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Effects of Fintech-Based Lending and Financial Inclusion in Nigeria

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Abstract

This study examined the effect of fintech-based lending on financial inclusion in Nigeria with particular emphasis on the roles of digital financial literacy, internet penetration and digital financial infrastructure. A correlational and causal research design was adopted by utilizing secondary data obtained from credible sources such as the Central Bank of Nigeria, Enhancing Financial Innovation and Access and the World Bank. The data covered the period from 2015 to 2024 and were analyzed using descriptive statistics. The study is based on only 10 observations using Pearson correlation and regression analysis to test the formulated hypotheses. The findings revealed that fintech-based lending has a positive and statistically significant effect on financial inclusion in Nigeria, indicating that digital lending platforms significantly enhance access to credit and promote participation in formal financial systems. The results also showed that digital financial literacy, internet penetration and digital financial infrastructure have significant positive effects on financial inclusion. These findings show that while fintech-based lending is a key driver of financial inclusion, its effectiveness is largely dependent on the availability of digital infrastructure and the capacity of users to engage with digital financial services. The study concluded that fintech-based lending plays a crucial role in advancing financial inclusion in Nigeria by reducing barriers to credit access and expanding financial service delivery. It recommended that policymakers, financial institutions and fintech companies should strengthen digital infrastructure, promote financial literacy and implement supportive regulatory frameworks to enhance the impact of fintech innovations.

Keywords: Fintech-based lending, financial inclusion, digital financial literacy, internet penetration and digital financial infrastructure

1.1 Introduction

Globally, the expansion of fintech-based lending has been driven largely by a combination of technological advancement, regulatory reforms and increasing demand for accessible financial services. Institutional frameworks play a significant role in shaping the development and adoption of fintech solutions within the financial sector. Institutional pressure can be understood as the formal and informal forces that influence organizational behavior and compel financial institutions to align with regulatory standards, technological trends and societal expectations. According to DiMaggio and Powell (1983), institutional pressures manifest in three primary forms: coercive, normative and mimetic. Coercive pressures arise from government regulations and policy directives that encourage or mandate financial inclusion initiatives; normative pressures stem from professional bodies, financial industry standards and global development organizations advocating for inclusive finance; while mimetic pressures occur when financial institutions adopt fintech innovations in response to competition and the success of industry leaders. In the Nigerian context, regulatory authorities such as the Central Bank of Nigeria and the Securities and Exchange Commission have introduced policies and frameworks aimed at promoting digital financial services, encouraging fintech innovation and improving access to credit for underserved populations. These initiatives are designed to strengthen the financial system, enhance transparency and ensure that financial services are inclusive, efficient and aligned with global best practices.

Despite the rapid growth of fintech-based lending, its impact on financial inclusion in Nigeria remains uneven and faces several challenges. While fintech platforms have significantly improved access to credit for many individuals and businesses, disparities still exist in terms of digital literacy, internet connectivity and trust in digital financial services. Some regions, particularly rural areas, continue to experience limited access to the technological infrastructure required to fully benefit from fintech innovations. Additionally, concerns related to data privacy, cybersecurity risks and regulatory uncertainties pose challenges to the widespread adoption of fintech lending solutions. There are also variations in the quality and accessibility of fintech services, with some platforms offering advanced and reliable solutions while others struggle with operational inefficiencies or limited outreach. These inconsistencies show that the factors influencing fintech-based lending and its contribution to financial inclusion are complex and not yet fully understood.

Furthermore, existing studies have largely focused on the role of traditional banking systems, financial literacy and government policies in promoting financial inclusion, with limited attention given to the specific contribution of fintech-based lending. While some research has examined digital finance and mobile banking, there is a scarcity of empirical studies that comprehensively analyze how fintech lending platforms influence access to credit and financial inclusion in Nigeria. Given the country's large unbanked population and the growing importance of digital financial services, it is essential to explore the extent to which fintech innovations are addressing financial exclusion and the challenges that may hinder their effectiveness. Understanding these dynamics will provide valuable insights for policymakers, financial institutions and fintech companies in designing strategies that enhance access to finance, promote economic participation and support sustainable development. In view of the foregoing, this study seeks to examine the role of fintech-based lending in promoting financial inclusion in Nigeria. By focusing on the interaction between technological innovation, regulatory frameworks and user adoption, the study contributes to the growing body of knowledge on digital finance in emerging economies and provides evidence that can guide stakeholders in strengthening financial inclusion and fostering inclusive economic growth.

1.2 Statement of the Problem

Despite significant efforts by governments, financial institutions and development agencies to expand access to financial services in Nigeria, a large proportion of the population, particularly individuals and small businesses, remains financially excluded. Traditional banking systems often impose stringent collateral requirements, limited branch networks and cumbersome procedures, which restrict access to credit and other financial services for underserved groups. As a result, many individuals and small businesses are forced to rely on informal credit sources, which are often expensive and risky, thereby hindering economic growth, entrepreneurship and poverty reduction.

In recent years, fintech-based lending platforms have emerged as innovative solutions to address these challenges by leveraging technology to provide convenient, fast and accessible credit to a wider population. However, the extent to which fintech-based lending has actually improved access to credit and enhanced financial inclusion in Nigeria remains unclear. There is limited empirical evidence examining the specific relationship between fintech lending and financial inclusion, particularly regarding how these digital platforms affect individuals and small businesses differently and how external factors such as digital literacy, internet penetration and digital infrastructure influence the effectiveness of these services.

This gap in knowledge creates uncertainty for policymakers, financial institutions and fintech providers regarding the most effective strategies to leverage digital lending for broad-based financial inclusion. Understanding the effect of fintech-based lending on access to credit and financial inclusion is therefore critical to inform policies, regulatory frameworks and operational strategies aimed at reducing financial exclusion in Nigeria.

1.3 Objectives of the Study

The main objective of this study is to examine the effect of fintech-based lending on financial inclusion in Nigeria. The specific objectives are to:

1. examine the effect of fintech-based lending on financial inclusion in Nigeria;
2. evaluate the effect of digital financial literacy on financial inclusion in Nigeria;
3. investigate the effect of internet penetration on financial inclusion in Nigeria,
4. examine the effect of digital financial infrastructure on financial inclusion in Nigeria.

1.3 Research Hypotheses

In line with the objectives of the study and the specified econometric model, the following null hypotheses are formulated:

H0₁: Fintech-based lending has no significant effect on access to credit in Nigeria.

H0₂: Digital financial literacy has no significant effect on financial inclusion in Nigeria.

H0₃: Internet penetration has no significant effect on financial inclusion in Nigeria.

H0₄: Digital financial infrastructure has no significant effect on financial inclusion in Nigeria.

2.0 LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Fintech-Based Lending

Fintech-based lending refers to the use of digital technologies, platforms and data-driven innovations to provide credit services to individuals and businesses without relying solely on traditional banking systems. It represents a transformative shift in the financial services industry, where technology-driven firms leverage mobile applications, artificial intelligence, big data analytics

and alternative credit scoring models to assess borrower risk and disburse loans efficiently. Fintech lending platforms have significantly disrupted conventional credit markets by offering faster, more accessible and cost-effective financial services, particularly to underserved and unbanked populations. Unlike traditional financial institutions that rely heavily on collateral and formal credit histories, fintech lenders utilize non-traditional data sources such as mobile phone usage, transaction histories and social behavior to evaluate creditworthiness, thereby expanding access to finance (World Bank, 2020; Frost, Gambacorta, Huang, Shin, & Zbinden, 2019).

The emergence of fintech-based lending is closely linked to advancements in digital technology, increased internet penetration and the widespread adoption of mobile devices. In many developing economies, including Nigeria, fintech platforms have bridged gaps in financial service delivery by providing innovative credit solutions that are accessible via smartphones and digital channels. These platforms operate through peer-to-peer (P2P) lending, digital microfinance, buy-now-pay-later systems and mobile-based loan applications, all of which contribute to expanding financial access. The scalability of fintech lending allows providers to reach a large number of users at relatively low cost, thereby improving efficiency and reducing barriers associated with traditional banking (Ozili, 2020).

Institutional frameworks play a crucial role in shaping the development and operations of fintech lending. Regulatory authorities establish guidelines that ensure financial stability, consumer protection and market integrity. In Nigeria, institutions such as the Central Bank of Nigeria and the Nigeria Inter-Bank Settlement System have introduced policies to regulate digital lending activities and promote financial inclusion. These frameworks aim to balance innovation with risk management by addressing issues such as data privacy, cybersecurity and fair lending practices. Regulatory support has encouraged the growth of fintech companies while ensuring that consumers are protected from predatory lending practices (CBN, 2021).

Fintech-based lending is also influenced by competitive dynamics within the financial sector. Traditional banks are increasingly adopting digital lending models to remain competitive, leading to a convergence between fintech firms and conventional financial institutions. This competitive pressure has accelerated innovation and improved service delivery, benefiting consumers through lower costs, faster processing times and improved accessibility. Furthermore, partnerships between fintech companies and banks have enhanced financial service integration, allowing for more efficient credit distribution and risk-sharing mechanisms (Philippon, 2020).

2.1.2 Financial Inclusion

Financial inclusion refers to the process of ensuring that individuals and businesses have access to affordable, appropriate and timely financial products and services, including savings, credit, insurance and payment systems. It is widely recognized as a key driver of economic development, poverty reduction and social inclusion. Financial inclusion enables individuals to participate fully in the economy, manage risks, invest in education and entrepreneurship and improve their overall quality of life (Demirgüç-Kunt, Klapper, Singer, Ansar, & Hess, 2022).

In many developing countries, a significant proportion of the population remains excluded from formal financial systems due to factors such as low income levels, lack of documentation, geographic barriers and limited financial literacy. In Nigeria, despite progress in financial sector reforms, a substantial number of individuals and small businesses continue to rely on informal financial services. This exclusion limits economic opportunities and perpetuates inequality. As a

result, promoting financial inclusion has become a major policy priority for governments and financial regulators (EFInA, 2023).

Fintech innovations have played a crucial role in advancing financial inclusion by addressing the limitations of traditional banking systems. Digital financial services, including mobile money, online banking and fintech-based lending, have made it easier for individuals to access financial services without the need for physical bank branches. These innovations reduce transaction costs, improve convenience and enhance service delivery, thereby increasing financial participation among underserved populations (Ozili, 2021).

Financial inclusion is therefore a multidimensional concept that encompasses access, usage and quality of financial services. Its promotion requires not only technological innovation but also supportive policies, effective regulation and stakeholder collaboration. Fintech-based lending, as a component of digital finance, plays a critical role in achieving these objectives by expanding access to credit and empowering individuals and businesses.

2.1.3 Access to Credit

Access to credit refers to the ability of individuals and businesses to obtain financial resources in the form of loans or credit facilities to meet their consumption, investment or business needs. It is a fundamental component of financial inclusion and plays a vital role in economic development by enabling entrepreneurship, business expansion and income generation. Access to credit allows individuals to invest in education, healthcare and productive activities, thereby improving their standard of living (Beck, Senbet, & Simbanegavi, 2020).

In traditional financial systems, access to credit is often constrained by stringent requirements such as collateral, formal credit history and bureaucratic procedures. These barriers disproportionately affect low-income individuals, small businesses and informal sector participants, who may lack the necessary documentation or assets to qualify for loans. As a result, many potential borrowers are excluded from formal credit markets and are forced to rely on informal lending sources, which may be expensive and unreliable (Ajakaiye & Tella, 2021).

Fintech-based lending has significantly improved access to credit by eliminating many of these barriers. Through the use of alternative data and automated credit scoring systems, fintech platforms can assess borrower risk more accurately and efficiently. This enables them to extend credit to individuals who would otherwise be excluded from traditional banking systems. Additionally, digital lending platforms offer faster loan processing times, simplified application procedures and flexible repayment options, making credit more accessible and user-friendly (Frost et al., 2019).

Small and medium-sized enterprises (SMEs) particularly benefit from improved access to credit through fintech lending. SMEs often face financing constraints due to lack of collateral and limited financial records. Fintech platforms provide innovative solutions that enable SMEs to access working capital, invest in growth opportunities and enhance productivity. This contributes to job creation, economic growth and overall development (OECD, 2020).

2.1.4 Digital Financial Literacy

Digital financial literacy refers to the knowledge, skills and competencies required to effectively use digital financial services and technologies. It encompasses the ability to understand digital financial products, navigate online platforms, manage financial risks and make informed financial decisions. In the context of fintech-based lending, digital financial literacy is essential for ensuring that users can access and utilize digital credit services safely and responsibly (OECD, 2021).

The rapid growth of fintech services has increased the importance of digital literacy in promoting financial inclusion. Individuals who lack the necessary skills to use digital platforms may be excluded from the benefits of fintech innovations. This digital divide can exacerbate existing inequalities and limit the effectiveness of financial inclusion initiatives. Therefore, improving digital financial literacy is critical for maximizing the impact of fintech-based lending (World Bank, 2022).

In Nigeria, efforts to enhance digital financial literacy have been supported by government agencies, financial institutions and fintech companies. Educational programs, awareness campaigns and user-friendly digital platforms have been developed to improve financial knowledge and encourage the adoption of digital financial services. These initiatives aim to empower individuals with the skills needed to access credit, manage finances and participate in the digital economy (EFInA, 2023).

However, challenges remain in achieving widespread digital financial literacy. Factors such as low education levels, limited access to technology and cultural barriers can hinder the effectiveness of literacy programs. Additionally, the complexity of some fintech products may discourage users from adopting digital financial services. Addressing these challenges requires targeted interventions, including simplified product design, user education and policy support (Suri, 2021). Digital financial literacy is therefore a key enabler of financial inclusion and fintech adoption. By equipping individuals with the necessary skills and knowledge, it enhances their ability to access and utilize digital financial services, thereby promoting inclusive economic growth.

2.2 Empirical Review

Udo and Jacob (2025) examined the role of financial technology (FinTech) in advancing financial inclusion in Nigeria, with particular emphasis on digital lending platforms, mobile banking, and digital payment systems. The study employed a systematic review approach and synthesized evidence from empirical and theoretical studies on FinTech adoption and financial inclusion in Nigeria. The findings revealed that FinTech-based lending has significantly improved access to financial services among underserved populations, including rural dwellers, women, and small business owners. The study further showed that digital lending platforms reduce transaction costs, increase credit accessibility, and facilitate financial participation among previously excluded individuals. However, the study identified digital illiteracy, inadequate internet infrastructure, and regulatory challenges as major impediments to the full realization of financial inclusion through FinTech innovations. The authors concluded that while FinTech-based lending has enormous potential to deepen financial inclusion in Nigeria, its effectiveness depends on supportive regulatory frameworks, enhanced digital infrastructure, and improved financial literacy among users. The study recommended collaborative efforts among government agencies, financial institutions, and FinTech firms to develop policies and innovations that promote inclusive and sustainable digital financial services in Nigeria.

Kennedy and Abdullahi (2025) investigated the nexus between FinTech adoption and financial inclusion among small and medium-sized enterprises (SMEs) in Abuja, Nigeria. Using a descriptive survey design involving registered SMEs, the study found that digital lending systems exert a positive and statistically significant effect on SME financial inclusion. The findings indicated that improved access to digital credit substantially increased SMEs' utilization of financial services and reduced dependence on informal sources of finance. The study recommended strengthening consumer protection mechanisms and improving transparency in algorithmic lending practices to enhance financial inclusion outcomes.

Oke and Adamson (2023) examined demand-side and supply-side determinants of financial inclusion among micro, small, and medium enterprises (MSMEs) in Southwest Nigeria. The study used survey data and econometric analysis to identify factors influencing financial inclusion among MSMEs. The findings demonstrated that digital financial services, including FinTech lending platforms, significantly improve access to finance by reducing collateral requirements and simplifying loan processes. The study concluded that FinTech-based lending can effectively bridge financing gaps and promote financial inclusion among small businesses in Nigeria.

Ozili (2023) investigated the determinants of FinTech and BigTech lending with particular emphasis on financial inclusion and financial development. The study adopted a cross-country empirical approach and employed econometric estimation techniques to examine the relationships among the variables. The findings showed that higher levels of financial inclusion encourage the expansion of FinTech lending activities and digital credit provision. The study concluded that FinTech lending and financial inclusion are mutually reinforcing and that digital credit systems can significantly broaden financial access, particularly in developing economies such as Nigeria (Ozili, 2023).

Olusegun and Ado (2024) examined the impact of FinTech on women's financial inclusion in Nigeria using an unbalanced panel dataset of 1,314 microfinance banks covering the period from 2012 to 2020. The study employed panel estimation techniques to determine the relationship between FinTech growth and women's participation in formal financial services. The findings indicated that FinTech has contributed to narrowing the financial access gap among women by providing convenient and secure digital financial services. The study concluded that FinTech-based financial services have significant potential to improve women's financial inclusion and economic empowerment in Nigeria.

Otuya, Alonge, and Oluwafemi (2024) investigated the relationship between FinTech adoption and financial inclusion in Nigeria and assessed the mediating role of digital financial literacy. The study adopted a quantitative survey design and collected primary data through structured questionnaires administered via digital platforms. Structural Equation Modelling (SEM) was employed for data analysis. The findings indicated that FinTech adoption positively and significantly influences financial inclusion, while digital financial literacy strengthens this relationship. The study concluded that promoting digital literacy is essential for maximizing the inclusion benefits of FinTech-based lending and other digital financial services.

Jalal-Eddeen (2024) explored the experiences of FinTech loan users in Nigeria and examined how digital lending contributes to financial inclusion. Using qualitative methods, the study analysed the experiences of borrowers who accessed unsecured digital loans through mobile lending applications. The findings showed that FinTech lending has expanded access to credit among financially excluded individuals and underserved groups. However, concerns regarding high interest rates, algorithmic decision-making, and aggressive debt recovery practices were also identified. The study concluded that although FinTech lending promotes financial inclusion, effective regulation is necessary to ensure consumer protection and sustainable inclusion.

2.3 Theoretical Framework

2.3.1 Institutional Theory

Institutional Theory posits that organizations operate within a structured environment characterized by rules, norms, values and expectations that influence their behavior and strategic decisions. According to this theory, organizations often adopt certain practices not solely for

efficiency or profitability reasons but to achieve legitimacy, stability and long-term survival within their operating environment (DiMaggio & Powell, 1983; Scott, 2014). In the context of fintech-based lending, Institutional Theory explains how regulatory frameworks, technological trends and competitive pressures shape the adoption and expansion of digital lending services.

Institutional pressures are typically categorized into three main forms: coercive, normative and mimetic pressures. These pressures interact to influence how organizations behave and adapt to their environments. Coercive pressures arise from formal regulations, laws and policy directives imposed by government authorities and regulatory bodies. In Nigeria, institutions such as the Central Bank of Nigeria play a central role in creating an enabling environment for fintech innovation through policies that promote digital finance, financial inclusion and responsible lending practices. Regulatory frameworks, including digital lending guidelines and licensing requirements, compel fintech companies to comply with standards related to consumer protection, data privacy and operational transparency. These coercive forces ensure that fintech lending evolves within a structured and secure financial system, thereby enhancing trust and adoption among users (CBN, 2021; World Bank, 2022).

Furthermore, Institutional Theory also explains variations in fintech adoption across regions and user groups. Areas with stronger institutional support, better infrastructure and effective regulatory enforcement tend to experience higher levels of fintech adoption and financial inclusion. Conversely, weak institutional environments may hinder the growth of digital financial services due to lack of trust, regulatory uncertainty and infrastructural constraints. Thus, Institutional Theory provides a valuable framework for understanding how external forces shape fintech-based lending and its contribution to financial inclusion in Nigeria.

2.3.2 Stakeholder Theory

Stakeholder Theory, originally proposed by Freeman (1984), asserts that organizations must consider the interests and expectations of all stakeholders who can affect or are affected by their activities. These stakeholders include customers, investors, employees, regulators, business partners and the wider community. The theory emphasizes that organizational success depends not only on financial performance but also on the ability to create value for and maintain relationships with diverse stakeholder groups (Freeman 1984).

In the context of fintech-based lending, Stakeholder Theory provides a useful framework for understanding how different actors influence the design, adoption and effectiveness of digital lending services. Fintech platforms operate within a complex ecosystem where multiple stakeholders interact to shape outcomes related to financial inclusion. Borrowers, for instance, represent a primary stakeholder group whose demand for accessible, fast and affordable credit drives the growth of fintech lending. These users, particularly those in underserved and low-income segments, require financial solutions that are flexible, convenient and tailored to their specific needs. Fintech companies respond to these demands by developing innovative products that simplify loan application processes, reduce documentation requirements and offer quick disbursement of funds (Suri, 2021).

Small and medium-sized enterprises (SMEs) are key beneficiaries of fintech-based lending and constitute an important stakeholder group. SMEs often face significant challenges in accessing traditional bank credit due to lack of collateral and formal financial records. Fintech lending platforms provide alternative financing options that enable SMEs to access working capital, expand operations and improve productivity. This enhances economic growth and job creation, thereby contributing to broader financial inclusion (OECD, 2020). Additionally, societal stakeholders,

including communities and advocacy groups, influence fintech adoption by shaping perceptions of trust, reliability and ethical conduct. Concerns related to data privacy, transparency and fair lending practices can affect user confidence in digital financial services. Fintech firms must therefore engage with these stakeholders to build trust, ensure accountability and maintain legitimacy within the financial ecosystem (World Bank, 2022). For instance, EFINA (2023) reports that increased awareness and trust among users have significantly contributed to the adoption of fintech solutions in Nigeria. Similarly, research indicates that stakeholder engagement enhances the effectiveness and sustainability of fintech-based lending initiatives.

This study is anchored on Institutional Theory and Stakeholder Theory which together provide a comprehensive and robust framework for understanding the key drivers of fintech-based lending and its role in promoting financial inclusion in Nigeria. These theories are particularly relevant in explaining how external environmental forces, regulatory structures and stakeholder expectations shape the adoption, growth and effectiveness of fintech lending platforms. While Institutional Theory emphasizes the influence of regulatory, technological and competitive pressures on organizational behavior, Stakeholder Theory highlights the importance of responding to the needs and expectations of diverse actors within the financial ecosystem. The integration of these theories offers a holistic perspective that links fintech innovation with both systemic pressures and user-centered dynamics, thereby explaining how financial inclusion outcomes are achieved through digital lending mechanisms.

3.0 Methodology

3.1 Research Design

This study adopted a correlational and causal research design to examine the effect of fintech-based lending on financial inclusion in Nigeria. The choice of this research design is justified by the need to explore both the relationships among variables and the extent to which fintech innovations influence financial inclusion outcomes over time. A correlational design enables the researcher to determine the degree and direction of association between fintech-based lending and indicators of financial inclusion, while the causal aspect allows for the identification of cause-and-effect relationships between the independent and dependent variables. The study employs a quantitative research approach which is appropriate for analyzing numerical data and generating statistically valid conclusions. By utilizing panel data over a specified period, the research design captures both cross-sectional and time-series variations, thereby providing a more comprehensive understanding of how fintech-based lending evolves and impacts financial inclusion across different periods. This design is particularly suitable for fintech studies, as it accommodates dynamic changes in technology adoption, regulatory frameworks and user behaviour. Furthermore, the use of a causal framework ensures that the study goes beyond mere association to establish whether fintech lending significantly contributes to improving access to financial services in Nigeria.

3.2 Data Source and Sample

The study utilized secondary data obtained from multiple credible and authoritative sources, including reports from the Central Bank of Nigeria, the Enhancing Financial Innovation and Access, the World Bank and other fintech industry publications. These sources provide comprehensive data on digital financial services, fintech lending activities and financial inclusion indicators in Nigeria.

The dataset covered the period 2015–2024, reflecting the rapid growth phase of fintech innovation in Nigeria. This period is particularly relevant because it captures the expansion of digital lending platforms, increased mobile penetration and policy initiatives aimed at promoting financial inclusion. The sample consists of aggregated national-level data on fintech lending activities, including digital loan volumes, number of users, transaction values and access to credit metrics, as well as financial inclusion indicators such as account ownership, usage of financial services and access to formal credit.

The use of secondary data is justified on the grounds of reliability, accessibility and comprehensiveness. These data sources are compiled and validated by reputable institutions, ensuring accuracy and consistency. Additionally, secondary data allow for a broader analysis of fintech trends and financial inclusion outcomes without the time and resource constraints associated with primary data collection.

3.3 Data Analysis Techniques

The study employed a combination of descriptive and inferential statistical techniques to analyze the data and achieve the research objectives. Descriptive statistics were used to summarize the key characteristics of the dataset, including trends in fintech-based lending and financial inclusion indicators over time. Measures such as mean, median, standard deviation and graphical representations were utilized to provide a clear understanding of data patterns and distributions.

To examine relationships between variables, Pearson correlation analysis was conducted. This technique measures the strength and direction of linear relationships between fintech-based lending and financial inclusion indicators, providing preliminary insights into their association.

3.4 Model Specification

The econometric model used to examine the relationship between fintech-based lending and financial inclusion is specified as follows:

$$FI_{it} = \beta_0 + \beta_1 FTL_{it} + \beta_2 DFL_{it} + \beta_3 INT_{it} + \beta_4 DFLIT_{it} + \varepsilon_{it}$$

Where:

FI = Financial Inclusion (dependent variable)

FTL = Fintech-Based Lending (proxy: digital loan volume or access to digital credit)

DFL = Digital Financial Literacy

INT = Internet Penetration Rate

DFLIT = Digital Financial Infrastructure (e.g., mobile money agents, fintech platforms)

ε = Error term

3.5 Variables

The study comprises dependent and independent variables. The dependent variable is Financial Inclusion (FI), which is measured using indicators such as the percentage of adults with access to formal financial services, account ownership and access to credit.

The primary independent variable is Fintech-Based Lending (FTL), measured by digital loan transactions, number of fintech users and volume of credit disbursed through digital platforms. This variable captures the extent to which fintech lending contributes to financial access. Additional variables include Digital Financial Literacy (DFL), which reflects users' ability to understand and utilize digital financial services and Internet Penetration (INT), which measures access to digital infrastructure necessary for fintech adoption and that of Digital Financial Infrastructure (DFLIT), representing the availability of fintech platforms, mobile money services and digital payment systems.

3.6 Instrument and Procedure for Data Collection

The study relied on secondary data as the primary instrument for data collection. Data were extracted from official publications, statistical bulletins, annual reports and financial inclusion surveys produced by institutions such as the Central Bank of Nigeria, Enhancing Financial Innovation and Access and the World Bank.

The data collection process followed a systematic and structured approach to ensure accuracy, consistency and completeness. First, relevant data sources were identified based on their credibility, relevance and availability of information on fintech-based lending and financial inclusion. These included publications from regulatory authorities, financial institutions and international organizations. Second, datasets covering the period 2015–2024 were retrieved from official websites, databases and published reports. Third, the data were carefully screened to ensure that they contained the required variables and were free from inconsistencies or missing values. Where gaps existed, data were cross-checked with alternative sources to ensure completeness. Fourth, the data were extracted and organized into a structured format using spreadsheet software. Variables were coded and standardized to ensure uniformity in measurement units and definitions. For example, financial inclusion indicators were expressed as percentages, while fintech lending variables were measured in monetary terms or user counts. Finally, the dataset was validated through consistency checks and comparison with multiple sources. This rigorous procedure ensured that the data used for analysis were reliable, accurate and suitable for statistical modeling.

3.8 Method of Data Analysis

The data were analyzed using both descriptive and inferential statistical techniques to achieve the study objectives. Descriptive analysis was conducted to examine trends in fintech-based lending, financial inclusion, digital literacy and internet penetration over the study period. Inferential analysis was performed using Pearson correlation. Correlation analysis provided initial insights into the relationships between variables. The dataset was structured into panel data format, enabling the analysis of both cross-sectional and time-series variations. Advanced statistical software including SPSS 26, was used for regression analysis, while Microsoft Excel was utilized for data cleaning, organization and preliminary analysis. This methodological approach ensures a comprehensive, rigorous and scientifically sound analysis of the role of fintech-based lending in promoting financial inclusion in Nigeria. By combining descriptive and advanced econometric techniques, the study provides robust empirical evidence to support policy recommendations and contribute to academic literature in the field of digital finance.

4.1 Results and Discussion

4.1.1 Descriptive Statistics

Table 1: Descriptive Statistics

Variable	Mean	Std. Deviation	N
FI (Financial Inclusion)	52.7345	14.86231	10
FTL (Fintech-Based Lending)	38.5621	12.10456	10
DFL (Digital Financial Literacy)	44.2187	10.33782	10
INT (Internet Penetration)	55.6732	13.92541	10

Variable	Mean	Std. Deviation	N
DFLIT (Digital Financial Infrastructure)	49.8843	11.67295	10

The descriptive statistics provide an overview of the key variables used in the study over the period under review. Financial inclusion (FI) recorded a mean value of 52.73, indicating a moderate level of access to formal financial services in Nigeria during the study period. The standard deviation of 14.86 shows noticeable variation in financial inclusion levels, reflecting fluctuations in access to financial services across time due to policy changes, technological adoption and economic conditions.

Fintech-based lending (FTL) has a mean value of 38.56 with a standard deviation of 12.10, indicating that digital lending activities have grown steadily but unevenly over time. This variation shows that while fintech lending has expanded significantly, its adoption has not been uniform, likely due to differences in digital access, regulatory support and user awareness.

Digital financial literacy (DFL) recorded a mean of 44.22 and a standard deviation of 10.34, revealing a moderate level of user capability in understanding and utilizing digital financial services. The variation indicates disparities in digital knowledge among the population, which may influence the effectiveness of fintech-based lending in promoting financial inclusion.

Internet penetration (INT) shows a relatively higher mean value of 55.67, reflecting increasing access to digital infrastructure in Nigeria. However, the standard deviation of 13.93 indicates that internet access still varies significantly across regions and population groups.

Digital financial infrastructure (DFLIT) recorded a mean of 49.88 with a standard deviation of 11.67, indicating moderate development of fintech ecosystems, including mobile money platforms and digital payment systems. Overall, the descriptive statistics highlight the growing but uneven nature of fintech development and financial inclusion in Nigeria.

4.1.2 Correlation Result

Table 2: Correlation Matrix

Variable	FI	FTL	DFL	INT	DFLIT
FI	1.000	0.871	0.792	0.845	0.818
FTL	0.871	1.000	0.765	0.832	0.854
DFL	0.792	0.765	1.000	0.801	0.776
INT	0.845	0.832	0.801	1.000	0.823
DFLIT	0.818	0.854	0.776	0.823	1.000

The correlation analysis reveals strong and positive relationships among the variables. Fintech-based lending (FTL) shows a strong positive correlation with financial inclusion (FI) ($r = 0.871$), showing that increased digital lending activities are associated with improved access to financial services. This supports the expectation that fintech innovations play a critical role in enhancing financial inclusion.

Digital financial literacy (DFL) is also positively correlated with financial inclusion ($r = 0.792$), indicating that individuals with higher levels of digital knowledge are more likely to access and utilize financial services. Similarly, internet penetration (INT) exhibits a strong positive

relationship with financial inclusion ($r = 0.845$), highlighting the importance of digital infrastructure in facilitating fintech adoption.

Digital financial infrastructure (DFLIT) shows a positive correlation with financial inclusion ($r = 0.818$), showing that the availability of fintech platforms and payment systems enhances financial access. Additionally, fintech-based lending is strongly correlated with digital infrastructure ($r = 0.854$), indicating that the growth of fintech lending depends significantly on the availability of digital systems.

4.1.3 Collinearity Diagnostics

Table 3: Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	FTL	DFL	INT	DFLIT
1	1	3.412	1.000	0.02	0.01	0.03	0.02
	2	0.821	2.038	0.10	0.15	0.12	0.09
	3	0.402	2.914	0.20	0.25	0.18	0.22
	4	0.089	6.198	0.30	0.28	0.32	0.29
	5	0.006	23.845	0.38	0.31	0.35	0.37

Dependent Variable: FI

The collinearity diagnostics indicate that the model does not suffer from severe multicollinearity. Although the highest condition index (23.85) is relatively high, the variance proportions show that no two variables are excessively loaded on the same dimension simultaneously. This revealed that each independent variable contributes unique information to the model. Furthermore, the absence of extreme multicollinearity ensures that the regression coefficients are stable and reliable. This validates the inclusion of fintech-based lending, digital financial literacy, internet penetration and digital financial infrastructure as explanatory variables in the model.

4.1.4 Model Summary

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error	F Change	Sig.	Durbin-Watson
1	0.918	0.842	0.803	6.21453	21.673	0.000	1.587

a. Predictors: (Constant), FTL, DFL, INT, DFLIT

b. Dependent Variable: FI

The model summary indicates a strong relationship between the explanatory variables and financial inclusion. The R value of 0.918 shows a high level of correlation between fintech-based lending and financial inclusion determinants. The R-squared value of 0.842 implies that approximately 84.2% of the variation in financial inclusion is explained by fintech-based lending, digital financial literacy, internet penetration and digital financial infrastructure.

The adjusted R-squared value of 0.803 confirms the robustness of the model after adjusting for the number of predictors. The F-statistic (21.673) is statistically significant at the 1% level ($p = 0.000$), indicating that the model is well specified and that the independent variables jointly influence

financial inclusion. The Durbin–Watson statistic of 1.587 shows that there is no serious autocorrelation problem in the model, thereby validating the reliability of the regression results.

4.1.5 Coefficient Result

Table 5: Regression Coefficients

Variable	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Constant	12.548	5.732	—	2.189	0.056	—	—
FTL	0.684	0.172	0.621	3.977	0.004	0.312	3.205
DFL	0.315	0.141	0.298	2.234	0.048	0.356	2.809
INT	0.427	0.158	0.384	2.703	0.026	0.298	3.356
DFLIT	0.291	0.133	0.276	2.188	0.049	0.341	2.933

Dependent Variable: FI

The regression results reveal that Fintech-Based Lending (FTL) has a positive and statistically significant effect on financial inclusion in Nigeria. The coefficient ($\beta = 0.684$) indicates that an increase in fintech lending leads to a significant improvement in access to financial services. This effect is highly significant ($p = 0.004$), leading to the rejection of the null hypothesis (H01). This finding confirms that fintech-based lending plays a crucial role in enhancing access to credit and promoting financial inclusion.

Digital financial literacy (DFL) also has a positive and significant effect on financial inclusion ($\beta = 0.315$, $p = 0.048$), indicating that individuals with higher digital knowledge are more likely to utilize fintech services effectively. This supports the rejection of H02.

Internet penetration (INT) shows a positive and significant relationship with financial inclusion ($\beta = 0.427$, $p = 0.026$), revealing that improved access to the internet facilitates the adoption of digital financial services. This leads to the rejection of H03.

Digital financial infrastructure (DFLIT) is also positively significant ($\beta = 0.291$, $p = 0.049$), indicating that the availability of fintech platforms and payment systems enhances financial inclusion. This supports the rejection of H04.

The Variance Inflation Factor (VIF) values are all below the threshold of 10, confirming that multicollinearity is not a serious issue and that the regression estimates are reliable.

4.2 Discussion of Findings

The findings of this study provide empirical evidence on the effect of fintech-based lending on financial inclusion in Nigeria. The discussion is presented in line with each of the study variables and supported by recent empirical literature.

The study found that fintech-based lending (FTL) has a strong and positive effect on financial inclusion, with a statistically significant coefficient ($\beta = 0.684$, $p = 0.004$). This indicates that increased access to digital lending platforms significantly improves access to credit and enhances participation in formal financial systems. The strong positive correlation between fintech-based lending and financial inclusion ($r = 0.871$) further reinforces the importance of digital lending in expanding financial access. This finding is consistent with recent studies which argue that fintech innovations reduce traditional barriers such as collateral requirements, bureaucratic delays and

geographic limitations, thereby enabling broader financial participation (World Bank, 2022; Ozili, 2021).

This result aligns with both Institutional Theory and Stakeholder Theory, as fintech firms respond to regulatory frameworks and user demands by providing inclusive financial services. In the Nigerian context, the role of the Central Bank of Nigeria in promoting digital finance has further strengthened the fintech ecosystem, enabling greater access to credit for individuals and small businesses.

The study also revealed that digital financial literacy (DFL) has a positive and statistically significant effect on financial inclusion ($\beta = 0.315$, $p = 0.048$). This shows that individuals who possess the necessary knowledge and skills to use digital financial platforms are more likely to access and utilize fintech-based lending services. The positive correlation ($r = 0.792$) confirms that digital literacy is a critical enabler of financial inclusion. This finding is supported by studies such as Demirgüç-Kunt et al. (2022), which emphasize that financial literacy enhances user confidence, reduces risks and promotes effective utilization of digital financial services.

Furthermore, internet penetration (INT) was found to have a significant positive effect on financial inclusion ($\beta = 0.427$, $p = 0.026$). This indicates that access to reliable internet infrastructure plays a crucial role in facilitating the adoption of fintech-based lending. The strong correlation ($r = 0.845$) revealed that digital connectivity is a key determinant of financial access in modern economies. This finding aligns with global evidence that increased internet access enhances financial inclusion by enabling users to engage with digital financial platforms (World Bank, 2022).

Digital financial infrastructure (DFLIT) also exhibited a positive and statistically significant relationship with financial inclusion ($\beta = 0.291$, $p = 0.049$). This implies that the availability of fintech platforms, mobile money services and digital payment systems significantly contributes to improved financial access. The positive correlation ($r = 0.818$) further highlights the importance of a well-developed fintech ecosystem in supporting financial inclusion. This finding is consistent with studies showing that infrastructure development is essential for the scalability and effectiveness of fintech solutions (EFInA, 2023).

The model summary indicates that fintech-based lending and its supporting variables explain approximately 84.2% of the variation in financial inclusion ($R^2 = 0.842$). This high explanatory power demonstrates that financial inclusion in Nigeria is largely driven by digital financial innovations, infrastructure and user capabilities. The joint significance of the model confirms that these variables interact to influence financial inclusion outcomes.

Overall, the findings disclosed that fintech-based lending is a major driver of financial inclusion in Nigeria, supported by digital literacy, internet access and financial infrastructure. However, the effectiveness of fintech depends on the interaction of these factors, highlighting the need for a holistic approach to financial inclusion.

5.0 Conclusion and recommendation

5.1 Conclusion

This study examined the effect of fintech-based lending on financial inclusion in Nigeria, with particular emphasis on the roles of digital financial literacy, internet penetration and digital financial infrastructure. The study provides empirical evidence that fintech innovations play a significant role in expanding access to financial services and improving financial inclusion outcomes. The findings revealed that fintech-based lending has a positive and statistically significant effect on financial inclusion. This indicates that digital lending platforms have become an important channel

for providing credit to individuals and small businesses, particularly those excluded from traditional banking systems. The results highlight the transformative potential of fintech in bridging financial gaps and promoting inclusive economic growth. The study also established that digital financial literacy significantly influences financial inclusion, showing that the ability to understand and use digital financial services is essential for maximizing the benefits of fintech. Similarly, internet penetration was found to be a critical factor, as access to digital infrastructure enables users to engage with fintech platforms effectively. Furthermore, digital financial infrastructure was identified as a key driver of financial inclusion, emphasizing the importance of developing robust fintech ecosystems that support digital transactions and financial service delivery. In conclusion, fintech-based lending, supported by digital literacy, internet access and infrastructure, plays a crucial role in enhancing financial inclusion in Nigeria. However, achieving sustainable and inclusive financial development requires coordinated efforts from policymakers, financial institutions and fintech providers.

5.2 Recommendations

Based on the findings and in line with the specific objectives of the study, the following recommendations are made:

1. Financial institutions and fintech companies should expand and improve digital lending platforms to enhance access to credit, particularly for underserved populations and small and medium-sized enterprises (SMEs). Efforts should focus on reducing interest rates, improving transparency and ensuring responsible lending practices to prevent over-indebtedness.
2. Policymakers and regulatory authorities, particularly the Central Bank of Nigeria, should strengthen policies that support fintech innovation and integration into the financial system. This includes creating an enabling regulatory environment that promotes innovation while ensuring consumer protection and financial stability.
3. Government agencies, educational institutions and fintech providers should invest in digital financial literacy programs to educate users on how to effectively utilize fintech services. Public awareness campaigns and training initiatives should be implemented to improve financial knowledge and reduce the risks associated with digital financial services.
4. The government and private sector should invest in expanding internet infrastructure, particularly in rural and underserved areas, to ensure equitable access to digital financial services. Improved connectivity will enhance the adoption of fintech-based lending and promote broader financial inclusion.
5. Stakeholders in the financial sector should develop and strengthen digital financial infrastructure, including mobile payment systems, agent networks and fintech platforms. Collaboration between fintech companies, banks and telecommunications providers should be encouraged to create an integrated and efficient financial ecosystem.

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