INTERACTIVE EFFECTS OF FINANCIAL DEVELOPMENT AND INFRASTRUCTURE ON SUSTAINABLE ECONOMIC GROWTH IN NIGERIA

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Abstract

Sustainable economic growth continues to be one of the major issue of concern confronting the Nigerian economy, with challenges that pertain to financial inclusion, intermediation, and infrastructure development. This study investigates how financial development and infrastructure development interact to influence sustainable economic growth for the period 1986 to 2024. The data for the analyses were sourced from Central Bank of Nigeria (CBN) and World Bank. A Vector Error Correction Model (VECM) was adopted for empirical investigation of short and long run relationships. The findings indicate that financial development does have a positive effect on sustainable growth, while financial infrastructure has an insignificant negative impact. Also, the interaction effect between financial development and infrastructure were estimated to have a significant effect on growth. Similarly, the moderation effects of financial deepening and fintech also has a significant effect. The study suggests the need for Nigeria to focus first on financial systems and infrastructure in order to achieve inclusive and sustainable economic growth.

Keywords: Financial Development, Financial Infrastructure, Sustainable Economic Growth, Nigeria
JEL Classification Codes: O16, O55

INTRODUCTION

Sustainable economic growth has evolved as a key economic objective for various nations that aim to achieve a balance between economic prosperity, social welfare, and environmental protection. Unlike traditional measures of economic growth that only consider short-term value addition, sustainable economic growth ensures long-term economic value addition as well as the protection and conservation of resources by combining productivity growth, human capital formation, and natural resource protection (Organisation for Economic Co-operation and Development (OECD), 2024; Babajide et al., 2015). The strategy aligns with Sustainable Development Goal 8 of the United Nations because it works to achieve sustainable economic growth, complete job opportunities, and valuable employment for all people (Cevik, 2024; van Niekerk, 2020). The economies which attain sustainable growth do so by effectively managing their resources while driving innovation and maintaining environmental protection to deliver equal benefits to their future generations.

One way to observe the sustainability of growth is through measures such as Adjusted Net Savings (ANS), which takes into consideration investments made in human capital formation, the depletion of natural resources, and the environmental effects of economic growth (Umeghalu, Machi, & Onwuka, 2025; World Bank, 2023; Hamilton & Hartwick, 2014). The fact that ANS is positive

suggests that the wealth of a nation is conserved for the future, but a negative ANS value implies a situation where growth is taking place but is built on the exploitation of resources, which is not sustainable. Historical trends in Nigeria have shown unstable economic growth, characterized by overreliance on depleting resources as indicated by low or negative ANS and underinvestment in human resources (World Bank, 2024). In fact, these patterns delineate the country's continuous challenge for robust and sustainable economic growth. The graph below provides the trend of Adjusted net savings from 1986 to 2023.

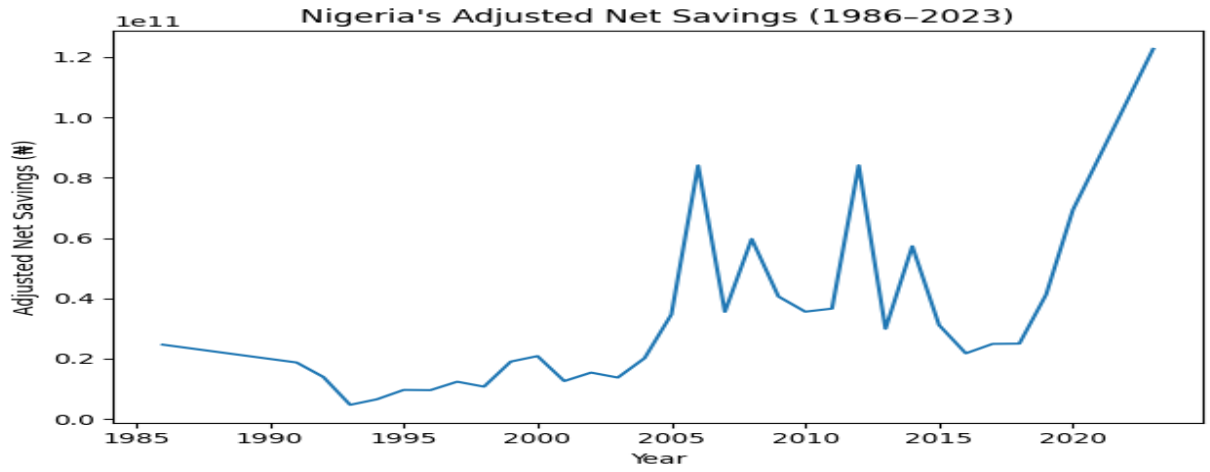

Figure 1: Trend of Nigeria's Adjusted Net Savings (1986–2023)
Source: World Bank (2024)

Within this sustainability framework, financial development assumes even greater importance. Financial development has, over time, been considered the key element to the sustainability of the economy through growth. It leads to better resource allocation, the mobilisation of idle savings for the economy, the facilitation of investments, the spread of economic participation, and the inclusiveness of the economy (Levine, 1997; OECD, 2024; Babajide et al., 2015). Countries with well-developed financial systems have exhibited stronger growth records worldwide. Thus, the United States, Denmark, and Sweden have employed financial technology, digital banking, and capital markets, which are well-developed, to expand financial access, improve capital allocation, and foster innovation, thus, increasing their GDP over time (World Economic Forum, 2023; OECD, 2024). On the other hand, a mobile money solution in Kenya, M-Pesa, has taken financial inclusion to more than 96% of the households thereby, lowering poverty and increasing economic resilience (Abamara et al., 2025; Enhancing Financial Innovation and Access, [EFInA], 2020). In Ghana, 67% of the population currently uses fintech solutions which has drastically improved their access to credit and payment systems (World Bank, 2023). These illustrate the ways in which financial development and infrastructure influence and complement one another to promote inclusive and sustainable growth (Umeghalu et al., 2022).

However, Nigeria is still grappling with the problem of how to translate financial development into economic growth that is not only rapid but also sustainable. There were reform programs such as the Payments System Vision 2020, National Financial Inclusion Strategy, and fintech innovations like eNaira but the reality on the ground is that millions of Nigerians are still financially excluded, and financial intermediation is very shallow (Umeghalu, Agupusi, & Uzodigwe, 2019; EFInA, 2023; CBN, 2022). During the period from 2005 to 2022, domestic credit to the private sector rose only slightly from 8.4% to 14.1%, a figure that is behind those of Kenya and South Africa, which means that there has been limited mobilization of resources for the productive sectors. Furthermore, structural issues such as a low literacy level, poor digital and energy infrastructure, and non-uniform distribution of financial access points, are some of the hurdles that the adoption of financial services and technology-driven innovations face. Consequently, the Nigerian financial sector has not provided the required support to wealth preservation, economic diversification, and environmentally sustainable growth, thus the country is exposed to cyclical and structural problems (Nwogwugwu & Umeghalu, 2021).

In view of the fact that the benefits of financial development have been demonstrated worldwide and that the challenges in Nigeria have been persistent, it is important to understand the interactive effects of financial development and infrastructure on sustainable economic growth. This research considers Adjusted Net Savings as a comprehensive indicator of sustainable growth and applies a Vector Error Correction (VEC) model to investigate the dynamic interplay between financial development, infrastructure, and long-run economic growth in Nigeria. By associating financial sector development with wealth preservation, inclusive participation, and sustainability, the paper offers empirical evidence that is indispensable for policy-making towards achieving strong and sustainable economic growth.

REVIEW OF RELATED LITERATURE

Mogbo (2025) used ARDL and cointegration analysis to evaluate the long-run relationship between financial development and economic performance in Nigeria (1994-2023). The findings revealed that financial development had a favourable impact on growth, but the effect was statistically significant only when financial infrastructure measures were included, implying that banking access moderates the finance-growth relationship. Adebayo (2025) used the ARDL model to assess the impact of financial development on Nigerian economic growth from 1981 to 2023. The study included control factors such as government spending, investment, trade openness, oil prices, and labour force to provide a thorough economic assessment. The empirical results showed that the financial development index had no statistically significant effects on economic growth in both the short and long run.

In 20 SSA nations, Alabi et al. (2024) conducted an empirical investigation of the role of infrastructure in the relationship between financial development and economic growth. Using data

from 1985 to 2018 and the pooled mean group (PMG) estimation technique, the empirical results indicated a non-linear relationship between financial development and economic growth, with the positive impact outweighing the negative one over the long and short terms. However, the non-linear estimate showed that financial development had a mixed influence on economic growth, showing that it had a beneficial effect up to a certain point before hurting growth.

Madu et al. (2024) examined the impact of financial development on Nigeria's economic growth from 1981 to 2021. The data were evaluated using the ARDL limits cointegration approach, and the long-run results revealed that financial development contributed positively to Nigeria's economic growth, but inflation and unemployment had a negative impact. In the short term, Nigeria's broad money supply had a negative impact on economic growth. Saramu et al. (2024) similarly conducted research to examine the impact of financial inclusion on economic growth in Nigeria, utilizing the ordinary least squares (OLS) method. Findings revealed a positive and statistically significant relationship between credit to the private sector and economic growth, while ATM transactions showed a positive but statistically insignificant relationship with economic growth. **Echu et al. (2024) investigated the role of digital finance in promoting sustainable development in the Nigerian economy. To achieve the study's goals, a positivist approach was taken with a sample of 384 respondents. The data was analyzed through regression analysis and the results** found considerable effect on sustaining the development of Nigeria.

Tidjani and Madouri (2024) investigated the relationship between financial technology, financial inclusion and sustainable development, focusing on the African region. The study analyzed data from 25 African countries between 2011 and 2019, employing econometric techniques such as dynamic panel methods (two-step SGMM) and static panel approaches. The findings revealed that financial inclusion and FinTech significantly and positively influenced sustainable development. However, an interesting observation was that the interaction between financial inclusion and FinTech showed a weak but significant negative effect. Samuel et al. (2024) examined the impact of FinTech on economic growth and financial inclusion in Nigeria using quarterly data from 1999 to 2020. The study employed the Johansen cointegration test, the Granger non-causality test, and the Toda–Yamamoto procedure. The findings indicated that FinTech contributed to economic growth and financial inclusion by reducing income inequality and poverty rates. Additionally, the results revealed the presence of unidirectional, bidirectional, and feedback causality between the variables.

Using OLS regression techniques, Ukoh and Ibe (2024) investigated how financial deepening affected Nigeria's economic growth between 1999 and 2022. The study indicated that there was a significant and positive relationship among money supply, private sectors' lending and economic development in Nigeria. Another study by Inuwa et al. (2022) investigated the impact of fintech on Nigeria's growth and development in the wake of the COVID-19 recovery. To that end, 415 bank customers were surveyed, and the data was analysed using the Point Likert-Scale structural

equation model (PLS-SEM). The results indicated that sustainability and transaction efficiency have a positive and significant impact on Nigeria's growth and development. Sennuga et al. (2021) analyzed the effect of financial development on economic growth in Nigeria using time series data over the period 1980 and 2019. The method of analysis was OLS, and the results indicated that real interest rate, gross domestic saving were inversely related to economic growth when combined while domestic credit to the private sector was positively related.

Noor et al. (2020) investigated the relationships between financial inclusion, financial literacy, and financial technology (FinTech) in Indonesia's economy. The research, based on an analysis of thirty journals and reports, found that demographic factors such as gender, age, education, and occupation influenced the advancement of financial inclusion, literacy, and technology adoption. Expanding on FinTech's broader impact, the study examined China's provincial data from 2011 to 2018, demonstrating that FinTech innovation and green finance significantly promoted green economic growth, though the effects were uneven across regions. Eastern China experienced far greater benefits compared to central and western areas. Using the ARDL model, Ademokoya (2020) investigated the relationship between the financial sector and sustainable development in Nigeria from 1986 to 2015. According to the study's findings, Nigeria's sustainable development was greatly and favourably impacted by the banking and stock markets.

Kalu et al. (2019) investigated the finance-growth nexus in Nigeria from 1981 to 2017, using the ARDL and Nonlinear ARDL (NARDL) models. Financial deepening indicators were found to positively and significantly affect the growth of the Nigerian economy, while financial access was found to insignificantly affect economic growth linearly and nonlinearly. Kamalu et al. (2019) looked into the causal relationship between financial developments, financial inclusion, trade openness, foreign direct investment, and economic growth in Nigeria between 1970 and 2018. The non-Granger causality Toda and Yamamoto test, the Gregory and Hansen cointegration test, the Ng Perron, and the Zivot Andrew unit roots test were also employed in this investigation. The results showed a one-way relationship between financial inclusion and growth and a two-way causal association between financial development and economic growth. Trade openness and economic growth do not, however, cause one another to grow.

Uruakpa et al. (2019) investigated the impact of financial inclusion on economic growth of Nigeria for the period 2003 – 2015. The study made use of the ordinary least square technique (OLS) of multiple regression analysis. The empirical results show that deposits of rural branches of commercial banks and ATM transactions exerted a positive and significant impact on economic growth in Nigeria while loans of rural branches of commercial banks revealed a negative and insignificant impact. Salami and Oluseyi (2013) examined the impact of financial sector development on the Nigerian economic growth in view that an efficient financial system is essential for building a sustained economic growth and an open vibrant economic system. The OLS method of the regression analysis was employed, and it was found that financial development,

proxied by ratio of liquidity liabilities to GDP, real interest rate, ratio of credit to private sector to GDP positively impacted on economic growth in Nigeria. The study also revealed that only the real interest rate was negatively related.

METHODOLOGY

Theoretical Framework

This study is theoretically anchored in the financial development-growth nexus and endogenous growth theories. In essence, Schumpeter (1911) first proposed that financial systems can positively impact economic growth, considering that they mobilize savings as well as allocate resources efficiently in an economy. On the contrary, complementing Schumpeter's analysis, Romer (1986) and Lucas (1988) contributed by asserting that human capital, as well as innovative activities, play an essential role in positive economic growth. Despite these advanced theories on the mechanisms of achieving growth, the theories fail to consider the interactive effect of financial systems, infrastructure, and sustainability, specifically in emerging economies such as Nigeria. Following various concepts, financial inclusion, as well as technological adoption, were used as an extension of traditional theories on how financial development can positively impact growth.

Model Specification

This study adapts and modifies the model of Salami and Oluseyi (2013). The model was adapted because some of the variables of this study were included in their model and they are good in explaining the relationship between financial development and sustainable economic growth in Nigeria. The model of Salami and Oluseyi (2013) adapted for this study is thus specified functionally as;

$$RGDP = f\ (M2GDP, RINTR, CRGDP) \quad 3.1$$

Where, GDP = Real Gross Domestic Product; M2GDP = Percentage on money supply to GDP; CRGDP = Credit to private sector as a share of GDP. This current study therefore modifies the model and it is stated as;

$$ANS = f\ (FDVT, FINI, FDVT * FINI, FINC * FINI, FDPN * FINI, FINTEC * FINI, INSQL) \quad 3.2$$

Where, ANS = Adjusted net savings, proxy for sustainable economic growth; FDVT = Financial development; FINI = Financial infrastructure, proxy by number of bank branches; FDVT*FINI = Interaction between financial development and financial infrastructure; FINC*FINI = Interaction between financial inclusion and financial infrastructure; FDPN*FINI = Interaction between financial deepening and financial infrastructure; FINTEC*FINI = Interaction between financial technology and financial infrastructure; INSQL = Institutional quality. The model can be expressed econometrically as in equation 3.3.

$$\text{ANS}_t = \beta_0 + \beta_1\text{FDVT}_{t-1} + \beta_2\text{FINI}_{t-1} + \beta_3\text{FDVT} * \text{FINI}_{t-1} + \beta_4\text{FINC} * \text{FINI}_{t-1} + \beta_6 FDPN * FINI_{t-1} + \beta_7\text{FINTEC} * \text{FINI}_{t-1} + \beta_8\text{INSQL}_{t-1} + \mu_t \quad 3.3$$

Where, t-1 is the lagged value of the variables; ln = Natural logarithm; μ_t is the stochastic error terms which explain other variables that cannot be captured in the model; β_0, β_1 to β_8 are the slopes of the coefficients.

Estimation Techniques and Procedure

This section discusses the estimation technique employed to measure our variables and the procedures taken to do this. The study adopted the Vector Error Correction Model (VECM) for the models which were used to estimate the parameters. The VECM model employed in this study is efficient in establishing significant relationship, elasticity and impact between the variables of the study. The time series data in the study was tested for stationarity using the Augmented Dickey-Fuller (ADF) unit root test. The long-term relationship between the dependent and independent variables was also examined using Johansen co-integration. The econometric software of E view 13 was used in running the model.

DATA ANALYSES ANS PRESENTATION OF RESULTS

Correlation Matrix

The correlation matrix measures how closely related two variables in the model are which can be used to check if multicollinearity exists or not. Multicollinearity in a model means there exists perfect or exact linear relationship in a model. If this exists, it violates the rule of OLS and our estimates become unreliable.

Table 1: Correlation Matrix Result

	ANS	FDVT	FINI	FDVT_FINI	FINC_FINI	FDPN_FINI	FINTEC_FINI	INSQL
ANS	1.000000							
FDVT	0.756170	1.000000						
FINI	0.644927	0.747007	1.000000					
FDVT_FINI	0.751255	0.799552	0.727994	1.000000				
FINC_FINI	0.700390	0.623237	0.669674	0.612925	1.000000			
FDPN_FINI	0.716629	0.622719	0.773218	0.606337	0.688839	1.000000		
FINTEC_FINI	0.734369	0.748511	0.609211	0.743979	0.743286	0.669857	1.000000	
INSQL	0.623097	0.643702	0.562059	0.647900	0.645328	0.628464	0.748587	1.000000

Source: Authors' Compilation using Eviews 13.0

Stationarity Test

This subsection deals with the test of unit root. Since time series data usually exhibit unit root, ADF unit root test was employed to test for stationarity. This test is necessary so as not to have misleading results. The result is thus presented in Table 2.

Table 2: Summary of the ADF and Structural Break Unit Root Test

Variables	ADF Statistic	ADF Critical Value @5%	Structural Break ADF Statistic	Structural Break Critical Value @5%	Order of Integration	Remark
ANS	-7.7369	-2.9458	-9.0579	-4.4436	I(1)	Stationary
FDVT	-3.1690	-2.9540	-6.1692	-4.4436	I(1)	Stationary
FINC	-7.2928	-2.9458	-8.1906	-4.4436	I(1)	Stationary
FDPN	-4.3732	-2.9458	-7.1795	-4.4436	I(1)	Stationary
FINTEC	-6.9008	-2.9458	-8.5575	-4.4436	I(1)	Stationary
FINI	-4.8753	-2.9458	-5.4439	-4.4436	I(1)	Stationary
INSQL	-6.1024	-2.9458	-14.9315	-4.4436	I(1)	Stationary

Source: Authors' Compilation using Eviews 13.0

The ADF test reports that all variables are stationary at their first difference, i.e., I(1). That means all variables were stationary following the first difference. As all ADF statistics are more negative than their corresponding 5% critical values, the null hypothesis of a unit root (i.e., non-stationarity) is not accepted for all variables. This means that ANS, FDVT, FINC, FDPN, FINI and INSQL all exhibit a difference-stationary process instead of a trend-stationary process. The fact that all the variables are I(1) suggests that they could be suitable for cointegration analysis to discover whether there exists any long-run equilibrium relationship between them. Since all the variables have the same order of integration, the Johansen cointegration test was employed to examine their long-run relationships.

Lag Length Selection

This section presents the appropriate lag length for this study before estimating the long and short run coefficients of the model.

Table 3: Summary of VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-82.27345	NA	2.40e-08	5.158483	5.513991	5.281204
1	-66.14696	301.3808*	4.15e-06*	7.182846*	9.942374*	8.257320*
2	-13.52389	57.40699	5.13e-06	7.403266	11.94488	8.785404

Source: Author's Compilation using Eviews 13.0

The results from the VAR lag order selection criteria show that the optimal lag length of the models is 1, as it is evidenced by the lowest values of the Akaike Information Criterion (AIC) and Schwarz Criterion (SC) at this lag. This indicates that incorporating one lag reflects an appropriate balance between model complexity and goodness of fit. The results ensure that the models are well-specified and suitable for further analysis.

Johansen Cointegration Test

The next step after determining the order of integration of the variable is to apply the Johansen test in order to establish a long-run relationship among the variables. The results of the test are reported

in Table 4.

Table 4: Summary Result of the Johansen Cointegration Test

Hypothesized No of CE(s)	Eigenvalue	Trace statistic	Critical value @ 5%	Max-Eigen statistic	Critical value @ 5%
None *	0.866861	253.0974	159.5297	66.53999	52.36261
At most 1 *	0.785022	186.5574	125.6154	50.72831	46.23142
At most 2 *	0.705155	135.8290	95.75366	40.30313	40.07757
At most 3 *	0.663033	95.52592	69.81889	35.89638	33.87687
At most 4 *	0.508126	59.62954	47.85613	23.41456	27.58434
At most 5 *	0.443905	36.21498	29.79707	19.36491	21.13162
At most 6 *	0.388909	16.85007	15.49471	16.25279	14.26460
At most 7	0.017937	0.597281	3.841465	0.597281	3.841465

Source: Authors' Compilation using Eviews 13.0

The result shows considerable evidence of cointegration. The trace statistic verifies that at least seven cointegrating equations exist, while the max-eigen statistic also confirms the existence of five cointegrating equations. This shows a moderate degree of long-run relationship among the variables, which suggests they have a tendency towards equilibrium.

Vector Error Correction Mechanism

This method was conducted to determine the joint dynamic behaviour of a collection of variables without requiring strong restrictions to identify the underlying structural parameters. The results of the VECM are presented in Table 5.

Table 5: Summary of VECM Result

	Coefficient	Std. Error	t-Statistic	Prob.
COINTEQ1	-0.116809	0.095661	-4.221074	0.0000
D(ANS(-1))	0.181076	0.223839	0.808957	0.4196
D(FDVT(-1))	0.281186	0.901616	3.584677	0.0005
D(FINI(-1))	-0.079208	0.540445	-0.700582	0.4844
D(FDVT_FINI(-1))	0.741643	0.187523	2.681956	0.0061
D(FINC_FINI(-1))	-0.498078	0.655953	-1.825207	0.0695
D(FDPN_FINI(-1))	0.088211	0.184922	3.017785	0.0011
D(FINTEC_FINI(-1))	0.520838	0.280729	1.855305	0.0651
D(INSQL(-1))	0.018555	0.019600	2.946717	0.0050
C	-0.784138	0.488391	-3.951877	0.0004
R-squared	0.732612	F-statistic		9.770142
Adjusted R-squared	0.655158			
S.E. of regression	0.215852			
Durbin-Watson stat	2.126553			

Source: Authors' Compilation using Eviews 13.0

The result shows the short-run dynamics and the rate of convergence to the long-run equilibrium. The error correction term (CointEq1) is -0.1168, which means that the deviations from the long-run equilibrium are being corrected at a rate of 12% per annum, implying a slow adjustment process. A 1% rise in the lagged value of ANS causes a 0.18% rise in its current value, indicating a positive effect of previous economic growth on the current growth. Likewise, a 1% rise in the lagged value of FDVT causes a 0.28% rise on sustainable economic growth indicating the positive contribution of financial development towards economic activities. The lagged value of financial infrastructure has a negative impact, as a 1% increase leads to a 0.079% decrease in sustainable economic growth. The interaction between financial development and financial infrastructure (FDVT_FINI) has a positive and significant impact on sustainable economic growth, indicating that a 1% increase in FDVT_FINI leads to a 0.74% rise in ANS. The interaction of financial inclusion and financial infrastructure (FINC_FINI) also shows negative and insignificant impact on sustainable economic growth. It implies that on average, 1% increase in FINC_FINI reduces ADNS by about 0.50%. Similarly, when financial deepening interacts financial infrastructure (FDPN_FINI), it reveals a positive and significant impact of 0.088% on sustainable economic growth. The moderation of fintech with financial infrastructure (FINTEC_FINI) is found to have positive impact, with a 1% increase in its lagged value having a 0.52% contribution on sustainable economic growth, which is however statistically insignificant. The R^2 is 0.7326, implying that 73% variations in ANS are explained by FDVT, FINI, FDVT_FINI, FINC_FINI, FDPN_FINI, FINTEC_FINI, and INSQL, while only about 27% of the variables not explicitly captured in the model are explained by the error term. The percentage is quite high and this suggests that our models are good fit. With a Durbin-Watson statistic of 2.1266, the residual exhibits a slight indication of negative autocorrelation.

Post Estimation Tests

Table 6: Summary of Serial Correlation Test

Lag	LRE* stat	df	Prob.	Rao F-stat	Df	Prob.
1	56.43178	64	0.7382	0.792418	(64, 52.6)	0.8136
2	47.05090	64	0.9447	0.621079	(64, 52.6)	0.9653

Source: Authors' Compilation using Eviews 13.0

The result reveals that the probability value for lag one and two are greater than the critical value at 5 percent level of significance. The study therefore accepts the null hypothesis which states that there is no serial correlation in the models.

The purpose of the heteroscedasticity test is to determine whether or not each observation's error variance is constant or not. The probability value must be greater than the 0.05 level of significance in order to support the null hypothesis that there is no heteroscedasticity in the residuals.

Table 7: Summary of Heteroscedasticity Test

Joint test:		
Chi-sq	Df	Prob.
458.4894	448	0.3557

Source: Researchers' Compilation Using Eviews 13.0

Thus, based on Table 7's findings, the probability value is equal to 0.3557 and this indicates that the significance level of the probability F statistic exceeds 0.05 percent. As a result, the study accepts the null hypothesis that the model does not exhibit heteroscedasticity in the residuals.

Table 8: Summary of Normality Test

Component	Jarque-Bera	Df	Prob.
1	0.334341	2	0.8461
2	0.424503	2	0.8088
3	9.630236	2	0.0081
4	0.170725	2	0.9182
5	1.015432	2	0.6019
6	1.349827	2	0.5092
7	5.791763	2	0.0553
8	1.595055	2	0.4504
Joint	20.31188	16	0.2065

Source: Researchers' Compilation Using Eviews 13.0

From the results, the joint probability value is **0.2065 and t**he observed p-values are higher than the 5% significance level (0.05). Hence, it strongly indicates that the test for normality of the null hypothesis cannot be rejected, meaning that the models' residuals are normally distributed, which is an essential assumption in econometric modeling.

Discussion of Findings

The findings indicate a slow adjustment to long-run equilibrium, showing that shocks persist in the economy. The previous growth affects the current growth positively since the past economic activities usually stimulate the current ones, and the financial development facilitates the growth by better credit allocation and resource mobilization. This is in line with the a priori expectations and the findings from the study of Alabi et al. (2024). Financial infrastructure alone limits the growth probably because of the inefficiencies and structural weaknesses it has, but when it is interacted with financial development and deepening, it raises their effectiveness and consequently the performance. Alabi et al. (2024) and Saramu et al. (2024) agree with this result, while also

showing the concern of Noor et al. (2020) about the institutional bottlenecks. The positive implication of FINTEC_FINI comes from its ability to improve efficiency, access, and innovation, thus confirming Echu et al. (2024) on technology's transformative impact. In contrast, financial inclusion with financial infrastructure shows a negative effect, as the provision of access without the institutional strength can lead to inefficiencies, thus backing up the findings of Tidjani and Madouri (2024) and Samuel et al. (2024). The insignificant but positive impact of financial deepening is because of the liquidity and credit expansion it offers, thus corroborating Salami and Oluseyi (2013). Institutional quality (INSQL) shows a positive and significant but extremely small impact, a reflection of Nigeria's weak institutional framework under which the governance inefficiencies, corruption, and enforcement gaps collectively undermine the growth potentials that may accrue from institutions. This finding is partially consistent with the findings of Noor et al. (2020), who maintained that institutional and human capital indicators signify an inability to create growth when structural bottlenecks are present.

CONCLUSION

The study adopted a VECM approach to examine the relationship which exists between financial development and sustainable economic growth in Nigeria. The findings showed that financial development has a positive and statistically significant impact. This implies that an improvement in credit allocation, savings mobilization, and financial intermediation efficiency enhances wealth creation. As the financial system becomes more developed, additional savings are mobilized within the system and converted into long-term capital for enterprises, households, and government projects, opening up additional investment opportunities and fostering the development of enterprises. However, the financial infrastructure in isolation displays a negative effect, indicating that increased access points and channels to the physical infrastructure of finance may actually produce diminished and even contrary results. This also implies that the financial infrastructure in Nigeria is still plagued by operational inefficiencies and uneven geographical distribution. Importantly, the interaction between financial development and financial infrastructure produces a strong and positive impact on growth, demonstrating that infrastructure becomes growth-enhancing only when complemented by deep and efficient financial intermediation. These indicate that the problem in Nigeria is not about extending access to finance, but rather how to enhance the quality and productivity of finance. This is due to the fact that sustainable growth is driven by how finance is used rather than its availability.

In view of these conclusions, the followings are recommended and should be implemented by the Central Bank of Nigeria;

(i) Rather than indiscriminately increasing bank branches or access points, policymakers should prioritize performance-based financial infrastructure by linking licensing of financial service providers to measurable lending targets for productive sectors such as manufacturing, agriculture, and technology. This ensures that infrastructure is really supportive of the real sector growth rather than merely transactional activities.

(ii) There should be the introduction of a credit-channeling framework where a set portion of bank and fintech lending is channeled to small and medium enterprises with risk-sharing with development finance institutions to transform financial depth into real investment.

(iii) The digital financial infrastructure should be integrated with national identification, tax, and payment databases to create interoperable platforms that reduce information asymmetry and improve credit assessment. Such integration would lower default risk, reduce lending costs, and enhance financial intermediation efficiency.

References

Abamara, K. C., Umeghalu, C. C., Okeke, Q. C., & Nkamnebe, O. E. (2025) The Effect of Financial Innovations on Deposit Financial Inclusion in Nigeria. European Archive for Economics and Development Research, 1(4), 32-43.

Adebayo, T. A. (2025). The relationship between financial development and economic growth in Nigeria. *Review of Business and Economics Studies, 13*(1), 24–42. https://doi.org/10.26794/2308-944X-2025-13-1-24-42

Ademokoya, A. A. (2020). Nexus between financial sector and sustainable development in Nigeria: A Principal Component Analysis. *ACTA Universitatis Danubius, 16*(4), 234–250.

Alabi, W. A., & Olaoye, F. O. (2022). The effect of technology adoption on financial inclusion: A cross-country panel analysis between China and Nigeria. *European Journal of Business and Management Research, 7*(2), 1-11. https://doi.org/10/\.24018/ejbmr.2022.7.2.1314

Babajide, A. A., Adegboye, F. B., & Omankhanlen, A. E. (2015). *Financial Inclusion and Economic Growth in Nigeria. International Journal of Economics and Financial Issues, 5*(3), 629–637. https://www.econjournals.com/index.php/ijefi/article/view/1154

Central Bank of Nigeria (2022). Financial inclusion. https://www.cbn.gov.ng/fininc/

Central Bank of Nigeria. (2022). *Payments System Vision 2025*. https://www.cbn.gov.ng/PaymentsSystem/PSV2025.html

Cevik, S. (2024). Is Schumpeter Right? Fintech and Economic Growth. *IMF Working Paper*, WP/24/20.

Echu, E. S., Ogundare, N. J., Abba, M. T., Misau, A. M., & Liman, J. A. (2024). Unlocking the potential of digital finance for sustainable development in Nigeria's economy. *International Journal of Research and Innovation in Social Science, 8*(6), 2509–2524. Retrieved from

https://dx.doi.org/10.47772/IJRISS.2024.806191

Enhancing Financial Innovation & Access (2020). FinTech Landscape and Impact Assessment Study 2020. Retrieved September 1, 2021. https://efina.org.ng/our-work/research/access/pdf

Enhancing Financial Innovation & Access. (2023). *Access to financial services in Nigeria survey 2023*. EFInA. https://www.a2f.ng/efina-report-nigerias-formal-financial-inclusion-grows-to-64-in-2023/

Hamilton, K., & Hartwick, J. M. (2014). Wealth and sustainability. *Oxford Review of Economic Policy, 30*(1), 170–187. https://doi.org/10.1093/oxrep/gru005

Inuwa, A.S., Shuaib, K.M., Gambo, B.B., Shehu, U.R., &Shehu, U.Y. (2022). Effect of financial technology (FinTech) on Nigeria's development amid Covid-19 recovery. *Baze University Journal of Entrepreneurship and Interdisciplinary Studies, 1*(2), 74-85.

Kalu, E. U., Okoyeuzu, C. R., Okechukwu, E. U., & Ukpere, W. I. (2019). Financial deepening and sustained economic growth in Nigeria: What nonlinear models reveal. *Journal of Reviews on Global Economics, 8,* 1320–1328. https://lifescienceglobal.com/pms/index.php/jrge/article/view/6323/3488

Kamalu, G. U., Nwanna, I. O., & Ogbuabor, J. E. (2019). Financial development, financial inclusion, trade openness, FDI and economic growth in Nigeria: A Toda-Yamamoto approach. *International Journal of Economics and Financial Issues, 9*(5), 209–219. https://doi.org/10.32479/ijefi.8411

Levine, R. (1997). Financial development and economic growth: Views and agenda. *Journal of Economic Literature, 35*(2), 688–726. https://www.jstor.org/stable/2729790

Lucas, R. E. (1988). On the mechanics of economic development. *Journal of Monetary Economics, 22*(1), 3–42. https://doi.org/10.1016/0304-3932(88)90168-7

Madu, M. M., Akpansung, A. O., & Hayatudeen, S. Z. (2024). Impact of financial development on economic growth in Nigeria. *ADSU International Journal of Applied Economics, Finance & Management, 9*(S1), 48–67. https://ajaefm.adsu.edu.ng/wp-content/uploads/2024/11/SI1-006-2024-Impact-of-Financial-Development-on-Economic-Growth-in-Nigeria-1.pdf

Mogbo, C. P. (2025). Evaluation of long-run relationship between financial development and economic performance in Nigeria. *Texila International Journal of Management, 11*(1). https://www.texilajournal.com/thumbs/article/12_TJ3036.pdf

Noor, M., Fourqoniah, F., & Aransyah, M. F. (2020). The Investigation of financial inclusions, financial literation, and financial technology in Indonesia. *JurnalPerspektifPembiayaan Dan Pembangunan Daerah, 8*(3), 257 - 268. https://doi.org/10.22437/ppd.v8i3.9942

Nwogwugwu, U. C. C & Umeghalu, C. C. (2021). International Trade and Economic Misery in African Countries with Low Human Development. Economics and Social Sciences Academic Journal, 3(9), 1-29. https://cirdjournal.com/index.php/essaj/article/view/75

Organisation for Economic Co-operation and Development. (2024). *Development Co-operation Report 2024: Tackling poverty and inequalities through the green transition*. OECD Publishing. https://doi.org/10.1787/357b63f7-en

Romer, P. M. (1990). Endogenous technological change. *Journal of Political Economy, 98*(5, Part 2), S71–S102. https://doi.org/10.1086/261725

Salami, G. O., & Oluseyi, O. A. (2013). Impact of financial sector development on the Nigerian economic growth. *American Journal of Business and Management, 2*(4), 347–356. https://doi.org/10.11634/216796061706361

Samuel, U. E., Onwumere, J. U. J., Prince, A. I., Edet, I. V., Ogbodo, I., & Jack, A. E. (2024). Effect of financial technology on economic growth in Nigeria (1999Q1–2020Q4). *Journal of Xi'an Shiyou University, Natural Science Edition, 18*(3), 390–401.

Saramu, Y., Bello, M., & Ibrahim, T. (2024). Financial inclusion and economic growth in Nigeria: An ex-post facto analysis. *African Journal of Economic Policy, 31*(1), 15–28.

Schumpeter, J. A. (1911). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Harvard University Press. (English translation published 1934)

Sennuga, M. A., Adenaike, A. S., Adedayo, T. G., & Sennuga, S. O. (2021). Financial development and economic growth in Nigeria. *International Journal of Business Management, 4*(4), 21–39. https://www.researchgate.net/publication/351263572_Financial_Development_and_Economic_Growth_in_Nigeria_The_Case_Study_of_Nigeria

Tidjani, C., & Madouri, A. (2024). Fintech, financial inclusion, and sustainable development in the African region. *Frontiers in Applied Mathematics and Statistics, 10*, 1-25. https://doi.org/10.3389/fams.2024.1276218

Ukoh, J. E., & Ibe, P. C. (2024). Effect of financial deepening on Nigerian economic growth from 1999–2022. *International Journal of Economics, Finance and Management*, 9(6), 22–34. https://doi.org/10.56201/ijefm.v9.no6.2024.pg22.34

Umeghalu, C. C., Agupusi, E. I., & Uzodigwe, A. A. (2019). Government Investment, Foreign Direct Investment and Standard of Living in Nigeria. International Journal of Economics, Commerce and Management 7 (1), 191-215.

Umeghalu, C. C., Imoagwu, C. P., Okafor, V. C. & Ezeoke, J. S. (2022). Banking Reforms and Price of Loanable Funds in Nigeria. Contemporary Journal of Banking and Finance, 1(2), 1-19. http://www.cirdjournal.com/index.php/cjbf/article/download/94/92

Umeghalu, C. C., Machi, I. O., & Onwuka, I. N. (2025). Human Capital Development and Economic Growth in Nigeria. Tropical Africa Spectrum, 1(4), 1-21.

Uruakpa, P. C., Ogochukwu, A. E., & Nwankwo, C. I. (2019). Impact of financial inclusion on economic growth of Nigeria (2003–2015). *Journal of Economics and Finance Studies, 7*(1), 45–57.

van Niekerk, A. J. (2020). Inclusive economic sustainability: SDGs and global inequality. *Sustainability, 12*(13), 5427. https://doi.org/10.3390/su12135427

World Bank (2023). Financial inclusion at a glance. https://www.worldbank.org/en/topic/financialinclusion

World Bank. (2024). *World Development Indicators*. https://databank.worldbank.org/source/world-development-indicators

World Economic Forum. (2023). *How Are Emerging Technologies Transforming Financial Services?* https://www.weforum.org.