has a negative coefficient of -0.113712, implying a potential negative influence. However, this coefficient is not statistically significant at the 0.05 level (p = 0.2742), suggesting a limited impact.

LTECH (Technology) shows a positive coefficient of 1.913757, indicating a notable positive effect on the dependent variable. This coefficient is highly significant (p = 0.0003), implying a significant long-term impact of technology.

The constant term "C" has a negative coefficient of -19.25883, suggesting a negative overall effect. However, this coefficient is not statistically significant (p = 0.1798), indicating limited explanatory power.

Discussion of Findings

In exploring the factor input drivers, the study meticulously investigated the impact of Human Capital (HCA) on the economy. However, the findings unveiled insignificant negative impacts in both the short and long run. These results diverge from the conclusions drawn by Teixeira and Dore (2022) and Widena and Barwono (2020). Consequently, it appears that HCA does not positively affect the output growth of Nigeria's economy.

In contrast, Capital Accumulation (CA) emerged as a pivotal driver of output growth, exerting influence in both the short and long run. This finding echoes the conclusions of Muhammad and Ehikioya (2015) and Uchenna (2020) and seamlessly aligns with the study's predetermined expectations. Therefore, according to the study's analysis, Capital accumulation contributes positively to the economy.

Similarly, empirical evidence suggests that Technology Adoption Rate (TECH) has a positive impact on output growth (GDP) across both the short and long term. This finding is consistent with the results of Widarni and Bawono (2020) and remains in line with the study's predetermined expectations. It underscores the notion that the adoption of technology plays a crucial role in enhancing Nigeria's output growth.

5. Conclusion and Recommendations

The research concludes that Capital Accumulation (CA) and Technology Adoption (TECH) are significant drivers of economic growth in Nigeria, positively impacting output in both the short and long run. In contrast, Human Capital (HCA) has an insignificant negative impact on the economy, suggesting a need to reassess current education and training programs. This highlights the importance of investing in infrastructure, technology, and aligning educational outcomes with market demands to drive sustainable economic growth.

Therefore, the following recommendations were made:

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Since Capital Accumulation (CA) positively affects output growth, policies should focus on improving infrastructure, providing incentives for savings and investments, and enhancing financial markets to mobilize capital effectively.

Given the positive impact of Technology Adoption (TECH) on GDP growth, the government should invest in technological infrastructure, support digital literacy programs, and create a conducive environment for tech startups and innovation.

The insignificant impact of Human Capital (HCA) suggests a need to reassess current education and training programs. Emphasis should be placed on aligning educational outcomes with market demands, improving the quality of education, and fostering skills that enhance productivity.

References

Adamu, J. & Musa, A. (2021). Impact of government expenditure on economic growth in Nigeria. *Journal of Applied Statistics, 12(1),* 139-174.

Ajide, Kazeem B. (2014). Determinants of economic growth in Nigeria, *CBN Journal of Applied Statistics (JAS)*: 5 (2), Article 8.

Bai, J., & Perron, P. (2003). Computation and Analysis of Multiple Structural Change Models. *Journal of Applied Econometrics*, 18(1), 1-22.

Balami, D. H. (2006). Macroeconomic theory and practice.

Barro, R. J. (1990). Government spending in a simple model of endogenous growth. *Journal of Political Economy* 98:5 103–125.

Barro, R. J., & Sala-i-Martin, X. (1995). Economic Growth. *New York: McGraw-Hill*.

Barro, R.J. (1995). Inflation and Economic Growth. NBER Working Papers5326, Cambridge, Mass.

Baum, A., Checherita-Westphal, C., and Rother, P. (2012). Debt and growth: New Evidence for the Euro Area. *European Central Bank, Working Paper Series No. 1450, July.*

Bello, M.S., Bello, A.A., and Aminu, H.J. (2017). The Determinants of Long-Run Economic Growth in Nigeria. *Asian Economic and Financial Review*, 8(1), 1-8.

Bosworth, B., and Collins, S. (2003). The Empirics of Growth: An Update. *Brookings Papers on Economic Activity*, 2: pp. 113-206.

Breitung, J. (2000). The Local Power of Some Unit Root Tests for Panel Data. In B. Baltagi (Ed.) *Advances in Econometrics, 15: Nonstationary Panels, Panel Cointegration, and Dynamic Panels*. *Amsterdam: JAI Press*, pp. 161–178.

Burnside, C., Eichenbaum, M., and Rebelo, S. (2001). Prospective Deficits and the Asian Currency Crisis. *Journal Of Political Economy*, 109(6): pp. 1155-1197.

Caner, M., Grennes, T., and Koehler-Geib, F. (2010). Finding the Tipping Point When Sovereign Debt Turns Bad. *The World Bank, Policy Research Working Papers No. WPS5391*: pp. 1-13.

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CBN (2019), Statistical Bulletin

Cesares, E. R. (2015). A Relationship Between External Public Debt and Economic Growth. *Estudio Economicos*, 30(2): pp. 219-243.

Cobb, C. W., & Douglas, P. H. (1928). A Theory of Production. *The American Economic Review*, 18(1), 139-165.

Dewan, E and Hussein, S (2001). Determinants of Economic Growth: Panel Data Approach. *Reserve Bank of Fiji* Working Paper No. 01/04.

Dickey, D.A. and Fuller, W.A. (1981). Likelihood Ratio Statistics for Autoregressive Time Series with a Unit Root. *Econometrica*.

Didit, W. U & Asturi, D. R. (2020). The Determinants of Economic Growth in Four (4) Asian Countries; Thailand, Philippines, Malaysia and Indonesia from 1st Quarter Of 2008 To 4th Quarter Of 2019.

Ditimi, A. (2017). The Nexus Between Exchange Rate Variation and Economic Growth in Nigeria. *Journal of Entrepreneurship, Business and Economics,* 5(1), (P1-40).

Doguwa, S. I., (2012). The Issue of Inflation and Economic Growth in Nigeria from The Angle of Threshold Level. *CBN Journal of Applied Statistic.*

Edoumiekumo, S.G and Opukri, C. O (2013). Economic Growth Factor in Nigeria: The Role of Global Trade. *American Journal of Humanities and Social Sciences,* 1(2): 51-55

Emeka, A. (2017). The Link Existing Among Capital Formation, Domestic Investment and Economic Growth in Nigeria.

Engle, R. and Granger, C.W.J. (1987). Co-Integration and Error-Correction: Representation, Estimation and Testing. *Econometrica: Journal of the Econometric Society*, 35: 251–276.

Enoma, A. and Isedu, M. (2011). The Impact of Financial Sector Reforms on Non-Oil Export in Nigeria. *Journal of Economics*, 2(2): 115-120

Favour, O.E (2017). The Relationship Between Economic Growth and Public Debt in Nigeria from 1980-2015. *Journal Of Academic Research in Economics.*

Gujarati, D. N (2002). Basic Econometrics. *London: McGraw Hill International*.

Imimole, B. and Imuoghele, L.E (2012). Impact of Public Debt on an Emerging Economy: Evidence from Nigeria (1980 – 2009). *International Journal of Innovative Research and Development*. 1(8).

John, O. O, Kenechukwu, O. C & Chjindu, A. A. (2019). The Deficit Financing and Economic Growth in Nigeria from 1987 To 2017. *Asian Journal of Economics, Business and Accounting.*

Johnson, R. (2019). Understanding GDP: An Economic Perspective. *Journal of Economic Studies*, 15(2), 25-40.

Johnson, R. (2021). Foreign Direct Investment: Drivers and Impacts. *Journal of International Business,* 17(3), 35-50.

Kolapo, F.T, Azeez, B.A, Mokuolu, J.O, Oluwaleye, T.O & Alabi, K.M (2021). Impact Of Government Expenditure on Economic Growth. *International Journal of Scientific Research and Management,* 9 (02), 2039-2150.

Kolawole, B.O. (2013). Growth-Effects of Macroeconomic Stability Factors: Empirical Evidence from Nigeria. *Developing Country Studies,* 3 (14): 47-54.

Kolline, B. G (2018). The Determinants of Economic Growth in Liberia From 1980 to 2015.

Kwiatkowski, D., Phillips, P. C. B., Schmidt, P., & Shin, Y. (1992). Testing the Null Hypothesis of Stationarity Against the Alternative of a Unit Root: How Sure Are We That Economic Time Series Have a Unit Root? *Journal Of Econometrics*, 54(1-3), 159-178.

Lucas, R. E. (1988). On the Mechanics of Economic Development. *Journal of Monetary Economics,* 22(1), 3-42.

Mankiw, N. G., Romer, D., & Weil, D. N. (1992). A Contribution to the Empirics of Economic Growth. *The Quarterly Journal of Economics*, 107(2), 407-437.

Mohammad, S. J. & Khaled, A. M., (2019). The Impact of External Debt on Economic Growth in Jordan Using Annual Data for the Period of 2010 to 2017. *International Journal of Economics and Finance,* 11 (4).

Muhammad, B. & Abdullahi M. (2018). Essays on Applied Economics.

Muhammad, I. & Ehikioya, L. I. (2015). The Macroeconomic Determinants of Economic Growth in Nigeria for a Period of 26years from 1986-2012.

Nkoro, E. & Uko, K. A (2019). The Sources of Economic Growth in Nigeria from 1960 to 2017 Using Growth Accounting Approach.

Obayori, B. J et al (2020). The Financial Inclusion and Economic Growth in Nigeria from 1981 to 2018.

Odhiambo, M. N, (2017). The Relationship Between Economic Growth and Public Debt. *Journal of Economics and Econometrics.*

Okeye, L.U., Modebe, N.J., Erin,O.A., Eyboumwan, G.O. (2020). Sustainable Economic Growth, Education Excellence and Innovation Management Through Vision 2020.

Oyegoke, E. O & Nuri, O. A (2021). The Impact of Foreign Direct Investment on Economic Growth in Nigeria from 1970 to 2020. *Business and Management Review*, 2(1): 92 – 100

Pakistan, G. (2013). Macroeconomic Determinants of Economic Growth in Pakistan. *The Pakistan Development Review.*

Perron, P. (1989). The Great Crash, the Oil Price Shock and the Unit Root Hypothesis. *Econometrica,* 57(6), 1361-1401.

Romer, P. M. (1986). Increasing Returns and Long-Run Growth. *Journal of Political Economy*, 94(5), 1002-1037.

Saidu, M. B (2017). The Determinants of the Lung-Run Economic Growth in Nigeria from 1981 to 2014 Using Population Growth.

Smith, A. (2020). Understanding Gross National Income: Concepts and Applications. *Journal of Economic Indicators,* 25(1), 10-30.

Solow, R. M. (1956). A Contribution to the Theory of Economic Growth. *The Quarterly Journal of Economics*, 70(1), 65-94.

Suaibu, I. M. (2011). The Monetary Growth Model for Nigeria Using Error Correction Mechanism Using Bounds Test Approach.

Swan, T. W. (1956). Economic Growth and Capital Accumulation. *The Economic Record,* 32(2), 334-361.

Uchenna, L.O. (2020). The Effect of External Debt on Economic Growth in Nigeria Using Its Major Determinants Like Gross Fixed Capital Formation, Exchange Rate and Inflation Rate.

Udeaja, E. A., (2015). The Determinants of Economic Growth in Nigeria. *ISSN2224-607X* 5(9), 2015

Udoh, E. B et al (2021). The Financial Deepening and Economic Growth in Nigeria from 2015 to 2016. *Research Journal of Finance and Accounting.*

Wayan, M., Anik, Y. and Gregorius, P.T. (2022). Economic Growth Based on the Keynes Theory. *Journal: segce.com*,5(2).

Yaqub, J.O. (2011). Exchange Rate Changes and Output Performance in Nigeria