Financial Technology Adoption, Digital Transaction Innovation and Poverty Alleviation in Nigeria

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ABSTRACT

Financial technology has increasingly transformed the delivery of financial services in developing economies, yet the extent to which expanding digital financial access translate into improved living standards remains an important empirical question in Nigeria. This study examines the relationship between financial technology access, innovative fin-tech transactions and poverty alleviation in Nigeria over the period 2010-2022. The study is motivated by the rapid expansion of digital financial services alongside persistent welfare challenges in the country and the limited empirical evidence distinguishing general fin tech penetration from the effect of innovative digital transactions. Annual financial and macroeconomic observations were converted to monthly series to increase the number of observations. Fin tech access was measured by the ratio of aggregate electronic financial transactions to gross domestic product, while poverty alleviation was peroxide by per-capita income. Innovative fin tech transactions were peroxide by incorporated transactions associated with emerging digital payments, including block chain related services. The study employed unit root and counteraction test, granger causality analysis and a simultaneous equation model estimated using the two stages least squares (2SLS) to account for the potential endo genetic between fin tech access and poverty alleviation. The study revealed a significant relationship between fin tech access and poverty alleviation, although the estimated coefficient of fin tech access in the poverty equation is negative. In contrast, innovative fin tech transactions exert a positive and statistically significant effect on per capita income. The results also indicate bidirectional granger causality between fin tech access and poverty alleviation, suggesting that the relationship is not exclusively one-directional. The study concludes that expanding digital financial activity alone may not automatically translate into improved welfare; the nature, accessibility and productive use innovative financial are important. Policies should therefore focus on broadening meaningful digital financial access, supporting digitalization among small businesses and strengthening the infrastructure required for innovative financial transactions.

KEYWORDS

Financial technology; Fin Tech access; innovative Fin Tech; digital transactions; poverty alleviation; per-capita income; Nigeria

I. INTRODUCTION

Financial technology (Fin Tech) has become an important component of financial-sector transformation, particularly in developing economies where conventional financial institutions have historically faced limitations in reaching geographically dispersed and financially excluded populations. The integration of digital technologies into financial services has created alternative channels through which individuals and businesses can make payments, transfer funds, save, obtain credit and participate in economic activities. In Nigeria, this transformation has been reflected in the increasing use of electronic payments, mobile financial services, point-of-sale terminals, digital platforms and other innovative payment technologies. The original study identifies this transformation as particularly important because Fin Tech has moved financial services beyond conventional deposit and withdrawal activities toward technology-enabled financial access.

The relevance of Fin Tech to poverty alleviation arises from its potential to reduce transaction costs, improve access to financial services and facilitate participation in formal economic activities. Financial access can provide households and businesses with mechanisms for saving, transferring resources and accessing financial opportunities. Nevertheless, increased availability of digital financial infrastructure does not necessarily guarantee improved welfare. Access may remain uneven because of differences in income, digital literacy, infrastructure, affordability and geographic location. The thesis itself identifies low and irregular income, limited physical access, financial literacy constraints, high costs and eligibility requirements among the barriers to financial inclusion in Nigeria.

An important issue, therefore, is whether the expansion of Fin Tech has translated into measurable improvements in the welfare of Nigerians. The existing literature has extensively examined financial inclusion and poverty reduction, while other studies have considered Fin Tech and financial inclusion. However, fewer studies have directly investigated the relationship between Fin Tech penetration, innovative digital transactions and poverty alleviation within Nigeria. The original study specifically identifies this gap and argues that Fin Tech should be examined beyond the conventional financial-inclusion perspective.

In the early 2000s, Nigeria developed the financial system plan for 2020 to turn the country's financial industry into a growth driver and propel it into the top 20 economies by 2020. After establishing the National Microfinance Policy in 2005, the CBN reformed its approach to Non-Interest Financial Institutions (NIFIs) in 2012 and introduced the National Financial Inclusion Strategy (NFIS) in 2013, which was later revised in 2018.

Nigeria embraced the use of electronic banking in the early 2000s (CBN, 2019). The proliferation of e-banking in the country can be attributed in part to the dynamism of technology, such as the introduction of mobile telephones in 2001 and increased access to personal computers and Internet service facilities. Prior to 2003, only a select few financial institutions maintained their own proprietary ATM fleets. Based on data from Tope (2010) as quoted by Onodugo and Ifeanyi (2015), Nigeria's primary shared ATM network, Inter-switch, went live in 2003 with five machines from United Bank for Africa (UBA) and First Bank of Nigeria (FBN). However, since 2009 when e-banking services were fully launched to the general public, ATM transactions have averaged N2.5 trillion for the period 2009 to 2018

while mobile pay services averaged N422 billion within the same period (NIBSS, 2018). According to Ondiege (2017), the increase in e-banking transactions motivated the financial service providers to create retail banking services thus empowering locals to own one of these financial technologies and utilize same to offer financial services to the public thereby creating employment and empowerment.

Therefore, Nigeria has implemented several policies and methods over time to achieve inclusive growth and development and expand access to financial technology and financial inclusion. Money transfers, insurance, payments, and deposits are only some of the Fin Tech services available online, via apps, via funding for businesses, via mobile phones, and via other electronic devices. Traditional African savings systems, such as the esusu and thrift plan tactics, which attract very little interest on loans, have also incorporated Fin Tech. These services have flourished in growing economies of Africa, like as Nigeria, because to their ease of use and the fact that they do not require the consumer or account holder's physical presence.

The present study addresses this gap by concentrating on two dimensions of financial technology. First, it examines access to Fin Tech, measured through the Fin Tech penetration rate. Second, it considers innovative Fin Tech transactions, which capture the increasing use of newer digital payment systems. This distinction is important because an increase in the volume of digital transactions does not necessarily have the same welfare implications as broader access to productive financial services.

The study further recognizes that the relationship between financial technology and poverty alleviation may be endogenous. While greater access to Fin Tech may affect income and living standards, improvements in economic conditions may simultaneously encourage greater adoption of digital financial services. The thesis consequently identifies a bidirectional relationship between Fin Tech and poverty alleviation and employs a simultaneous-equation framework to account for this interdependence.

Against this background, the study specifically examines:

- The effect of access to Fin Tech on poverty alleviation in Nigeria; and
- The effect of innovative Fin Tech transactions on poverty alleviation in Nigeria.

II. LITERATURE REVIEW

A. Conceptual Literature Review

1. Financial Technology and Access to Financial services

Financial Technology represent the application of Technological innovations to the provision and delivery financial services. Its expression has altered the structure of financial intermediation by introducing digital channels that can reduce dependence on conventional branches. In Nigeria, Mobile Banking, USSD services, point of sales terminals, electronic electronic payment platforms, digital wallets and other technologies have progressively

explained the channels through which individuals and businesses interact with financial institutions.

Fin Tec access is particularly relevant to developing economies because conventional financial infrastructure may not adequately serve rural, low-income and geographical isolated populations. Digital channels can reduce some of the cost associated with physical banking and provide customers with financial services without requiring direct access to traditional branches. The thesis notes that USSD, for example can extend financial transactions to users of ordinary mobile phones, including individuals who do note posses' smartphones or reliable internet connections.

2. Innovation Fin Tech Transactions

The development of innovation fin Tech has introduced new forms of digital transactions that go beyond traditional electronic Banking. These include digital wallets, third-party payment platforms, electronic payment gateways, and block chain related applications. The thesis measures innovative Fin Tech transactions using an aggregate of innovative payment systems, including block chain technology and platforms such as pay stack, inters witch and related digital payment channels.

The growing scale of this transaction provides evidence of the increasing the importance of digital finance within Nigeria's economic system. According to the thesis data, innovative Fin Tech Payment Transactions increased substantially during the study period and reach approximately ₦11. 8 trillion in 2022.

3. Fin tech and poverty Alleviation

The theoretical connection between Fin Tech and poverty reduction is largely established through financial inclusion. Improved access to financial services can enable individuals to participate in economic activities, smooth consumption, accumulate savings and potentially access credit. Fin Tech can also facilitate business transactions and reduce the cost and time associated with financial exchanges.

However, the relationship may not be automatically positive. The available of financial technology does not necessarily mean that low-income households can effectively use it for productive purposes. Digital exclusion, financial cost, inadequate infrastructure, limed financial literacy and unequal access may weaken the poverty reducing effect of Fin Tech. consequently, the empirical direction of the relationships remains an important question.

B. Theoretical Framework

The study is anchored principally on the financial inclusion hypothesis. The hypothesis emphasise the importance providing the affordable and appropriate financial services to the individuals and businesses that are excluded or undeserved by conventional financial system. The theoretical proposition is that wider access to financial services can contribute to economic participation, wealth accumulation and improved living standards.

The theory is particularly relevant to Nigerian Fin Tech environment because technological platforms can overcome some of the physical and geographical constraints associated with conventional banking. Mobile financial services, agent banking and digital payment platforms can extend financial services to previously underserved populations.

The study also incorporates the logic of financial intermediation theory, particularly because financial intermediaries facilitate the movement of resources between surplus and deficit economic units. Technological innovations can potentially make this intermediation faster, cheaper and more accessible.

C. Empirical Literature Review

1. Access to Fin Tech and poverty in Nigeria

Empirical evidence indicates that access to financial technology can influence poverty outcomes by reducing the cost of financial transactions, extending financial services to underserved populations, and facilitating participation in formal financial activities. Wayne et al. (2020) examined the role of technology in expanding access to financial services in Nigeria, with particular attention to financial inclusion and financial vulnerability. Their findings indicate the substantial proportion of the Nigerian population remained undeserved by conventional banking infrastructure, particularly in rural communities. The study argued that Fin Tech could help narrow this access gap by lowering the cost of delivering financial services and extending services beyond conventional bank branches and automated teller machines. The implication is that wider access to digital financial service can create opportunities for financially exclude households to participate more actively in economic activities.

Eze and Alugbuo (2021) empirical investigated the relationship between financial inclusion and poverty reduction in Nigeria using data from the World Bank's 2017 Global Findex survey. The study employed logit and instrumental- variable estimation techniques, with poverty represented by a dummy variable identifying individuals within the bottom 40 percent of the income distribution. Financial inclusion was measured using indicators using relating to saving's payments, employment, pension participation, government transfers and self-employment. The findings showed that greater access to financial services was associated with a reduction in household poverty. The study therefore emphasized the importance of strengthening institutions arrangements, financial regulation and contact enforcement to ensure that access to financial services translate into improved welfare outcomes.

Aderibigbe (2020) examined the contribution of the Nigeria Banking system to poverty reduction, particularly through microcredit financial services. The study observed that limited access to credit remain an important constraint on poverty reduction among low-income groups. However, it argued that simply expanding credit facilitate may not be sufficient unless financial interventions are designed around the actual needs' beneficiaries. The study consequently emphasized a participatory and people centred approach involving governmental agencies, financial institutions, non-governmental organizations and community-based organizations. This finding is particularly relevant to Fin Tech because digital access alone may not automatically produce poverty-reduction outcomes unless the services provided are affordable, accessible and suited to the circumstances of low-income users.

More recent Nigerian evidence strengthens the argument that the relationship between financial technology and poverty should be examined directly rather than being inferred solely from financial inclusion. Boloupremo and Ogege (2024), using an autoregressive distributed lad (ARDL) framework examined financial technology as potential driver of poverty reduction in Nigeria. Their result indicates a statistically significant relationship

between financial technology innovation and poverty, suggesting that developments in financial technology are closely connected with changes in poverty outcomes. The study further highlighted the need for appropriate policy and institutional measures to ensure that technological developments translate into broader welfare improvements. This evidence is particularly important because it moves beyond the traditional financial inclusion argument and consider the direct relationship between financial technologies.

The empirical literature also suggest that the benefit of Fin Tech access may depend on the forms of technology being adopted, Odeley and Onyeneye (2022), using quarterly Nigerian data covering 2009-2019 and an ARDL approach, examined the relationship between Fin Tech financial inclusion using indicators such as, ATM withdrawal, POS transactions, online payments, mobile money withdrawal and GSM subscriptions. Their finding indicate that Fin Tech did not automatically translate into improve financial inclusion during the period studied, although economic growth exerted an important influence on financial inclusion in both the short and long run. The findings demonstrate that technological expansion along may not guarantee inclusive financial outcomes. Infrastructure, affordability, financial literacy, institutional quality and user's ability to effectively utilize digital financial services may determine whether Fin Tech produces meaningful socioeconomic benefits.

Edozie (2026) further financial inclusion technologies, and poverty reductio in Nigeria, with particular attention to point-to sales technology. The econometric evidence reported a positive contribution of POS services to poverty reduction. The study associated POS technology, not only with improve access to financial transactions but also with employment and livelihood opportunities particularly for individuals operating as financial service agents. The findings reinforce the argument that Fin Tech can affect poverty through more than one channel: it can facilitate access to financial while simultaneously creating income-generating opportunities for service providers and small-scale entrepreneurs.

Overall, the empirical evidence reviews that access to Fin Tech can contribute to poverty reduction but the relationship is neither automatic nor uniform. While studies such as Eze and Alugbuo (2021), Boloupremo, and Ogege (2024), and Edozie (2026), provides evidence of beneficial poverty related effects Odeley and Oyeneye (2022), demonstrate that increase technological penetration does not necessarily produce proportional improvement in financial inclusion. The differences may arise from variations in the indicator employed, geographically coverage, methodology, data period and institutional conditions. Consequently, there remains a need for further empirical investigation using a broader measure of Fin Tech access and a longer time series of Nigeria. This provides justifications for examining Fin Tech access as a distinct explanatory variable in the present study.

2. Innovative Fin Tech Services (Block chain Technology) and poverty in Nigeria

Innovative financial technologies have increasingly transformed the delivery of financial services by introducing digital payment platforms, electronic wallets, mobile transactions, block chain-based system and other technology driven financial products. Their potential contribution to poverty reduction arises from their ability to reduce transaction cost, facilitate faster payments, expand market participation and improve access to financial service among individuals and businesses previously excluded from conventional banking. However empirical evidence on the direct poverty reduction effect of block chain and other innovative Fin Tech services in Nigeria remains relatedly limited. Tefa (2015) examined financial innovation and poverty alleviation among rural household in Northern Nigeria. The

study emphasized the vulnerability of rural farming household and examined the extent to which existing financial inclusion mechanism benefited low-income groups. The findings showed the poorer rural household could benefit considerably from appropriately designed savings and credit arrangement, particularly through community-based savings mechanism. However, access to formal financial products remained constrained by institutional and socioeconomic factors. The study therefore suggested that financial innovations should be designed in a way that reflect the economic and social realities of rural communities. Although the study predates the rapid expansion of block chain based financial services, its findings provide an important foundation of understanding why innovative financial technologies must be accessible and appropriate to low-income users if they are contributing to poverty reduction.

Usman (2020) investigated the influence of electronic banking technologies on access to credit in Nigeria using ATMs, POS terminal and active internet banking accounts as indicator of electronic banking. Employing linear regression analysis, the study found that POS terminals exerted a stronger influence financial inclusion than ATMs, and internet banking. The findings suggested that technologically enable financial services can expand access when they are delivered through channels that are convenient and accessible to users. This evidence is relevant to innovative Fin Tech because it demonstrates that the effectiveness of the financial innovation depends partly on the accessibility and practical usability of the technology.

Sigh et al. (2021) examined the relationship between financial technology innovations and poverty across 22 Indian States using panel data covering 201-202. The study considered technologies such as automated teller machines and Kisan credit card and found evidence that financial technology contributed to improvements in poverty related outcomes. The authors emphasize the importance of investment financial infrastructure and technology as mechanism for supporting economic development and poverty reduction. Although the study was conducted outside Nigeria, it provides comparative evidence that technological innovations in financial services can contribute to poverty reduction when supported by appropriate infrastructure and institutional arrangements.

Noha and Mahmoud (2020) investigated the effects of Fin Tech on the sustainable development Goals, particularly the possibility of accelerating the reduction of extreme poverty. Using annual data for 127 developing economics between 2004 and 2018 and applying the generalized method of moment (GMM), the study constructed a measure of Fin Tech Adoption based on the indicators such as mobile phone subscriptions, internet use and fixed broadband access. The findings indicated that Fin Tech adoption had a statistically significant poverty reducing effect. However, the study also showed that technological innovation alone was insufficient to eliminate extreme poverty. Improvements in governance, human capital and broader institutional conditions were identified as necessary complement to financial technology. The implication for Nigeria is that blockchain and other innovative Fin Tech service are more likely to generate meaningful welfare benefits when technological development is accompanied by supportive economic and institutional conditions.

Appiah-Otoo and song (2021) investigated the direct and indirect effects on Fin Tech on poverty in China using data from 31 provinces between 2011 and 2017. Poverty was proxied by household per-capita consumption, while Fin Tech was examined through dimensions including third-party payment and credit. Their findings indicated that Fin Tech contributed

to poverty reduction both directly through improvements in economic and financial infrastructures that innovative technologies may influence household welfare through multiple channels, including improved financial access reduced transaction costs and participation in economic activities.

Within Nigeria, the emergency of block chain and other innovative platforms has substantially broadened the range of digital financial services. The present study's earlier literature recognizes that innovative payment channels -including block chain relate systems and platforms such as electronic payments gateways- have experienced considerable expansion. The increasing value of transaction through these channels suggests growing acceptance of technological mediated financial services. However, transaction growth alone does not establish whether such innovations improve household welfare or reduce poverty. This distinction creates an important empirical issue for the present study because the relevant question is not simply whether innovative Fin Tech services has expanded, but whether their expansion is associated with measurable improvements in poverty alleviation.

Recent Nigerian evidence provides further support for examining this relationship. Boloupremo and Ogege (2024) found a statistically significant relationship between financial technology innovation and poverty reduction in Nigeria using ARDL methodology. Their findings indicate that technological development in financial services is economically relevant to poverty dynamics. Similarity, Edozie (2026) reported that financial inclusion technologies, particularly POS services, contributed positively to poverty reduction in Nigeria by facilitating financial transactions and creating livelihood opportunities. These recent finding suggest that poverty implication of Fin Tech innovations may operate through both financial access and employment channels.

Taken together, the empirical literature indicate that innovative Fin Tech services have the potentials to improve economic welfare by expanding access to payments, credit and other financial services. Nevertheless, the Nigeria literature remains comparatively limited with respect to block chain technology and other emerging Fin Tech payment system as direct determinant of poverty alleviation. much of the existing research have focused on financial inclusion, electronic banking, ATMs, and POS services or general Fin Tech adoption rather than specifically examining innovative Fin Tech transactions. The present study therefore contributes to the literature by examining the relationship between transaction conducted through innovative Fin Tech service and poverty alleviation in Nigeria. This focus is particularly relevant given the rapid expansion of digital payment technologies and the continuing challenge of translate financial innovation into broad-based improvement in living standards.

III. METHODOLOGY

A. Research Design

The study employs and ex-pot-facto research design using secondary series data covering Nigeria for 2010-2022. The original study use data obtained principally from the central Bank of Nigeria and World Bank. The variables were transformed into monthly observation to increase the number of observations available for econometric estimation.

The study contains 154 observations in the econometric analysis.

B. Measurement of Variables

Table 1: Measurement of Variables

Variable	**Measurement**
Poverty alleviation (PAL)	Per-capita income
Fin Tech access (AFT)	Aggregate Fin Tech transactions/GDP
Innovative Fin Tech (IFT)	Value of transactions through innovative Fin Tech channels
POS	Value of POS transactions
MIP	Mobile and internet payment transactions
FIO	Financial openness/deepening
BNK	Bank density

The paper explicitly defines per-capita income as the proxy for poverty alleviation because increases in income per person are interpreted as improvements in living standards. FinTech access is measured through the ratio of aggregate FinTech transactions to GDP.

C. Model Specification

Because the study identifies possible simultaneity between FinTech access and poverty alleviation, a simultaneous-equation model is employed:

$PALt = \beta 0+\beta 1AFTt+\beta 2POSt+\beta 3MIPt+\beta 4IFTt+\varepsilon 1t$

Where:

- *PAL* = poverty alleviation/per-capita income
- *AFT* = access to FinTech
- *POS* = POS transactions
- *MIP* = mobile and internet payments
- *IFT* = innovative FinTech transactions.

The second equation is:

$AFTt=\alpha 0+\alpha 1PALt+\alpha 2POSt+\alpha 3FIOt+\alpha 4BNKt+\varepsilon 2t$

The equations were estimated using Two-Stage Least Squares (2SLS) because the evidence indicated endogeneity between FinTech access and poverty alleviation. The thesis reports significant endogeneity-test probabilities of 0.0021 for AFT and 0.0002 for PAL.

D. Justifying the Adoption of Simultaneous Equation Model

This study leverages on the position of Inuwa (2021) where the poverty level in Nigeria was determined as a major driver of Fin Tech innovations in the country. Since this present study tries to ascertain how Fin Tech can help in the poverty alleviation drive of the government, it also becomes necessary to study the major determinants of Fin Tech innovations of which

the increasing poverty index is a major determinant. Hence, we tried to capture both effects through the adoption of a simultaneous equation model.

Again, the adoption of the Simultaneous equation model is also justified using the Granger causality test. A preliminary analysis of the variables gave a bi-directional causal relationship. Interestingly, the conventional Pairwise Granger causality test hinted on a possible bi-directional causality between poverty index and Fin Tech variable and this further motivated the researcher to adopt the simultaneous model

IV. RESULTS AND DISCUSSION

A. Trend of Fin Tech Access

1. Data Presentation

Trends showing income per capita (proxy for poverty alleviation), Fin Tech penetration rate (proxy for financial technology access) and payments made via innovative Fin Tech services from 2010 to 2022

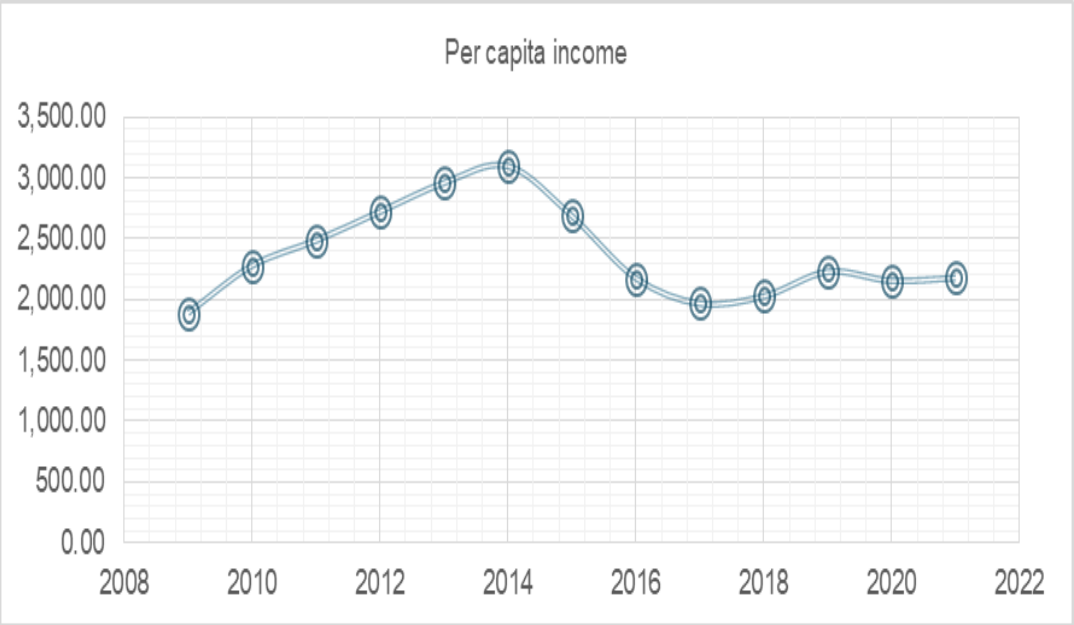


Figure 1: Trend of per capita income for Nigeria, 2010-2022

The figure 4.1 above shows that there is an obvious growth trend in per capita income growing from $1,891 which was around N12.7 in 2010 to about $3,098 in 2014 which was about N19.5. Per capita income started to drop slightly in 2015 and reached a low of $1,968 which was N6.4. The slight recovery made in 2018 culminated in per capita income reaching $2,177 (about N5.4) by the end of 2022. It is important to note that the exchange rate conversion was made at the official rate of exchange. According to Omar and Inaba (2020), when the parallel rate is considered, we see that the income per capita is far much lower than what is portrayed in the official rate.

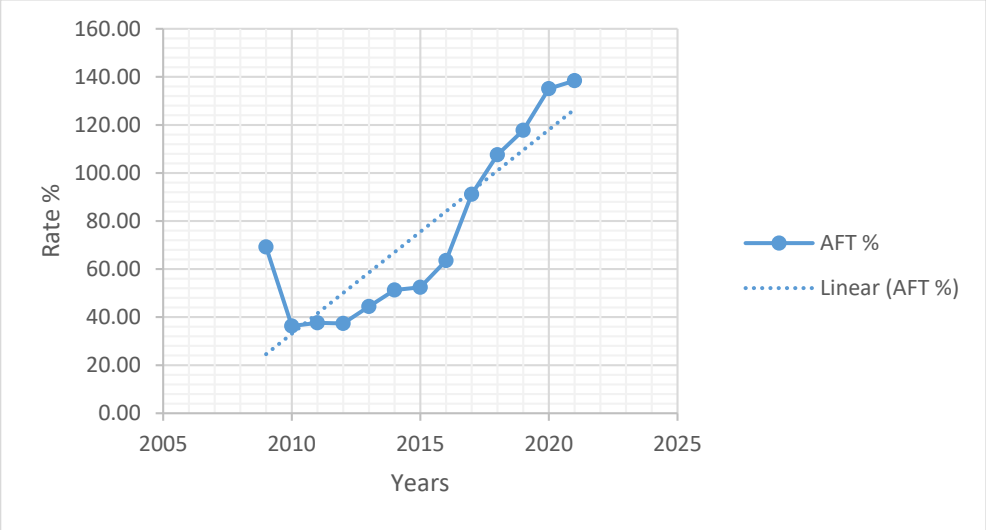


Figure 2: Trend of Fin Tech penetration for Nigeria, 2010-2022

The trend analysis of Fin Tech penetration rate in Nigeria shows that there was an initial decline in Fin Tech penetration rate at initial start-up in 2010 when it dropped from 69.2% of GDP to 36.3% in 2010. Subsequently, there was a steady trend of growth in Fin Tech penetration rising steadily and reached an all-time high of 138.4% of GDP in 2022. This is evidence that financial technology has taken over the payment system in Nigeria and has surpassed the 100 per cent mark. The expectation is that financial institutions will key into the massive penetration to provide means of alleviating poverty in Nigeria. This shall be ascertained much later in this analysis as we proceed.

The increasing penetration of Fin Tech suggests that digital financial transactions have become increasingly embedded in Nigeria's financial system. However, the subsequent econometric evidence demonstrates that increased penetration should not automatically be interpreted as equivalent to improved welfare.

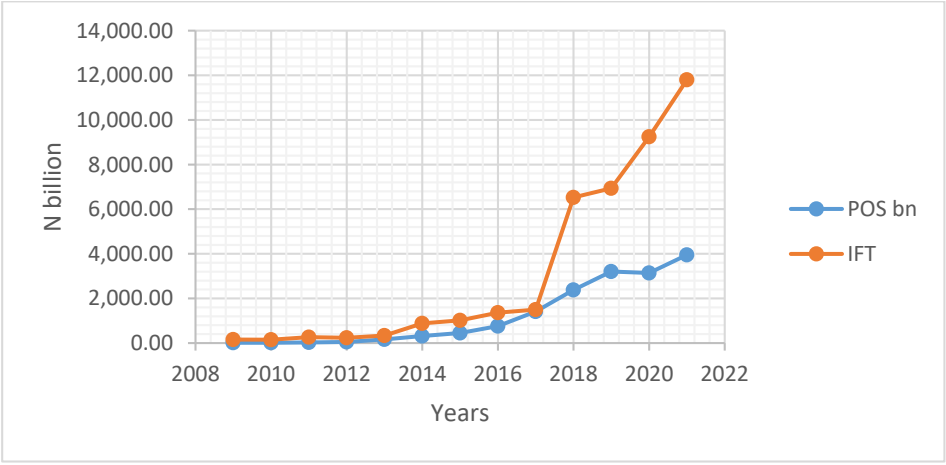


Figure 3: Trends of POS transactions and innovative Fin Tech transactions in Nigeria, 2010-2022

The figure 3 above shows that both POS transactions and transactions via innovative Fin Tech payments showed positive growth trend from 2010 through 2022. For example, value of POS transactions that started at N11.03bn in 2009 reached N1.4 trillion in 2017 and ended the year 2022 at N3.9 trillion. Innovative Fin Tech payment channels which include foreign remittances through e-transact, System Specs, block chain technology, Pay stack, etc. reached N11.8 trillion in 2022. This points to the fact that there is huge potential for financial technology in Nigeria as payments made via innovative systems are on the rise.

B. Stationarity, Long-Run Relationship and Engle-Granger Causality

The Augmented Dickey-Fuller test shows that PAL, AFT, POS, MIP, IFT, FIO and BNK were non-stationary at levels but became stationary after first differencing. Thus, the variables were integrated of order one, I (1).

Table 2: Summary of ADF test results at 5% critical value

Variables	**ADF Test Statistics**		**Order of Integration**	**Decision Rule**
	@ Level	@1st Difference		
LnPAL	-0.1279 [0.6381]	-2.7408 [0.0063]	I(1)	Stationary at 1st difference
LnAFT	-0.5569 [0.8753]	-3.9469 [0.0022]	I(1)	Stationary at 1st difference
LnPOS	-1.0257 [0.7434]	-8.4602 [0.0000]	I(1)	Stationary at 1st difference
LnMIP	0.0985 [0.9646]	-4.7748 [0.0001]	I(1)	Stationary at 1st difference
LnIFT	0.0953 [0.9645]	-9.8223 [0.0000]	I(1)	Stationary at 1st difference
LnFIO	-2.1311 [0.2329]	-4.3978 [0.0004]	I(1)	Stationary at 1st difference
LnBNK	0.8896 [0.8994]	-2.0668 [0.0376]	I(1)	Stationary at 1st difference
5% critical value @ level = -2.9389 *5% critical value @ 1st difference = -2.9458*				

Table 3: Summary of the Engle-Granger Cointegration Test

Dependent	**tau-statistic**	**Prob.***	**z-statistic**	**Prob.***
PAL	-6.945114	0.0222	-7.651922	0.0458
AFT	-5.625128	0.0362	-26.53756	0.4787
BNK	-1.620079	0.9973	-23.96238	0.5887
FIO	-3.742931	0.5151	-26.77272	0.4689
IFT	-8.994408	0.0371	-32.08847	0.2724
MIP	-2.505776	0.9556	-30.72220	0.3117
POS	-3.677660	0.5490	-26.81620	0.4671

The Engle-Granger counteraction results further indicate a long-run relationship between poverty alleviation and Fin Tech access. For PAL, the tau-statistic was −6.9451 with a probability value of 0.0222, while AFT recorded −5.6251 with a probability value of 0.0362. These results led the original study to reject the null hypothesis of no counteraction.

This finding suggests that Fin Tech access and poverty alleviation do not merely move together temporarily; their relationship exhibits a long-run component within the study period.

C. Granger Causality

Table 4: Summary of Granger Causality Test

Null Hypothesis:	Obs	F-Statistic	Prob.
AFT does not Granger Cause PAL	154	6.32976	0.0277
PAL does not Granger Cause AFT		4.46111	0.0131
POS does not Granger Cause PAL	154	3.63364	0.0288
PAL does not Granger Cause POS		3.06640	0.0495
MIP does not Granger Cause PAL	154	3.80333	0.0245
PAL does not Granger Cause MIP		3.56813	0.0378
IFT does not Granger Cause PAL	154	2.11709	0.1240
PAL does not Granger Cause IFT		0.12106	0.8861
FIO does not Granger Cause PAL	154	1.76383	0.1749
PAL does not Granger Cause FIO		3.85732	0.0233
BNK does not Granger Cause PAL	154	2.07311	0.1294
PAL does not Granger Cause BNK		1.70069	0.1861

The Granger causality results provide evidence of bidirectional causality between Fin Tech access and poverty alleviation. AFT does not Granger-cause PAL produced an F-statistic of 6.32976 with a probability value of 0.0277, while PAL does not Granger-cause AFT recorded an F-statistic of 4.46111 with a probability value of 0.0131.

The finding is important because it indicates that the relationship cannot be adequately represented as a simple one-way process in which Fin Tech independently determines poverty outcomes. Instead, changes in economic welfare may also influence the adoption and use of Fin Tech.

D. Estimation of the 2SLS Result

Table 5: Modelling equation 1 (poverty alleviation – Fin Tech) by 2SLS

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	8.347449	0.699985	11.92518	0.0000
AFT	-0.504426	0.034753	-14.51456	0.0000
POS	0.021388	0.017334	1.233900	0.2192
MIP	0.101544	0.082596	1.229408	0.2208

IFT	0.059704	0.020039	2.979373	0.0034
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	9.754246	2.377876	4.102084	0.0001
PAL	1.406649	0.093746	15.00494	0.0000
POS	0.159001	0.010025	15.86044	0.0000
FIO	0.485716	0.326620	1.487096	0.1391
BNK	0.340343	0.201304	1.690698	0.0930

The Simultaneous equation model is estimated thus:

PALt = 8.347 - 0.504*AFTt + 0.021*POSt + 0.102*MIPt + 0.0597*IFTt+ ε1t
AFTt = 9.754 + 1.407*PALt + 0.159*POSt + 0.486*FIOt + 0.3403*BNKt+ ε2t

E. Effect of Fin Tech access on poverty Alleviation

The 2SLS estimation produces coefficient of -0.504426 for Fin Tech access in the poverty alleviation equation, with a t-statistic of – 14.51456 and a probability value of 0.0000.

Thus. The coefficient is statistically significant at the 5% level but negative. Given that poverty alleviation is proxied by per-capita income, the result indicates that greater Fin Tch access, as measured in the study, was associated with lower income during the period under the investigation.

Thia result is particularly noteworthy because it contrasts with conventional expectation that greater financial access should improve welfare. One possible interpretation, consistent. With the study's framework, is that Fin Tech penetration measured by transaction intensity does not necessarily represent effective or product financial inclusion. A high volume of digital transactions can coexist with limited productivity financial access among poorer households.

The finding therefore suggests an important distinction between Fin Tech availability and effective utilization of Fin Tech for income generating activities.

1. Effect of innovative Fin Tech Transactions on poverty Alleviation

The result for innovative Fin Tech transaction is considerably different. IFT have a coefficient of 0.059704, at t- statistic of 2.979373 and a probability value of 0.0034.

The positive coefficient indicates that increases in innovative Fin Tech transactions were associated with increase in per-capita income. Since the study uses per-capita income, as its poverty alleviation proxy, this result implies an association between innovative digital financial transactions and improved welfare.

The result provides an important contribution to literature because it suggests that the type of Fin Tech activity matters. General Fin Tech penetration produced a negative coefficient, whereas innovative Fin Tech transaction produced positive and statistically significant

coefficient. Consequently, policies that simply expand digital transaction volumes may not produce the same outcomes as policies that encourage productivity and innovative digital financial services.

2. Reverse Relationship: Poverty Alleviation and Fin Tech Access

The second 2SLS equation report a coefficient of 1.406649 for PAL, with a t- statistic of 15.00494 and probability value of 0.0000.

This means that improvements in per-capita income were positively associated with Fin Tech access. Combine with Granger causality result, the evidence supports the existence of an interdependent relationship between economic welfare and Fin Tech adoption.

This finding has an important policy implication: expanding Fin Tech may require more than simply increasing the supply of digital financial platforms. Rising household incomes and stronger economic participation may themselves increase the capacity of individuals and business to adopt and use digital financial services'

V. DISCUSSION OF FINDINGS

The findings provide three major insights. First, Fin Tech access expanded substantially during the study period, demonstrating the rapid transformation of Nigerian's financial system.

Second, increase Fin Tech penetration did not automatically translate into higher per-capita income. Indeed, the negative and statistically significant coefficient for AFT suggests that the aggregate volume of Fin Tech activity should not be treated as synonymous with welfare improvement. This finding is in agreement with Okpe, C.O, (2026) who observed that transactions made through innovative Fintech services and fintech access have statistically relationship on poverty alleviation in Nigeria.

In addition, the study is consistent with the evidence provided by Ogbeide and Igbinigie (2019), who established that an increase in the number of commercial bank branches per 100,000 adults has a significant positive effect on per capita income and living standards, while also contributing to poverty reduction. Similarity, an Aribaba (2020) demonstrated that inclusion initiatives play an important role in improving welfare of low-income households in Nigeria. The study further revealed that social programs can reduce poverty and enhance per capita income, thereby contributing to improvements in the overall quality of life. In the same vein, survey-based studies by Bassey et al. (2022), Okeye et al. (2021), and Eze and Alugbuo (2021) reported a positive relationship between Fin Tech adoption and poverty reduction in Nigeria. These findings collectively underscore the importance of expanding access to financial services and promoting digital financial technologies as mechanism for improving economic welfare and reducing poverty.

The contrast between AFT and IFT is particularly important for the Nigerian context. It indicates that the quality and economic function of digital financial activity may be as important as the scale of adoption. A digital financial system can record substantial transaction volumes while some households remains excluded from productive financial

opportunities. Conversely, innovative digital payment mechanism can support businesses, facilitate market transactions and improve the efficiency of economic exchange.

The bidirectional relationship between Fin Tech access and poverty alleviation also suggests that digital financial development should be understood as part of a broader development process rather than as an isolated technological intervention.

VI. CONCLUSION

This study examined the relationship between Fin Tech access, innovative digital transactions and poverty alleviation in Nigeria between 210 and 2022. The evidence indicates that Fin Tech penetration expanded considerable during the period and that a long-run relationship existed between Fin Tech access and poverty alleviation. However, the 2SLS results show that Fin Tech access had a significant negative relationship with per- capita income, while innovative Fin Tech transactions had a positive and statistically significant relationship with per-capita income. The findings therefore suggest that the expansion of digital financial activity alone is insufficient to guarantee improved welfare. What appears particularly relevant is whether Fin Tech services provide productive opportunities for household and businesses. The bidirectional causality between Fin Tech access poverty alleviation further demonstrates that economic welfare and digital financial adoption influence one another. Consequently, efforts to use Fin Tech as an instrument for poverty reduction should emphasize productive digital finance, inclusive access, and digitalization of small business and infrastructure that allows underserved population to participate effectively in the digital economy.

RECOMMENDATIONS

Based on findings, the study proposes that:

- Fin Tech policy should move beyond transaction expansion toward productivity financial inclusion. Increasing the number of digital transactions should be the sole measure of success.
- Innovative digital financial services should be strengthened, given the positive and significant relationship between innovative Fin Tech transactions and per capita income.
- Small and medium sized enterprises should be encouraged to adopt digital payment technologies, particularly technologies capable of improving market access and transaction efficiency and digital infrastructure should be expanded, particularly in rural areas, so that Fin Tech adoption is not concentrated among already financially advantaged groups.
- Fin Tech development should be integrated with broader poverty-reduction policies, since the evidence indicates a bidirectional relationship between Fin Tech access and economic welfare.

SOURCES AND NOTES

Per capita income was sourced from the World Bank Database (www.data.worldbank.org).

POS transactions, financial openness and bank density were sourced from the CBN Statistical Bulletin, 2023 edition.

The Fin Tech penetration rate (ratio of e-payments to GDP) was computed using data obtained from the CBN.

Lending via Mobile and Internet Systems and Transactions via Innovative FinTech Services were sourced individually from the CBN e-payment statistics for various years.

Years	Per capita income ($)	Fin Tech penetration rate (%)	Value of POS transactions (Nbn)	Lending via Mobile and Internet Systems (Nbn)	Transactions via Innovative Fin Tech Services (Nbn)	Financial Openness (%)	Bank Density
2010	1,891.34	69.21	11.03	9,889.58	159.13	2.29	5436
2011	2,280.44	36.27	12.72	10,518.17	146.24	20.01	5809
2012	2,487.60	37.63	31.02	9,600.02	262.35	19.82	5454
2013	2,723.82	37.34	48.01	13,292.64	235.43	21.35	5564
2014	2,961.55	44.45	161.02	14,461.41	336.17	23.14	5639
2015	3,098.99	51.28	312.07	16,754.00	878.78	22.65	5526
2016	2,678.48	52.41	448.51	17,688.42	1,016.05	21.94	5470
2017	2,176.00	63.52	759.00	21,025.24	1,360.41	23.65	5570
2018	1,968.56	91.10	1,409.81	22,459.18	1,495.42	24.90	5714
2019	2,027.00	107.60	2,383.11	22,646.33	6,526.96	23.07	5301
2020	2,229.86	117.75	3,204.75	25,676.87	6,932.83	23.52	5437
2021	2,155.75	135.08	3,141.42	29,030.01	9,246.79	23.56	5385
2022	2,177.82	138.40	3,953.47	32,868.49	11,801.38	22.90	6918

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