© DEC 2025 | IRE Journals | Volume 9 Issue 6 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I6-1712613

Bridging the Divide: How Big Data is Redefining Financial Inclusion for Nigerians

OBOMEGHIE ADAMU MUHAMMED
Department of Statistics, Auchi Polytechnic, Auchi, Edo state, Nigeria

Abstract- ***The rapid proliferation of digital technologies and data generation has positioned big data as a transformative force in the Wotrld financial sector. Through leveraging alternative data sources such as mobile usage, social media activity, and transaction records, financial institutions are expanding services to previously unbanked and under-banked populations, thereby promoting financial inclusion. This paper explores how big data usage is redefining financial services by enhancing accessibility, personalization, and security for Nigerian financial consumers. Data for the analysis were collected from both the World development indicator data base as well as the Nigeria CBN statistical bulletin. The data are from 2005 to 2023. The ARDL long-run and bound test is used in the analysis of the data collected. Findings indicates that Big Data has a positive impact on financial inclusion in Nigeria within the period under study while both quality of legislation and GDP exerted negative impact on financial inclusion in Nigeria. It is recommended among others, that policy makers in Nigeria should integrate Big Data analytics directly into the national statistical inclusion strategy and elevate the statistical office by acknowledging its role as a partner in financial inclusion. The study also recommends that Nigeria policy makers should apply the principle of regulatory proportionality and context specific legal review. Finally, it also recommended that Nigeria policy managers should adopt the strategy of inclusive growth Re-anchoring (IGR) focused on redirecting the benefits of GDP growth to the financially underserved.***

Keywords; Big Data, Financial inclusion, Digital divide, Unbanked sector, regulatory quality, FinTech.

I. INTRODUCTION

The proliferation of mobile money services and FinTech startups has significantly contributed to expanding financial access, especially in rural and underserved communities. The Central Bank of Nigeria (CBN) has also relaxed regulations to foster innovation and inclusion. For many developing countries, improving financial inclusion is a critical pillar of its developmental agenda. A high exclusion rate restricts economic growth, perpetuates poverty, and prevents segments of the population from accessing essential services like credit, savings, and insurance. The Nigerian government, primarily through the Central Bank of Nigeria (CBN), has set aggressive targets to reduce the financial exclusion rate. The Nigerian government and financial institutions have launched various initiatives to improve financial inclusion such as, the National Financial Inclusion Strategy (NFIS), initially aimed to reduce the exclusion rate from 46.3% in 2010 to 20% by the end of 2020, with an ultimate goal of achieving 95% inclusion in the adult population. While significant progress has been made, the country continues to pursue this goal, adapting strategies to leverage the rapid rise of digital technologies. (World Bank, 2021).

Nigeria presents a compelling paradox in global financial development: it stands as Africa's undeniable leader in financial technology (FinTech) investment and innovation, yet it struggles with one of the continent's most significant financial exclusion gaps. While the nation's FinTech ecosystem attracted over $400 million in funding in 2024, representing nearly half of all deals across Africa, approximately 26% of its adult population. an estimated 28.8 million people remain financially excluded (EFINA, 2023). This dual reality persists because Nigeria FinTech revolution is fundamentally driven by commercial viability in high-density urban markets, thereby bypassing the distinct infrastructural and socioeconomic barriers that define rural financial exclusion.

Financial exclusion in developing countries is heavily concentrated along a stark urban-rural divide. Recent data illustrates that while only 17% of adults in urban centers are financially excluded, the rate soars to 37% in rural communities (EFINA, 2023). This 20-

percentage-point gap signifies a profound failure in outreach, which cannot be solved by digital applications alone. The barriers to formal access in rural areas are often non-financial, comprising three critical factors listed as:

Identity and documentation: Many rural residents lack the requisite National Identification Number (NIN) or Bank Verification Number (BVN) needed for seamless onboarding into formal Tier-1 accounts, creating a KYC hurdle (EnterpriseNGR, 2024).

Income irregularity: The primary barrier cited by the unbanked is little or irregular income, affecting almost half of the excluded population (EFINA, 2023). Without sufficient capital to save or invest, the value proposition of formal finance remains diminished.

Infrastructural poverty: Digital solutions require reliable connectivity and power. Rural areas suffer from poor network coverage and unreliable electricity, severely undermining the practicality and efficiency of mobile banking and digital wallets (CBN, 2024).

In stark contrast to the exclusion challenge, the Nigerian FinTech sector continues to exhibit extraordinary growth and market leadership. The industry is characterized by high investment, with major firms like Moniepoint securing large funding rounds to scale their digital payment and agent banking networks (Akin, 2025).This growth is focused on digital payments and merchant solutions, targeting areas where transaction density is highest: the urban and peri-urban commercial hubs. The FinTech model prioritizes two key metrics: velocity of transactions and large transaction volumes, both of which are primarily met by the millions of formal and informal businesses operating in cities. Consequently, the services offered such as; sophisticated API integrations, digital lending based on data-rich histories, and advanced payment gateways, are optimized for users who are already literate, connected, and have disposable income. (Obomeghie, 2025a).

The most effective tool for reducing rural inclusion in Nigeria has been the agent banking model (POS terminals). Data suggests that the use of POS terminals has a significant positive effect on financial inclusion and the growth of rural deposits (Akpotor & Amughoro, 2025). However, the human agents who operate these terminals are often reluctant to venture into the least profitable, most remote locations due to security risks and the high cost of transportation and infrastructure upkeep (EnterpriseNGR, 2024). This reluctance creates a "last-mile" gap that digital technology, in and of itself, cannot cross.

Problem Statement:

Despite Nigeria's significant economic growth and a burgeoning population of over 200 million people, a substantial portion remains financially excluded, particularly in rural and underserved urban areas. Traditional financial systems often fail to reach these populations due to high costs, lack of infrastructure, and limited credit information. This divide hampers economic development, poverty alleviation, and social inclusivity. (EFINA, 2023)

With the advent of big data technologies, there is a transformative opportunity to redefine financial services by enabling more accurate risk assessment, personalized offerings, and targeted outreach. However, challenges such as data privacy concerns, limited digital literacy, infrastructural deficits, and the need for robust data governance remain barriers to harnessing big data effectively.

This research aims to explore how big data can be leveraged to bridge the financial divide in Nigeria, identifying the opportunities, challenges, and strategies necessary to create a more inclusive financial ecosystem that empowers all Nigerians, regardless of their geographic or socio-economic status.

Research Questions

How does big data adoption impact on the expansion of financial services among unbanked and under-banked populations in Nigeria?

In what ways does economic growth impact on the affordability and accessibility of financial products for Nigerian consumers?

How do Nigerian financial institutions leverage on legislative quality to promote financial inclusion?

Significance of the study

Nigeria has a large unbanked and under-banked population, estimated at around 63% of adults as of

2021 (Central Bank of Nigeria, 2021). Leveraging big data offers a pathway to include these populations in the formal financial system, which leads to greater financial, economic and social development.

The rapid proliferation of mobile technology and telecom infrastructure creates vast data sources that, if harnessed effectively, can revolutionize financial services delivery.

Understanding this dynamic is crucial for policymakers, financial institutions, and technology firms aiming to foster inclusive economic growth, reduce poverty, and enhance financial stability.(Obomeghie, 2025b)

Research Gaps

Most developing countries are constantly confronted with a scarcity of comprehensive empirical studies evaluating the actual impact of big data initiatives on financial inclusion in Nigeria. Most existing literature remains conceptual or anecdotal.

Secondly, limited researches exist on how infrastructural, socio-economic, and digital literacy barriers affect the effectiveness of financial inclusion strategies.

As well, there is lack of analysis on the effectiveness of current policies and regulations governing big data use in Nigerian financial services, and how these can be improved.

Finally, there is the need for more research on how informal data sources (e.g., mobile money, social media) are harnessed to extend credit and financial services to unbanked populations.

II. LITERATURE REVIEW

Concepts of big data in relation to financial inclusion in Nigeria

Big Data refers to large, complex, and rapidly growing datasets that traditional data-processing software cannot handle efficiently. It encompasses the 3Vs: Volume, Velocity, and Variety (Laney, 2001). This includes mobile phone logs, transaction records, social media activity, and sensor data. Big Data analytics involves examining large datasets to uncover hidden patterns, correlations, and insights. Analytics tools process diverse data sources to assess creditworthiness, predict financial behavior, and tailor financial products to underserved populations (Manyika et al., 2011). Big Data allows for real-time processing of financial transactions, enabling immediate risk assessment, fraud detection, and personalized service delivery. This is vital in Nigeria's rapidly growing digital economy (Eze et al., 2020). Financial institutions leverage big data to make informed decisions, optimize outreach, and develop tailored financial products for Nigeria's diverse populations. This approach helps bridge the financial divide by addressing specific needs (Wezel, & Ree, 2023).

Handling large datasets raises concerns about privacy, security, and ethical use of data. Nigeria's evolving regulatory framework aims to balance innovation with consumer protection (Ogu, et al. 2024). Big Data's concepts such as, diverse data sources, advanced analytics, real-time processing, and data-driven decision-making are revolutionizing financial inclusion in Nigeria by enabling innovative credit scoring, personalized services, and fraud detection, despite existing challenges. Addressing these challenges is critical for effective deployment of Big Data in Nigeria's financial sector (Ozilli, 2021).

The FinTech revolution in Nigeria

Nigeria, Africa's largest economy and most populous nation, has become the undisputed epicenter of the continent's FinTech revolution. This rapid growth is fueled by a unique confluence of factors such as:

Large, young, and mobile-savvy population: Nigeria has one of the world's youngest populations, with a high and increasing rate of smart-phone and internet penetration. This demographic is naturally inclined to adopt mobile-first financial solutions.

Significant financial exclusion: Despite the presence of traditional banks, a substantial portion of the population remains unbanked or underserved. In 2025, 64% of the adult population has access to formal

accounts, up from less than a quarter in 2008, but the gap remains large and provides immense opportunity for digital solutions.

Infrastructure gaps: Traditional banking relied heavily on brick-and-mortar infrastructure. FinTech bypasses these limitations through agent networks and mobile apps, such as: OPay, PalmPay, and Moniepoint\, offering services directly to consumers in rural and semi-urban areas.

Supportive, evolving regulation: While initially cautious, the Central Bank of Nigeria (CBN) has adopted a more collaborative and "pro-innovation" stance. Key regulatory milestones include: i) The introduction of the Bank Verification Number (BVN) for enhanced digital identity verification. ii) Licensing regimes for Payment Service Banks (PSBs) and Mobile Money Operators (MMOs), allowing Telecom companies and non-bank entities to provide financial services. iii)The development of robust inter-bank settlement infrastructure, such as the Nigeria Inter-Bank Settlement System (NIBSS) Instant Payment (NIP) platform.

Theoretical review on big data in relation to financial inclusion in Nigeria

The integration of Big Data into financial services is grounded in various theoretical frameworks that explain how data-driven decision-making can enhance financial inclusion. In the Nigerian context, where traditional banking infrastructure faces limitations, these theories provide a foundation for understanding the transformative potential of big data such as:

Data-driven decision-making theory
This theory posits that organizations leveraging large volumes of data can improve decision accuracy and operational efficiency (McAfee & Brynjolfsson, 2012). In financial inclusion, this translates into better credit risk assessment, personalized services, and targeted outreach to unbanked populations. In Nigeria, Fintech firms utilize alternative data sources such as mobile usage and transaction history to make informed lending decisions, thus extending financial services to previously underserved groups (Oseni, 2025).
Technology Acceptance model (TAM)
This model suggests that perceived usefulness and ease of use influence the adoption of new technologies. Big Data analytics, as a technological innovation, can be adopted by financial institutions and users if it enhances service delivery and user experience. In Nigeria, increased trust in digital financial services driven by data security features encourages user adoption among Nigerians (Henandez et al. 2024).

Financial inclusion framework
This framework emphasizes that access to affordable and appropriate financial services depends on factors like infrastructure, literacy, and trust (World Bank, 2018). Big Data can address these factors by enabling targeted interventions, improving service design, and fostering trust through secure platforms. In the Nigeria scenario, Big Data enables tailored financial literacy campaigns and risk assessments, facilitating broader access (CBN, 2024).

Diffusion of innovations theory
Proposed by Rogers (2003), this theory explains how technological innovations spread within a society. Big Data-powered financial services can accelerate the diffusion process by demonstrating tangible benefits to early adopters, thereby encouraging wider adoption. In Nigeria, mobile money services leveraging Big Data analytics have rapidly expanded, especially in rural areas, due to demonstrable convenience and security (Iwedi, et al. 2023).

Socio-technical systems theory
This theory emphasizes the interaction between social and technological elements within an organization or society. Effective integration of Big Data into acountry’s financial ecosystem requires harmonizing technological capabilities with social factors like user trust, literacy, and regulatory frameworks. In Nigeria: Ensuring data privacy and enhancing digital literacy are crucial for successful Big Data adoption (Ogu, et, al. 2024).

The application of these theoretical frameworks underscores the transformative role of Big Data in advancing financial inclusion. By improving decision-making, fostering technology adoption, and aligning social and technological factors, Big Data can bridge the financial divide and promote inclusive growth.

Empirical review of big data and financial inclusion in Nigeria

Recent empirical studies highlight the transformative impact of big data analytics on promoting financial inclusion in developing countries. Leveraging alternative data sources, financial institutions have expanded access to credit, mobile banking, and other financial services for previously underserved populations.

Oseni (2025), investigated how fintech firms in Nigeria utilize big data analytics to improve credit risk assessment. The researchers found that the incorporation of mobile phone usage data, transaction history, and social media behaviors significantly enhances the accuracy of credit scoring models for unbanked individuals. The empirical evidence suggests that fintech-driven credit scoring reduces the information asymmetry between lenders and borrowers, thereby increasing loan accessibility for low-income and rural populations.

Equally, Iwedi, et, al. (2023), empirically analyzed the role of mobile money platforms in Nigeria. The study shows that mobile money transaction volumes and active users have increased substantially in regions where big data analytics are employed to personalize services and optimize agent deployment. The data-driven approach has been linked to a 15% increase in financial inclusion in rural areas over three years.

A recent study by Ugwuoke, et, al. (2023), assesses how micro-insurance providers in Nigeria utilize big data to tailor insurance products to low-income farmers and informal sector workers. The findings demonstrate that big data analytics enable better risk assessment, leading to higher adoption rates of microinsurance products, which are vital for financial resilience among the underserved.

Finally, Ogu, et, al. (2024) highlighted challenges such as data privacy concerns, infrastructural deficits, and data quality issues in Nigeria. The researchers argue that these challenges limit the full realization of big data's potential in enhancing financial inclusion.

The above empirical studies underscore the fact that big data is a critical enabler of financial inclusion in Nigeria. While promising, the realization of its full potential requires addressing regulatory, infrastructural, and ethical challenges.

Method of data analysis and the model

The Autoregressive Distributed Lag (ARDL) model is formulated and utilized for the analysis. The model is a dynamic single equation model that includes both the lagged of the dependent variable and the current and lagged values of the independent variables. The model can be represented as follows:

$$FD_t = \propto_0 + \sum_{i=1}^{p} \psi_i FD_{t-1} + \sum_{j=0}^{q1} \beta_{1,j} GDP_{t-j} + \sum_{k=0}^{q2} \beta_{2,k} LEG_{t-k} + \sum_{l=0}^{q3} \beta_{3,l} DP_{t-l} + \epsilon_t$$

Where;

FD_t = the dependent variable at time *t.*

$\propto_0$ = the intercept

$\sum_{j=0}^{q1} \psi_1 FD_{t-i}$ = This is the Autoregressive (AR) part. The lags of the dependent variable, p is the optimal number of lags for FD_t

$\sum_{j=0}^{q1} \beta_{1,j} GDP_{t-j}$ = the distributed lag part for GDP, q_1 is the optimal lag for GDP_t, the term for j=0 includes the contemporaneous value of GDP_t

$\sum_{k=0}^{q2} \beta_{2,k} LEG_{t-k}$ = the distributed lag part for LEG, q_t is the optimal lag for LEG_t

$\sum_{l=0}^{q3} \beta_{3,1} DP_{t-l}$ = the distributed lag part for FD. q_3 is the optimal lag for FD_t

ϵ_t= the white noise error term at time *t*

(p, q_1 , q_2 , q_3) = the order of the ARDL model, which is chosen based on an AIC information criteria is used in the analysis by selecting the model with the minimum value across all lag combinations.

For this cointegration analysis (long-run relationship), the ARDL model is re-parameterized into its equivalent Error Correction Model (ECM) form. This is particularly useful because it separates the long-run and short-run dynamics.

The ECM equation is given as follows;

© DEC 2025 | IRE Journals | Volume 9 Issue 6 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I6-1712613

$$\Delta FD_t = \propto_0 + \sum_{i=1}^{p-1} \psi_i \Delta FD_{t-1} + \sum_{j=0}^{q1-1} \beta_{1,j} \Delta GDP_{t-j} + \sum_{k=0}^{q2-1} \beta_{2,k} \Delta LEG_{t-k} + \sum_{l=0}^{q3-1} \beta_{3,1} \Delta DP_{t-l} + \Delta EC_{t-1} + \epsilon_t$$

Definition of Variables.

Big Data (DP): This refers to extremely large and complex datasets that require advanced processing and analysis to extract useful patterns and insight. In this study Nigeria statistical performance index is used as the proxy.

Financial inclusion (FD): Refers to access affordable and appropriate financial services and products for all individuals and businesses, especially the underserved and marginalized population. This variable is represented by Nigeria financial deepening index.

Legislative quality (LEG): This refers to the overall effectiveness, coherence, clarity and appropriateness of law. In this study, the rule of law is used as the proxy.

GDP: refers to the total monetary value of all goods and services produced within Nigeria over a specific year.

Analytical framework.

The analytical framework for the study is hypothesizes in the table 1 below;

Table 1. Hypothesized analytical framework

Variable	Expected sign	Rational
LEG	Negative (+)	The quality of legislative quality positively influence financial inclusion through the creation of conducive environment for financial institution to operate. (Beck, et,al, 2003)
GDP	Negative (+)	Economic growth usually leads to improvement in financial services, greater access to banking services and increased financial literature, all leading to higher financial inclusion (Honchan, 2008)
DP	Positive (+)	Big Data enhances financial inclusion because it enables financial institutions to analyze vast amounts of non-traditional data to assess the credit worthiness of individuals who lack formal financial history. (Beck, et, al. 2007)

Source; Authors compilation.

Justification of the chosen method.

The ARDL model is justified in this analysis because of its flexibility to handle variables with mixed integration orders, its suitability for small samples, its ability to simultaneously estimate short- and long-run relationships, and its robustness in cointegration testing. These features make it an ideal choice for this model because, it is good in empirical analyses involving macroeconomic, environmental, or social data where data limitations and mixed integration are common(Obomeghie & Obomeghie, 2025)

III. DATA ANALYSIS

Table 1. Descriptive statistics.

	DP	FD	GDP	LEG
Mean	56.07664	12.78788	397.0958	23.01788
Median	52.56250	12.77727	414.4700	23.55769
Maximum	77.75625	19.60353	574.1800	29.52381
Minimum	46.20000	8.111026	175.6700	13.87560
Std. Dev.	9.486209	3.099611	100.1646	4.432269

© DEC 2025 | IRE Journals | Volume 9 Issue 6 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I6-1712613

Skewness	1.361666	0.745762	-0.466732	-0.311790
Kurtosis	3.468191	3.035880	2.767524	2.187426
Jarque-Bera	6.044963	1.762196	0.732610	0.830559
Probability	0.048680	0.414328	0.693291	0.660156
Sum	1065.456	242.9698	7544.820	437.3397
Sum Sq. Dev.	1619.787	172.9366	180593.0	353.6101
Observations	19	19	19	19

Source; Authors computation using E-view econometric packages

From table 1 above which depicts the descriptive statistics, it can be seen that GDP has the highest mean while financial inclusion (FD) has the lowest mean. Equally, GDP has the highest standard deviation while financial inclusion (FD) again has the lowest standard deviation

Table 2. Summary of panel unit root test

Variable	Order	AADF	5% critical value	Conclusion
D(DP)	1 (1)	-3.692261 (0.0147)	-2.86	Stationary
FD	1 (0)	-4.632155 (0.0023)	,,	Stationary
D (LEG)	1 (1)	-6.720769 (0.0000)	,,	Stationary
D(GDP)	I(1)	-1.999363 (0.0464)	‘’	Stationary

Source; Authors computation using E-view econometric packages

From table 2 above which shows the stationarity test for the model, it can be noted that all the variables used in the analysis are stationary at first difference except FD which is stationary at levels

Table 3. F-Bound test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	12.62753	10%	2.37	3.2
k	3	5%	2.79	3.67
		2.5%	3.15	4.08
		1%	3.65	4.66
Actual Sample Size	17		Finite Sample: n=35	
		10%	2.618	3.532
		5%	3.164	4.194
		1%	4.428	5.816
			Finite Sample: n=30	
		10%	2.676	3.586
		5%	3.272	4.306
		1%	4.614	5.966

Source; Authors computation using E-view econometric packages

© DEC 2025 | IRE Journals | Volume 9 Issue 6 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I6-1712613

Table 3 represents the F-bounds test, for the estimates. Since the F-statistics test value of 12.62753 is greater than the 5% value of 4.66, 4.194 and 4.306 respectively, we conclude that a long-run relationship exist between the variables.

Table 4. Cointegration test

Series: DP FD GDP LEG Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.906614	64.52718	47.85613	0.0007
At most 1	0.578539	24.22002	29.79707	0.1913
At most 2	0.368549	9.531550	15.49471	0.3185
At most 3	0.096017	1.716054	3.841466	0.1902
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.906614	40.30716	27.58434	0.0007
At most 1	0.578539	14.68847	21.13162	0.3113
At most 2	0.368549	7.815496	14.26460	0.3978
At most 3	0.096017	1.716054	3.841466	0.1902
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level * denotes rejection of the hypothesis at the 0.05 level **MacKinnon-Haug-Michelis (1999) p-values				

Source; Authors computation using E-view econometric packages

The cointegration test is represented in table 4 above. From the table it can be seen that both the Trace test and the Max=Eigen values of 64.52718 and 40.30716 are greater than the 5% critical values of both 47.85613 and 24.58434 respectively, clearly indicating a long-run relationship between the variables.

Table 5. The ARDL estimates

ARDL Long Run Form and Bounds Test Dependent Variable: D(FD) Selected Model: ARDL(2, 0, 2, 1)				
Conditional Error Correction Regression				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	21.25896	4.649617	4.572195	0.0018
FD(-1)*	-1.112330	0.144578	-7.693650	0.0001
LEG**	-0.340606	0.115193	-2.956815	0.0182
DP(-1)	0.115647	0.051581	2.242037	0.0552
GDP(-1)	-0.011679	0.004555	-2.564005	0.0334
D(FD(-1))	0.816062	0.149236	5.468264	0.0006

© DEC 2025 | IRE Journals | Volume 9 Issue 6 | ISSN: 2456-8880
DOI: https://doi.org/10.64388/IREV9I6-1712613

D(DP)	0.036411	0.097518	0.373380	0.7186
D(DP(-1))	-0.145181	0.104525	-1.388962	0.2023
D(GDP)	-0.021300	0.008693	-2.450345	0.0399
* p-value incompatible with t-Bounds distribution. ** Variable interpreted as Z = Z(-1) + D(Z).				
Levels Equation				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LEG	-0.306209	0.052937	-5.784462	0.0004
DP	0.103968	0.028003	3.712811	0.0059
GDP	-0.010499	0.002440	-4.303369	0.0026
C	19.11210	2.148414	8.895910	0.0000
EC = FD - (-0.3062*LEG + 0.1040*DP -0.0105*GDP + 19.1121)				

Source; Authors computation using E-view econometric packages

Interpretation of the long run estimates.

In the case of our first independent variable which is the legislative quality, the long-run result indicates that a unit increase in LEG is associated with a decrease of 0.306209 units in financial inclusion, holding other variables constant. The effect is very reliable given that the p-value of 0.0004 is less than 0.05.

With respect to our second independent variable which is Big Data, the result shoes that, a unit increase in Big Data is associated with a decrease of 0.103968 units in financial inclusion (FD), holding other variables constant. The effect is also very reliable given that the p-value of 0.0059 is less than 0.05.

Finally, the last independent variable is the gross domestic product (GDP) and the result indicate that, a unit increase in GDP is associated with a decrease of 0.010499 units in financial deepening (FD), holding other variables constant. The effect is very reliable given the p-value of 0.0026 which is less than 0.05).

All three independent variables (LEG, DP, and GDP) are statistically significant in determining changes in FD, as their p-values (0.0004, 0.0059, and 0.0026) are all much smaller than the common 0.05 significance level. This is a robust model where every independent variable reliably predicts the dependent variable, FD, but they all push FD in different directions and with different strengths.

IV. CONCLUSION

With respect to legislative quality, (LEG), the combination of the negative coefficient and the significant p-value delivers a clear result that, there is a statistically significant negative association between Nigeria legislative quality and financial inclusion. This suggests that the current structure or implementation of financial legislation may be creating unintended barriers to entry or compliance costs that disproportionately exclude individuals or groups, thereby hindering, rather than promoting, financial inclusion. This is in line with similar findings by Anarfo, et, al. (2020). Poor legislative quality may involve overly restrictive or inconsistent regulations that hinder financial access. For example, complex licensing procedures, high compliance costs, or frequent policy changes can discourage financial institutions from expanding services to underserved populations. (Beck, 2011). While legislative quality is usually intended to protect consumers and stabilize markets, this finding suggests it is having the opposite effect on financial access. This conclusion strongly warrants a policy review to identify and mitigate the specific regulatory hurdles causing this regression.

With respect to Big Data, the key element here is that the relationship is both positive and statistically significant. This indicates that an improvement in Big Data analytics is a significant long-run driver for enhancing financial inclusion. This is in line with the findings of Adeoye, et al. (2024). The analysis suggests that better adoption of Big Data analytics

leads to a measurable, reliable, and positive impact on financial inclusion. Essentially, when the numbers get better, the money follows. This finding is robust and warrants consideration for policy or strategic investment.

Finally, with respect to economic growth (GDP) finding shows that while growth is happening, it is simultaneously linked to a statistically reliable, albeit small, reduction in financial inclusion. There is a statistically significant, yet very weak, negative association between Gross Domestic Product (GDP) and financial inclusion. This suggests that the benefits of economic growth (GDP) are not being inclusively distributed throughout the financial system. The growth observed may be concentrated in sectors or among populations already financially included, potentially widening the gap and leaving some groups further behind. This finding is supported by the findings by Odame, et al, (2024). While the effect is small, the fact that it is statistically reliable indicates that the current model of economic expansion is, at the margin, exclusive rather than inclusive. This conclusion is a strong signal for policymakers to investigate the quality and distributional aspects of GDP growth to ensure it promotes financial access for everyone

RECOMMENDATIONS

With respect to Big Data and financial inclusion it is recommended the Nigeria policy makers should enhance Data Infrastructure and Digital Ecosystems by Strengthening Nigeria's digital infrastructure to facilitate the collection, storage, and analysis of big data, enabling financial institutions to better understand and serve underserved populations. Equally, financial institution should Promote Data-Driven Credit Scoring Models by Encouraging financial institutions to adopt alternative credit scoring models based on big data analytics to assess the creditworthiness of low-income and unbanked populations. Finally, Nigeria financial regulators should Support Fintech Innovation and Collaboration by Encouraging collaboration between traditional banks, fintech firms, telecom operators, and data providers can enhance the use of big data for financial inclusion because this will facilitate partnerships and innovation hubs that promote data sharing and development of inclusive financial products.

With respect to legislative quality, it is recommended that policy makers should not abandon the financial regulation in place but to apply the principle of regulatory proportionality and a context-specific legal review. The primary driver of a negative relationship between the rule of law and inclusion is often regulatory burden. Stricter laws can raise compliance costs so high that financial institutions find it uneconomical to serve low-income or remote populations, thus causing exclusion. Consequently, the Central Bank and financial regulators must immediately review and simplify regulations for basic financial services used by the financially excluded. They may introduce a simplified, risk-based "Know Your Customer" (KYC) regime accounts (e.g., mobile money wallets). This allows people without formal IDs or utility bills to open accounts, while maintaining strict KYC for high-value transactions.

Equally, it is recommended that policy makers should apply less stringent, yet sound, prudential standards to non-traditional financial service providers (like mobile money operators) that are critical for inclusion, rather than forcing them to comply with the full, expensive rules designed for large commercial banks.

Simplify the legal process for formalizing assets (land, livestock) so they can be used as collateral for formal loans. Currently, complex land registry laws (a manifestation of the rule of law) often lock the poor out of formal credit.

In essence, the recommendation is, "Less Law, Better Law". The goal is to strip away the *costly rigidity* of the law while retaining the core *integrity* that protects both consumers and the financial system. The key is to ensure that the rule of law supports, rather than impedes, financial inclusion. This involves reforming regulatory frameworks, leveraging technology, and fostering inclusive policies that cater to the needs of all segments of society.

Although, the standard belief is that financial inclusion drives economic growth (GDP), a negative relationship means the economy is growing, but the financially excluded population is either being left

behind or is actively getting poorer. This is the definition of exclusive growth, or, in its extreme form, immiserizing growth for the poor. Government is advices to adopt a strategy of Inclusive Growth Re-Anchoring focused on redirecting the benefits of GDP growth to the financially underserved.

Policy makers should also implement policies that mandate or incentivize large, growing sectors (the GDP drivers) to integrate small, local businesses (the excluded population) into their supply chains. Also establish value chain financing programs where financial institutions offer credit to small producers and farmers based on their contracts with the large, creditworthy corporate buyers. This effectively uses the corporate credit standing to de-risk loans to the poor.

Policy makers should also direct a portion of the tax revenue generated by the growing GDP towards investments that enhance the capacity of the excluded to use financial services productively. Such as investment in skills training, digital literacy, and basic infrastructure (electricity/internet) in marginalized areas. This ensures that when an excluded individual gets a bank account, they have a small business or an income stream to actually put money into it. The overall goal is to make inclusive growth the only kind of growth this economy pursues, effectively turning your negative correlation into a positive one.

REFERENCES

[1] Ugwuoke, O. W., Ogbonna, O. E. & Freeman, A. A. (2023) Financial inclusion and poverty reduction in Nigeria: the role of microfinance institutions. CBN Journal of Applied Statistics (JAS): 14(2) https://dc.cbn.gov.ng/jas/vol14/iss2/1

[2] Adeoye, O., Addy, W., Adeola, A.N., Olubusola, O., Chinwe, O., Onyeka, O. & Zdzislaw, P. (2024). Leveraging AI and data analytics for enhancing financial inclusion in developing economies. Finance & Accounting Research Journal. 6. 288-303. 10.51594/farj.v6i3.856.

[3] Wezel, T & Ree, J.J. (2023) Nigeria fostering financial inclusion through digital financial services: Nigeria. *Selected Issues Papers* 2023, 020 (2023), https://doi.org/10.5089/9798400237195.018

[4] Beck, T., Demirgüç-Kunt, A., & Pería, M. S. M. (2011). Bank financing for SMEs: Evidence across countries and bank ownership types. Journal of Financial Services Research, 39, 35-54. https://doi.org/10.1007/s10693-010-0085-4

[5] Beck, T., Demingue-Kunt. A. & Levere, R. (2003). Law and finance: why does legal origin matters . Journal of Comparative Economics 3(4)653-675. Doi.org/10.1016/j.jce.2003.08.001

[6] Beck, T., Demingue-Kunt. A. & Levere, R. (2007). Finance, Inequality and the poor. Journal of Economics performance. 21 (3) 91-114. Doi.10.1007/s10887-007-9010-6

[7] CBN *(2024). Digital financial services and financial inclusion in Nigeria: Milestones and New Directions. www.cbn.org.ng*

[8] EFINA (Enhancing Financial Innovation and Access). *(2023). Access to Financial Services in Nigeria (A2F) Survey 2023. Efina.org,ng*

[9] Ozili, K.P. (2021). Financial Inclusion in Nigeria: Determinants, Challenges, and Achievements: New Challenges for Future Sustainability and Wellbeing, Ercan Özen, Simon Grima, Rebecca Dalli Gonzi. DOI; HTTPS://DOI.ORG/10.1108/978-1-80043-968-920211020

[10] EnterpriseNGR. *(2024). Closing Nigeria's Exclusion Gap. https://enterprisengr.com/closing-nigerias-exclusion-gap.*

[11] Hernandez, A., L., Bustamante Molano, L.X., Gutierrez-Portela, F. et al. (20241). Financial fraud detection through the application of machine learning techniques: a literature review. Humanit Soc Sci Commun 11, 1130 https://doi.org/10.1057/s41599-024-03606-0

[12] Honohan, P.(2008). Cross country variation in household access to financial services. Journal of Banking and Finance. 32(2) 249-265. https://doi.org/10.1016/j.jbankfin.2008.05.004

[13] Laney, D. (2001). "3D Data Management: Controlling Data Volume, Velocity, and Variety." META Group.

https://www.scirp.org/reference/ReferencesPapers?ReferenceID=1611280

[14] Manyika, J., et al. (2011). "Big Data: The Next Frontier for Innovation, Competition, and Productivity." McKinsey Global Institute. https://www.semanticscholar.org/paper

[15] McAfee, A., & Brynjolfsson, E. (2012). Big data: The management revolution. Harvard Business Review, 90(10), 60-68. https://www.researchgate.net/publication/232279314

[16] Ogu, L., Enyia, O.J.& Antai, O.G. (2024). Rights and challenges impacting the protective framework for financial technology consumers in Nigeria. .International Journal of Economics Business and Management. 1(1), 323-340. ISSN: 3079-4218

[17] Iwedi M., Owakah N.F., Wofuru-Nyenke O.K. (2023), Effect of Financial Technology on Financial Inclusion in Nigeria. African Journal of Accounting and Financial Research 3(1), 2136. DOI: 10.52589/AJAFRA7LQZBE9

[18] Obomeghie, A.M. & Obomeghie, A.I. (2025b). Economic complexities and manufacturing growth: the Nigeria experience. International Journal

[19] of Research and Innovation in Social Science. (IJRISS), 9(6), pages 1759-1770, https://ideas.repec.org/s/bcp/journl.html

[20] Obomeghie, A.M. (2025a). Artificial intelligence and students entrepreneurship achievements in Nigeria. ISA Joiurnal of Business, Economics and Management. 2(3) 170-181. Doi; 105281/zenodo.15433830.

[21] Obomeghie, A.M. (2025b). Imperatives of investing in human capital and innovation for a sustained entrepreneurial growth in Nigeria. World Journal of Advanced Research and reviews. 26 (1)3025-3033.https://doi.org/10.30574/wjarr.2025.26.1.0403

[22] Odame C, Appiah KO, Gyimah P (2024). The financial inclusion–economic growth nexus: what is new now? *Journal of Money and Business*, Vol. 4 No. 2 pp. 121–137, doi: https://doi.org/10.1108/JMB-05-2023-0026

[23] Oseni, S. (2025) Fintech services and financial inclusion in nigeria. Global Research Journal of Business Management (GRJBM). 5(2) 80 – 94. https://journals.amssr.org/grjbm. ISSN: 2811-1737.

[24] Akpotor, A.V. & Amughoro A. (2025). Effect of FinTech on financial deepening and financial inclusion in Nigeria. GLS KALP: Journal of Multidisciplinary Studies, 5(2), 1-20. https://doi.org/10.69974/glskalp.05.02.01

[25] *Akin , J. (2025). Fintech growth in Nigeria; Whats next? https://alphatab.com.ng/fintech-growth-in-nigeria*

[26] Riti, R.I., Abrudan, C.I., Bacali, L., & Bâlc, N. (2025). Command Redefined: Neural-Adaptive Leadership in the Age of Autonomous Intelligence. *AI*. DOI:10.3390/ai6080176

[27] Ajekwe, C.C. (2020). Assessment of Efforts at Expanding Financial Inclusion in Nigeria.

[28] International Journal of Economics, Finance and Management Sciences. 8, (5) DOI.10.11648/j.ijefm.20200805.12

[29] World Bank (2021). Global Findex Database 2021. issuu.com/world.bank.publications/docs/9781464818974

[30] Soetan, T.O., Mogaji, E. (2024). Financial inclusion in Nigeria. In: Financial services in Nigeria. Sustainable Development Goals Series. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-031-62340-0_7

[31] Anarfo, B.E., Abor, Y.J & osei, A.K (2020), Financial regulation and financial inclusion in Sub-Saharan Africa: Does financial stability play a moderating role?, Research in International Business and Finance, 51. https://doi.org/10.1016/j.ribaf.2019.101070.