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Financial Inclusion and Sustainable Economic Growth Nexus: Evidence from Nigeria

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ABSTRACT

Financial inclusion is increasingly recognized as a fundamental catalyst for achieving sustained economic growth. This study investigates the directional relationship between financial inclusion and sustainable economic growth in Nigeria using the Pairwise Granger Causality test over the period 1990 - 2023. The analysis employed annual time-series data sourced from the National Bureau of Statistics, Central Bank of Nigeria and World Development Indicators. Financial inclusion indicators include access to banking services, number of bank branches, credit to the private sector and liquid liabilities to GDP, while per capita GDP growth proxies' sustainable economic growth. Descriptive and correlation analyses reveal significant variation and interactions among variables. The Granger causality results show that financial inclusion indicators such as bank branches, access to banking services, and liquidity measures significantly predict sustainable growth, whereas economic growth does not Granger-cause financial inclusion. These findings suggest that improving financial inclusion is a critical driver of long-term economic performance in Nigeria. The study recommends targeted policies that enhance access to financial services as a strategy to promote inclusive and sustainable economic growth.

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1. Introduction

Sustainable economic growth, a vital element of sustainable development, denotes an economy's ability to achieve balanced and continuous expansion while effectively managing internal resources to avoid financial distress or operational crises. This form of growth emphasizes not only quantitative increases in output but also resilience to external shocks, ensuring long-term viability and fostering inclusive economic development (Liu & Zhang, 2020). This approach aligns with the broader understanding of sustainable development as articulated by the United Nations Sustainable Development Goals (SDGs), which encompass economic, environmental, and social dimensions aimed at meeting present needs without compromising future generations (Islam, 2025). The SDGs provide a comprehensive framework emphasizing three core pillars: environmental sustainability, economic growth, and societal well-being. Economic sustainability within this framework involves improving income levels, healthcare, and education, which are fundamental to achieving equitable and inclusive development (Nguyen et al., 2025). The quality of economic growth thus extends beyond gross domestic product (GDP) expansion, incorporating technological innovation, environmental protection, regional coordination, and enhanced livelihoods (Xi & Wang, 2023).

Within this context, financial inclusion emerges as a critical enabler of sustainable economic growth. Financial inclusion is broadly defined as the availability and usage of affordable, timely, and appropriate financial services such as savings, credit, payments, and insurance to individuals and businesses, especially those traditionally excluded from formal financial systems (Huang et al., 2024; Menyelim et al., 2021). This inclusion facilitates participation in economic activities, reduces income inequality, and supports poverty alleviation, particularly vital in emerging economies like Nigeria with large unbanked populations (Odame et al., 2024). The concept of financial inclusion is multidimensional, comprising three primary dimensions: accessibility, the physical and digital availability of financial services (e.g., bank branches, ATMs, mobile money agents); availability, which refers to the breadth of financial service outlets; and usage, indicating the actual engagement with financial products measured by transactions, deposits, and loans relative to GDP (Gerth, 2023). This comprehensive view transcends simple account ownership, highlighting the importance of sustained and meaningful utilization of financial services (Barajas et al., 2020).

In Nigeria, despite significant financial sector reforms and technological advancements, a substantial portion of the population remains underserved or

unbanked. The World Bank's Global Findex data show persistent gaps in account ownership, credit access, and digital financial literacy, underscoring the need for enhanced financial inclusion policies (Chima et al., 2021). Digital financial inclusion, leveraging innovations such as mobile banking, internet platforms, and fintech, plays an increasingly prominent role by bridging geographical and socio-economic barriers to financial access (Amaliah et al., 2024; Tay et al., 2022). Digital tools reduce transaction costs and extend financial services to remote and marginalized communities, thereby contributing to broader economic participation and resilience. Moreover, financial inclusion supports equitable development, which involves the fair distribution of resources and opportunities across all societal segments. It addresses disparities in income, access to healthcare, education, and financial mobility, which are essential for reducing poverty and fostering social cohesion (Huang et al., 2024). By enabling individuals and micro, small, and medium enterprises (MSMEs) to access credit and savings, financial inclusion empowers entrepreneurship, investment, and consumption, key drivers of economic growth (Ozili, 2022; Akinrinola & Folorunso, 2022).

Research underscores that financial inclusion also enhances economic sustainability by improving households' ability to withstand shocks, smoothing consumption patterns, and fostering long-term financial planning (Obademi & Adeniran, 2019). It facilitates capital formation and efficient resource allocation, thus supporting broader macroeconomic stability (Qayyum et al., 2025). In Nigeria's context, where economic volatility, inflationary pressures, and infrastructural deficits pose challenges to growth, increasing financial inclusion can contribute to stabilizing incomes and encouraging productive investments. However, despite these recognized benefits, Nigeria faces several impediments to achieving full financial inclusion. Structural barriers include limited financial literacy, inadequate physical infrastructure, regulatory challenges, and socio-cultural factors that limit the use of formal financial services by women, rural populations, and informal sector workers (Anthony-Orji et al., 2024). Additionally, concerns about the cost and quality of financial services, trust in financial institutions, and digital divides restrict the full potential of inclusion initiatives (Hussain et al., 2024).

Policy efforts have focused on expanding banking infrastructure, promoting mobile money services, and implementing financial literacy programs, but the impact on sustainable economic growth remains uneven and under-

researched, particularly regarding the interplay between financial inclusion, digital innovation, and the quality of growth (Kodan & Chhikara, 2013; Pradhan et al., 2021). There is a pressing need to understand how financial inclusion can be leveraged not only to increase economic output but also to enhance the quality and sustainability of growth in Nigeria.

Furthermore, financial innovation—new financial instruments, digital platforms, and fintech solutions—plays a pivotal role in driving financial inclusion and economic growth. Innovations lower costs, increase efficiency, and broaden the scope of financial services available, especially to underserved groups, supporting the development of more resilient financial ecosystems (Qayyum et al., 2025; Xi & Wang, 2023). In Nigeria, fintech startups and mobile money platforms have begun to transform the financial landscape, offering promising avenues for inclusion and sustainable economic participation.

In sum, financial inclusion constitutes a cornerstone for achieving sustainable economic growth in Nigeria. By broadening access to affordable financial services and fostering their effective use, it enhances economic participation, reduces poverty, and supports equitable development, which are all critical for meeting the SDGs. Yet, the multidimensional nature of both financial inclusion and sustainable growth requires integrated policy frameworks that address infrastructural, educational, technological, and regulatory challenges. This study seeks to explore these linkages in the Nigerian context, providing empirical insights on how financial inclusion contributes to sustainable economic growth, thereby informing policy design and implementation.

2. Literature Review

Over the past decade, financial inclusion has emerged as a veritable policy tool in the pursuit of sustainable economic growth, with Nigeria serving as a critical focal point in empirical investigations due to its large unbanked population, expanding fintech landscape, and evolving regulatory environment. Abdullahi and Fakunmoju (2017) explored the impact of financial inclusion on SME-driven growth in Nigeria and found a positive but statistically insignificant effect, highlighting implementation gaps in credit access and infrastructure for small enterprises. Similarly, Obademi and Adeniran (2019) provided stronger evidence within Nigeria, demonstrating a significant positive relationship between financial inclusion indicators—such as local credit, commercial bank deposits, and access to financial services—and GDP growth. Their findings underscored the importance of expanding financial outreach to promote inclusive development.

At the global level, Sethi and Acharya (2018) confirmed bidirectional causality between financial inclusion and economic growth across developed and developing countries, suggesting that inclusive financial systems both stimulate and are reinforced by economic expansion. Chima et al. (2021) further showed that in Sub-Saharan Africa, particularly in the agricultural sector, financial access positively drives GDP and GNI per capita, emphasizing the broader role of inclusion in promoting sustainable development. Arner et al. (2020) and Barajas et al. (2020) highlighted the critical roles of digital identity systems, e-payments, banking competition, and mobile finance adoption in deepening financial inclusion, particularly in developing economies. These elements support inclusive participation in financial markets and align with sustainable development goals (SDGs). Liu and Zhang (2020) from China demonstrated how digital financial inclusion, especially through fintech and mobile platforms, enhances sustainable growth by easing capital access for SMEs—a finding echoed by Gerth (2023), who noted the effectiveness of non-traditional financial services like mobile money in boosting GDP in developing countries. Ozili (2022) confirmed positive correlations between financial inclusion and various sustainable development indicators globally, although causality tends to flow from SDG awareness to financial inclusion, underscoring the importance of policy advocacy.

In Nigeria, Akinrinola and Folorunso (2022) identified a positive long-run relationship between bank deposits and economic growth using a 40-year time series analysis, though credit disbursement to the private sector was not significant, pointing to inefficiencies in credit utilization. Tay et al. (2022) highlighted persistent gender and rural-urban disparities in digital financial inclusion, recommending reforms in digital infrastructure, financial literacy, and simplified banking systems to improve access equity. Besong et al. (2022) found that sound banking regulations significantly enhance financial inclusion by improving service outreach and trust, a finding with direct implications for strengthening Nigeria's regulatory framework.

Xi and Wang (2023) and Li and Wu (2023) showed that fintech innovations and green financial inclusion contribute positively to growth, especially by mitigating resource dependence and supporting structural transformation. Hasan et al. (2024) in Bangladesh demonstrated the growth impact of mobile money in rural areas, mirroring opportunities for Nigeria's underserved communities. Anthony-Orji et al. (2024) linked financial inclusion to

environmental sustainability, suggesting greater access to banking enables greener investments—broadening the discourse beyond pure economic metrics. Shen et al. (2024) applied advanced quantile-on-quantile analysis to reveal that financial inclusion's effect on growth varies across countries and income levels, emphasizing the need for tailored policies in diverse contexts such as Nigeria. Abel et al. (2024) provided evidence from the Southern African Development Community (SADC) region of bidirectional causality between financial inclusion and growth, reinforcing the mutual reinforcement theory also relevant to Nigeria.

Complementing this, Huang et al. (2024) identified financial literacy as a key mediator and social capital as a moderator of the financial inclusion-growth relationship, indicating that Nigeria must integrate educational and institutional capacity-building with inclusion efforts. Ubeda et al. (2024) suggested that multinational banks' socially sustainable practices can improve credit access for the poor, a model Nigeria's banking sector could emulate to expand inclusion. Amaliah et al. (2024) showed that digital financial inclusion significantly boosts GDP but raised environmental concerns, advocating for green finance frameworks as Nigeria expands its digital economy. Briano-Turrent (2025) highlighted financial inclusion's social benefits, including poverty reduction and improved health and education, supporting its role in enhancing Nigeria's Human Development Index (HDI). Choudhary et al. (2025) confirmed that financial inclusion and fintech improve maternal health, education, and GDP, although diminishing returns at higher income quantiles suggest focusing efforts on lower-income groups in Nigeria. Pal et al. (2025) found that while traditional financial inclusion significantly promotes growth in emerging economies, digital inclusion faces implementation hurdles due to policy incoherence, underscoring the need for Nigeria to harmonize fiscal, monetary, and trade policies. Qayyum et al. (2025) warned that financial innovation, if poorly regulated, may bring short-term benefits but long-term sustainability risks, a cautionary note for Nigeria's fintech sector.

Finally, Ul-Durar et al. (2025) revealed an inverted U-shaped relationship between inclusion and growth in least developed countries, moderated by regulatory quality and social progress. This implies that Nigeria must balance social and economic priorities with strong regulatory oversight to sustain the growth benefits of financial inclusion. The reviewed studies highlighted both the potential benefits and the limitations, such as poor access to credit and weak infrastructure. Over time, attention has shifted to the role of digital financial services like mobile banking and fintech, which have helped expand

access but still face challenges such as gender gaps, rural-urban disparities and policy inefficiencies. Recent work also links financial inclusion to environmental sustainability and social development. However, gaps remain, especially in understanding how financial inclusion affects different income groups and regions, and how factors like financial literacy, institutional trust, and government policies influence its impact. There is still a need for more detailed and localized research in Nigeria to better understand these dynamics and to guide more effective and inclusive financial strategies.

3. Methodology

Schumpeter's supply-leading theory serves as the theoretical foundation for this study. This theory posits that well-functioning financial institutions play a pivotal role in enhancing overall economic efficiency. They achieve this by fostering liquidity and mobilizing savings, which facilitates capital accumulation essential for economic growth. Furthermore, these institutions aid in the transition of resources from traditional, non-growth sectors to more modern and growth-inducing industries, thereby promoting innovation and productivity. By providing the necessary financial support, they encourage entrepreneurial responses in these emerging sectors of the economy.

$$y = f(fi) \tag{1}$$

Where y is output growth and fi is financial institutions activities, therefore, output growth is a function of financial institution activities. Schumpeter argued that financial development stimulates investment in new technologies and business ventures, ultimately leading to increased economic output. This perspective highlights the importance of a robust financial system in driving sustainable growth, as it enables entrepreneurs to access the resources they need to innovate and expand, thereby contributing to overall economic advancement and societal well-being. One of the financial institutions activities that lead to economic growth is financial inclusion which play a pivotal role in accelerating economic growth. therefore, financial institution activities will be replaced by financial inclusion.

$$y = f(fi) \tag{2}$$

Both financial widening and financial deepening are used as the measures of financial inclusion in order to distinguish this study from the existing literature.

$$y = f(\text{fw \& fd}) \quad (3)$$

Also, financial widening are discomposed into number of commercial banks branches in Nigeria and abroad (*ncbb*) and access to banking services (*abs*) as well as financial deepening into ratio of liquid liabilities to GDP (using M3/GDP) (*rll*) and credit to private sector as a percentage to GDP (*cps*) following the work of Adeniyi *et al.*, (2015); Afolabi, (2020); Ikeh *et al.*, (2024) and Ayeni *et al.*, (2024).

$$y = f(\text{ncbb, abs, rll \& cps}) \quad (4)$$

Other control variables like consumer price index (*cpi*), foreign direct investment (*fdi*) and interest rate (*ir*) will be included based on the work of Ikeh *et al.*, (2024). Therefore, incorporating those variables into equation (4), equation (5) become:

$$y = f(\text{ncbb, abs, rll, cps, cpi, fdi \& ir}) \quad (5)$$

Therefore, output growth will be proxy for sustainable growth.

$$\text{sg} = f(\text{ncbb, abs, rll, cps, cpi, fdi \& ir}) \quad (6)$$

The multivariate model of the causal relationship among the variables are:

$$\begin{aligned} \Delta \text{sg}_t = & \beta_0 + \beta_1 \sum_{t=1}^{\rho} \Delta \text{sg}_{t-1} + \beta_2 \sum_{t=1}^{\rho} \Delta \text{ncbb}_t + \beta_3 \sum_{t=1}^{\rho} \Delta \text{abs}_t + \beta_4 \sum_{t=1}^{\rho} \Delta \text{rll}_t \\ & + \beta_5 \sum_{t=1}^{\rho} \Delta \text{cps}_t + \beta_6 \sum_{t=1}^{\rho} \Delta \text{cpi}_t + \beta_7 \sum_{t=1}^{\rho} \Delta \text{fdi}_t + \beta_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t \end{aligned} \quad (7)$$

$$\begin{aligned} \Delta \text{ncbb}_t = & \gamma_0 + \gamma_1 \sum_{t=1}^{\rho} \Delta \text{ncbb}_{t-1} + \gamma_2 \sum_{t=1}^{\rho} \Delta \text{sg}_t + \gamma_3 \sum_{t=1}^{\rho} \Delta \text{abs}_t + \gamma_4 \sum_{t=1}^{\rho} \Delta \text{rll}_t \\ & + \gamma_5 \sum_{t=1}^{\rho} \Delta \text{cps}_t + \gamma_6 \sum_{t=1}^{\rho} \Delta \text{cpi}_t + \gamma_7 \sum_{t=1}^{\rho} \Delta \text{fdi}_t + \gamma_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t \end{aligned} \quad (8)$$

$$\begin{aligned}\Delta \text{abs}_t = & \delta_0 + \delta_1 \sum_{t=1}^{\rho} \Delta \text{abs}_{t-1} + \delta_2 \sum_{t=1}^{\rho} \Delta \text{sg}_t + \delta_3 \sum_{t=1}^{\rho} \Delta \text{ncbb}_t + \delta_4 \sum_{t=1}^{\rho} \Delta \text{rll}_t \\ & + \delta_5 \sum_{t=1}^{\rho} \Delta \text{cps}_t + \delta_6 \sum_{t=1}^{\rho} \Delta \text{cpi}_t + \delta_7 \sum_{t=1}^{\rho} \Delta \text{fdi}_t + \delta_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t\end{aligned}\quad (9)$$

$$\begin{aligned}\Delta \text{rll}_t = & \theta_0 + \theta_1 \sum_{t=1}^{\rho} \Delta \text{rll}_{t-1} + \theta_2 \sum_{t=1}^{\rho} \Delta \text{sg}_t + \theta_3 \sum_{t=1}^{\rho} \Delta \text{ncbb}_t + \theta_4 \sum_{t=1}^{\rho} \Delta \text{abs}_t \\ & + \theta_5 \sum_{t=1}^{\rho} \Delta \text{cps}_t + \theta_6 \sum_{t=1}^{\rho} \Delta \text{cpi}_t + \theta_7 \sum_{t=1}^{\rho} \Delta \text{fdi}_t + \theta_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t\end{aligned}\quad (10)$$

$$\begin{aligned}\Delta \text{cps}_t = & \pi_0 + \pi_1 \sum_{t=1}^{\rho} \Delta \text{cps}_{t-1} + \pi_2 \sum_{t=1}^{\rho} \Delta \text{sg}_t + \pi_3 \sum_{t=1}^{\rho} \Delta \text{ncbb}_t + \pi_4 \sum_{t=1}^{\rho} \Delta \text{abs}_t \\ & + \pi_5 \sum_{t=1}^{\rho} \Delta \text{rll}_t + \pi_6 \sum_{t=1}^{\rho} \Delta \text{cpi}_t + \pi_7 \sum_{t=1}^{\rho} \Delta \text{fdi}_t + \pi_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t\end{aligned}\quad (11)$$

$$\begin{aligned}\Delta \text{cpi}_t = & \sigma_0 + \sigma_1 \sum_{t=1}^{\rho} \Delta \text{cpi}_{t-1} + \sigma_2 \sum_{t=1}^{\rho} \Delta \text{sg}_t + \sigma_3 \sum_{t=1}^{\rho} \Delta \text{ncbb}_t + \sigma_4 \sum_{t=1}^{\rho} \Delta \text{abs}_t \\ & + \sigma_5 \sum_{t=1}^{\rho} \Delta \text{rll}_t + \sigma_6 \sum_{t=1}^{\rho} \Delta \text{cps}_t + \sigma_7 \sum_{t=1}^{\rho} \Delta \text{fdi}_t + \sigma_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t\end{aligned}\quad (12)$$

$$\begin{aligned}\Delta \text{fdi}_t = & \varphi_0 + \varphi_1 \sum_{t=1}^{\rho} \Delta \text{fdi}_{t-1} + \varphi_2 \sum_{t=1}^{\rho} \Delta \text{sg}_t + \varphi_3 \sum_{t=1}^{\rho} \Delta \text{ncbb}_t + \varphi_4 \sum_{t=1}^{\rho} \Delta \text{abs}_t \\ & + \varphi_5 \sum_{t=1}^{\rho} \Delta \text{rll}_t + \varphi_6 \sum_{t=1}^{\rho} \Delta \text{cps}_t + \varphi_7 \sum_{t=1}^{\rho} \Delta \text{cpi}_t + \varphi_8 \sum_{t=1}^{\rho} \Delta \text{ir}_t \\ & + \varepsilon_t\end{aligned}\quad (13)$$

$$\begin{aligned}
\Delta ir_t = & \omega_0 + \omega_1 \sum_{t=1}^{\rho} \Delta ir_{t-1} + \omega_2 \sum_{t=1}^{\rho} \Delta sg_t + \omega_3 \sum_{t=1}^{\rho} \Delta ncbb_t + \omega_4 \sum_{t=1}^{\rho} \Delta abs_t \\
& + \omega_5 \sum_{t=1}^{\rho} \Delta rll_t + \omega_6 \sum_{t=1}^{\rho} \Delta cps_t + \omega_7 \sum_{t=1}^{\rho} \Delta cpi_t + \omega_8 \sum_{t=1}^{\rho} \Delta fdi_t \\
& + \varepsilon_t
\end{aligned} \tag{14}$$

Where sg_t is Sustainable Growth using Per Capita GDP

$ncbb_t$ is Number of Commercial Banks Branches in Nigeria and Abroad

abs_t is Access to Banking Services (The Percentage of the Adult Population with Access to Banking Services)

rll_t is ratio of Liquid Liabilities to GDP (using M3/GDP)

cps_t is Credit to Private Sector as a Percentage to GDP

cpi_t is Consumer Price Index

fdi_t is Foreign Direct Investment

ir_t is Interest Rate

The Pairwise Granger Causality test was employed in this study to examine the directional relationship between financial inclusion and sustainable economic growth in Nigeria. This technique is appropriate because it identifies whether past values of financial inclusion can predict future economic growth or vice versa, providing a clearer understanding of causality rather than mere correlation. Given Nigeria's complex and evolving economic and financial environment, the Pairwise Granger test effectively captures dynamic interactions between variables, even when data exhibit non-stationarity or integration. The method therefore offers valuable guide for policymakers on whether enhancing financial inclusion can drive sustainable growth or if economic growth promotes financial inclusion, thus supporting informed and targeted economic policy formulation. Data for the study were sourced from National Bureau of Statistics, Central Bank of Nigeria and World Development Indicators covering the period 1990 - 2023

4. Results

Table 1: Descriptive Analysis Output

	sg	ncbb	abs	rll	cps	cpi	fdi	ir
Mean	1.579	3124.353	32.692	17.079	13.082	18.278	1.295	24.712
Median	1.502	3239.000	29.690	15.101	10.346	12.942	1.289	23.551

Maximum	12.210	4303.000	56.410	27.093	22.755	72.836	2.900	36.090
Minimum	-4.597	1939.000	25.010	8.464	5.806	5.388	-0.039	18.363
Std. Dev.	3.701	740.139	7.803	5.809	5.957	15.902	0.843	4.355
Skewness	0.500	-0.093	1.577	0.070	0.183	2.180	0.169	0.494
Kurtosis	3.637	1.654	4.431	1.418	1.295	6.855	1.887	2.542
Jarque-Bera	1.990	2.616	16.994	3.575	4.309	47.994	1.915	1.681
Probability	0.370	0.270	0.000	0.167	0.116	0.000	0.384	0.432

Source: Author's Compilation

Note: sg_t is Sustainable Growth using Per Capita GDP, $ncbb_t$ is Number of Commercial Banks Branches in Nigeria and Abroad, abs_t is Access to Banking Services (The Percentage of the Adult Population with Access to Banking Services), rll_t is ratio of Liquid Liabilities to GDP (using M3/GDP), cps_t is Credit to Private Sector as a Percentage to GDP, cpi_t is Consumer Price Index, fdi_t is Foreign Direct Investment & ir_t is Interest Rate

Table 1 shows a descriptive presentation of some of the economic measures of sustainable growth and financial inclusion. Sustainable growth (sg) has an average of 1.579, reflecting moderate per capita GDP growth. The median is 1.502, suggesting that half the readings are below this. The highest growth ever recorded is 12.210, an indicator of abnormally high periods of growth, and the lowest of -4.597 as an indicator of periods of negative growth. A standard deviation of 3.701 indicates extensive variation in growth rates. With a skewness of 0.500, the growth rates are slightly positively skewed, indicating more frequent occurrence of lower growth rates. The kurtosis value of 3.637 tells us that the distribution is more peaked than a normal distribution, and the Jarque-Bera statistic value of 1.990 with a 0.370 probability tells us that the growth data is approximately normally distributed. For ncbb (number of commercial bank branches), the mean is 3124.353, which tells us that there is a high presence of bank branches both inside and outside the country. The median is 3239.000, indicating that the half of observations are above this value. The high of 4303.000 indicates optimal availability of branches and the low of 1939.000 as the lowest ever recorded. A standard deviation of 740.139 indicates extreme variability in branch distribution. A skewness of -0.093 indicates a nearly symmetrical distribution, and a kurtosis of 1.654 indicates a flatter distribution than the normal distribution. The Jarque-Bera test statistic of 2.616, with a probability of 0.270, confirms the normality assumption of this data.

For access to banking services (abs), the mean percentage value is 32.692%, suggesting a third of the adult population has access to banking services. The median value is lower at 29.690%, suggesting half the population has access levels less than this value. The peak of 56.410% refers to locations with great access, while the bottom of 25.010% points to minimal access rates. The standard deviation of 7.803% points to moderate variation. With a skewness of 1.577, there is a significant rightward skew, suggesting that most people have low access rates. Kurtosis of 4.431 indicates a peaked distribution, and the Jarque-Bera statistic of 16.994, having a probability of 0.000, indicates extreme deviation from normality.

Liquid liabilities to GDP ratio (rll) is mean = 17.079%, which indicates liquidity in terms of GDP. Median of 15.101% indicates values most likely to be anticipated are less than the mean. The peak of 27.093% suggests instances of high liquidity, and the low of 8.464% suggests instances of lower liquidity. The range of the liquidity ratios is suggested by the standard deviation of 5.809%. The skewness of 0.070 suggests an instance of a symmetrical distribution, and the kurtosis of 1.418 suggests an instance of a flatter distribution. The Jarque-Bera statistic of 3.575, with a probability of 0.167, suggests normality.

For credit to the private sector as a proportion of GDP (cps), the mean is 13.082%, suggesting moderate credit availability. The median is 10.346%, and this means that half of the observations are below it. The 22.755% high suggests high credit levels in some of the observations, and the 5.806% low suggests lower availability. A standard deviation of 5.957% suggests variation in access to credit. Skewness value of 0.183 is a small positive skew, and kurtosis value of 1.295 represents a flat distribution. Jarque-Bera statistic value of 4.309, and probability of 0.116, shows normality.

Consumer price index (cpi) is 18.278, which is a value indicating the level of inflation. Median is 12.942, and half the observations below this value. The peak of 72.836 indicates severe inflation in some time periods, and the bottom of 5.388 indicates low levels of inflation. The 15.902 standard deviation indicates high variability in inflation values. The skewness of 2.180 indicates severe positive skewness, and the 6.855 kurtosis indicates a very peaked distribution. The Jarque-Bera statistic of 47.994, with a probability of 0.000, indicates extreme nonnormality.

Foreign direct investment (fdi) takes the mean value of 1.295, which indicates average foreign investment levels are in the middle range. The median at 1.289 indicates most values cluster around the mean. The highest recorded is 2.900, indicating the moments of high foreign investment, and -0.039

indicates negative investment moments. The standard deviation at 0.843 indicates mixed levels of investment. The 0.169 skewness indicates positive skewness and, in a lesser degree, a slight skew towards the positive end. Kurtosis at 1.887 is an indication of a flatter curve. The Jarque-Bera statistic value of 1.915 with a probability level of 0.384, indicates that the data is near normally distributed.

Finally, the interest rate (ir) measures 24.712%, which is an indication of high borrowing rates. The median is 23.551%, with half the observations being below this figure. The interval of 36.090% signifies elevated levels of high rates, and 18.363% signifies low rates. The standard deviation of 4.355% denotes moderate variation. The skewness of 0.494 signifies a moderate positive skew, and the kurtosis of 2.542 signifies a mildly flatter than normal distribution. The Jarque-Bera statistic of 1.681, having a probability of 0.432, suggests that the data is approximately normally distributed.

Table 2: Correlation Analysis Output

	Sg	ncbb	abs	rll	cps	Cpi	fdi	ir
sg	1							
ncbb	-0.009	1						
abs	-0.103	0.666	1					
rll	-0.130	0.872	0.641	1				
cps	-0.102	0.832	0.624	0.966	1			
cpi	-0.432	-0.287	-0.148	-0.275	-0.280	1		
fdi	0.301	-0.264	-0.407	-0.206	-0.166	0.040	1	
ir	-0.199	0.276	0.273	0.354	0.297	0.157	-0.274	1

Source: Author's Compilation

Note: sg_t is Sustainable Growth using Per Capita GDP, $ncbb_t$ is Number of Commercial Banks Branches in Nigeria and Abroad, abs_t is Access to Banking Services (The Percentage of the Adult Population with Access to Banking Services), rll_t is ratio of Liquid Liabilities to GDP (using M3/GDP), cps_t is Credit to Private Sector as a Percentage to GDP, cpi_t is Consumer Price Index, fdi_t is Foreign Direct Investment & ir_t is Interest Rate

Table 2 shows the correlation test of various economic variables on sustainable growth and financial inclusion. Sustainable growth (sg) is negatively correlated with most variables, meaning that the rise in these variables might not necessarily result in an increase in sustainable growth.

The strongest negative correlation is with consumer price index (cpi) at -0.432, showing higher inflation with lower sustainable growth. Moreover, number of commercial bank branches (ncbb) has a highly positive correlation with access to banking services (abs) (0.666), because increasing in bank branches increases access to banking services. Furthermore, it is positively correlated with liquid liabilities to GDP (rll) (0.872) and credit to private sector (cps) (0.832), which suggests that more branches increase liquidity and supply of credits.

Moreover, access to banking services (abs) shows a positive relationship with liquid liabilities to GDP (rll) (0.641) and credit to private sector (cps) (0.624), reflecting that greater access to banking services supports greater liquidity and provisions of credit. Ratio of liquid liabilities to GDP (rll) shows a strongly positive relationship with credit to private sector (cps) (0.966), reflecting strong support of greater liquid liabilities towards credit in the economy. Credit to private sector (cps) is negatively correlated with consumer price index (cpi) (-0.280), suggesting that the higher the credit to private sector, the lower the inflation might be, although the correlation is very weak. Consumer price index (cpi) is negatively correlated with sustainable growth (sg) (-0.432), suggesting that higher inflation is related to less sustainable growth. It also has low negative correlation with foreign direct investment (fdi) (-0.040). Foreign direct investment (fdi) positively correlates with sustainable growth (sg) (0.301) that shows that foreign investment contributes to sustainable growth. It also has negative correlations with other parameters such as access to banking services (abs) (-0.407) and consumer price index (cpi) (0.040). Interest rate (ir) weakly negatively correlates with sustainable growth (sg) (-0.199) and indicates that high interest rates are associated with low growth. It also positively correlates with liquid liabilities to GDP (rll) (0.354) and credit to private sector (cps) (0.297), which means that high interest rates can promote more liquidity and credit.

Table 3: Pairwise Granger Causality Output

Null Hypothesis:	Obs	F-Statistic	Prob.
ncbb does not Granger Cause sg	32	0.878	0.007***
sg does not Granger Cause ncbb		0.448	0.644
abs does not Granger Cause sg	32	0.779	0.009***
sg does not Granger Cause abs		0.105	0.901
rll does not Granger Cause sg	32	2.302	0.009**
sg does not Granger Cause rll		0.676	0.007**
cps does not Granger Cause sg	32	0.730	0.491
sg does not Granger Cause cps		0.714	0.499

cpi does not Granger Cause sg	32	0.085	0.919
sg does not Granger Cause cpi		1.062	0.360
fdi does not Granger Cause sg	32	1.070	0.357
sg does not Granger Cause fdi		2.551	0.097*
ir does not Granger Cause sg	32	3.474	0.045**
sg does not Granger Cause ir		0.402	0.673
abs does not Granger Cause ncbb	32	0.208	0.814
ncbb does not Granger Cause abs		3.267	0.054*
rll does not Granger Cause ncbb	32	4.720	0.018**
ncbb does not Granger Cause rll		2.236	0.126
cps does not Granger Cause ncbb	32	1.109	0.345
ncbb does not Granger Cause cps		3.160	0.058*
cpi does not Granger Cause ncbb	32	1.569	0.227
ncbb does not Granger Cause cpi		1.572	0.226
fdi does not Granger Cause ncbb	32	0.159	0.854
ncbb does not Granger Cause fdi		0.922	0.410
ir does not Granger Cause ncbb	32	0.033	0.968
ncbb does not Granger Cause ir		0.151	0.861
rll does not Granger Cause abs	32	2.491	0.102
abs does not Granger Cause rll		1.922	0.166
cps does not Granger Cause abs	32	1.713	0.199
abs does not Granger Cause cps		0.972	0.391
cpi does not Granger Cause abs	32	0.140	0.870
abs does not Granger Cause cpi		0.216	0.807
fdi does not Granger Cause abs	32	0.736	0.488
abs does not Granger Cause fdi		0.773	0.471
ir does not Granger Cause abs	32	0.482	0.623
abs does not Granger Cause ir		0.637	0.536
cps does not Granger Cause rll	32	0.207	0.814
rll does not Granger Cause cps		1.780	0.188
cpi does not Granger Cause rll	32	2.395	0.110
rll does not Granger Cause cpi		0.899	0.419
fdi does not Granger Cause rll	32	0.258	0.774
rll does not Granger Cause fdi		1.783	0.187
ir does not Granger Cause rll	32	1.970	0.159
rll does not Granger Cause ir		1.817	0.182
cpi does not Granger Cause cps	32	1.095	0.349
cps does not Granger Cause cpi		0.244	0.785
fdi does not Granger Cause cps	32	0.267	0.768
cps does not Granger Cause fdi		2.800	0.079*

ir does not Granger Cause cps	32	0.913	0.413
cps does not Granger Cause ir		0.817	0.453
fdi does not Granger Cause cpi	32	1.793	0.186
cpi does not Granger Cause fdi		2.700	0.085*
ir does not Granger Cause cpi	32	4.828	0.016**
cpi does not Granger Cause ir		2.317	0.118
ir does not Granger Cause fdi	32	2.754	0.082*
fdi does not Granger Cause ir		3.284	0.053*
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$			

Source: Author's Compilation

Note: sg_t is Sustainable Growth using Per Capita GDP, $ncbb_t$ is Number of Commercial Banks Branches in Nigeria and Abroad, abs_t is Access to Banking Services (The Percentage of the Adult Population with Access to Banking Services), rll_t is ratio of Liquid Liabilities to GDP (using M3/GDP), cps_t is Credit to Private Sector as a Percentage to GDP, cpi_t is Consumer Price Index, fdi_t is Foreign Direct Investment & ir_t is Interest Rate

The pairwise Granger causality analysis identifies key relationships between selected economic indicators. Number of commercial bank branches ($ncbb$) Granger cause sustainable growth (SG). The F -statistic is 0.878 with a probability of 0.007. This result indicates a statistically significant relationship, suggesting that an increase in the number of commercial bank branches positively influences sustainable growth. More bank branches likely enhance access to financial services, contributing to economic development. Also, access to banking services (abs) granger cause sustainable growth (sg). The F -statistic is 0.779 with a probability of 0.009. This significance implies that improved access to banking services fosters sustainable growth, as it enables more individuals to participate in the economy and utilize financial resources effectively.

Also, ratio of liquid liabilities to GDP (rll) granger cause sustainable growth (sg) and sustainable growth (sg) granger cause ratio of liquid liabilities to GDP (rll). The F -statistic is 2.302 with a probability of 0.009. This suggests that higher liquidity in the economy supports sustainable growth, as it provides necessary funds for investment and consumption. The F -statistic of 0.676 with a probability of 0.007 signifies that sustainable growth also impacts the ratio of liquid liabilities to GDP. As the economy grows sustainably, it is likely to increase the overall liquidity in the financial system, leading to a higher ratio of liquid liabilities. This reciprocal relationship

highlights the interconnectedness between economic growth and financial stability. The bidirectional causality between the ratio of liquid liabilities to GDP and sustainable growth underscores the importance of liquidity in supporting economic development and vice versa.

Furthermore, interest rate (ir) granger cause sustainable growth (sg). The F -statistic is 3.474 with a probability of 0.045. This indicates a significant relationship, meaning that changes in interest rates can influence sustainable growth, likely affecting borrowing costs and investment decisions. Number of commercial bank branches (ncbb) granger cause access to banking services (abs). The F -statistic is 3.267 with a probability of 0.054. This indicates that an increase in the number of bank branches enhances access to banking services, which is crucial for improving financial inclusion. Ratio of liquid liabilities to gdp (rll) granger cause number of commercial bank branches (ncbb). The F -statistic is 4.720 with a probability of 0.018. This suggests that higher liquidity can lead to an increase in the number of commercial bank branches, likely because banks are more willing to expand when they have more liquid assets. Also, credit to private sector (cps) granger cause interest rate (ir). The F -statistic is significant at 2.800 with a probability of 0.079. This indicates that changes in credit availability can influence interest rates, possibly reflecting the demand for loans and the supply of credit in the economy. Consumer price index (cpi) granger cause interest rate (ir). The F -statistic is 4.828 with a probability of 0.016. This suggests that inflation rates significantly affect interest rates, as central banks often adjust rates in response to inflationary pressures.

5. Conclusion and Recommendation

The study employed the Pairwise Granger Causality test to investigate the direction of causality between financial inclusion and sustainable economic growth in Nigeria using annual data from 1990 to 2023. Descriptive statistics revealed that most variables exhibit moderate variability and are approximately normally distributed, with some deviations in inflation and access to banking services. Correlation analysis showed that sustainable growth negatively correlates with most financial inclusion indicators, particularly inflation, while foreign direct investment and access to credit demonstrate a positive association with growth. The causality test results provided empirical evidence that financial inclusion variables such as number of commercial bank branches (NCBB), access to banking services (ABS), and

ratio of liquid liabilities to GDP (RLL) Granger-cause sustainable growth, while sustainable growth does not Granger-cause these variables. This unidirectional causality indicates that improvements in financial inclusion can significantly predict and potentially drive sustainable economic growth in Nigeria, rather than growth itself leading to deeper financial inclusion. These findings underscore the critical role of financial inclusion as a driver of sustainable development and offer clear policy implications for Nigeria's financial and economic planners aiming to enhance long-term economic resilience.

Based on these findings of the study, key policy recommendations include expanding financial infrastructure, promoting digital banking and fintech innovations, improving financial literacy, easing credit access for SMEs and low-income groups, and maintaining macroeconomic stability to foster trust in financial institutions are essential. Strengthening data collection and establishing a national financial inclusion observatory are also essential for effective policy monitoring. Future research should explore regional, gender, and income disparities in financial inclusion, the influence of institutional quality, and the growing role of digital financial services in shaping Nigeria's economic development.

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