Impact of Financial Technology on the Performance of Commercial Banks in Nigeria

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ABSTRACT

The growth and penetration of financial technology (FinTech) are instrumental to achieving universal financial inclusion and integrating the unbanked population into the financial system. However, this development has intensified competition between traditional and agency banks, thereby posing a threat to commercial banks' performance. This context has motivated several studies examining the impact of FinTech on commercial banks' performance, although notable econometric shortcomings persist in the literature. Against this backdrop, this study employs robust analytical techniques underutilized in prior research. An ex-post facto research design was adopted, using annual time series data spanning from 2012 to 2025. The variables considered include Return on Assets (ROA) as the regressand, while Automated Teller Machines (ATM), Point of Sale (POS), and Mobile Banking (MB) serve as regressors. To determine the appropriate estimation technique, a unit root test was conducted, revealing a mixed order of integration at $I(0)$ and $I(1)$, while the F-bound test confirmed the existence of a cointegrating relationship in the model. Given this mixed order of integration, the Auto Regressive Distributed Lag (ARDL) model was employed, but the established cointegrating relationship suggests a more suitable technique (the Error Correction Mechanism [ECM]) to address disequilibrium in the model. The ECM results indicate that ATM and MB have a significant positive impact on commercial banks' performance in the short run, while POS has a positive but statistically insignificant impact during the period under review. In the long run, however, only MB maintains a significant positive impact, whereas ATM and POS exhibit a negative but insignificant impact on commercial banks' performance in Nigeria. These findings suggest that although FinTech contributes positively to commercial banks' performance in the short run, the increasing convenience and operational flexibility of agency banking may drive greater adoption among Nigerians in the long run, potentially crowding out traditional banking channels. This backdrop is reflected in the negative performance of ATMs and POS in the long-run. In light of these findings, this study recommends that commercial banks develop innovations that will facilitate the adoption of APIs or open banking to enable service and data sharing through Application Programming Interface, thereby stimulating third-party collaborations and improving performance of commercial bank in Nigeria.

Keywords: ATMs, Commercial Banks, FinTech, Mobile Banking, POS, Return on Assets, TAM.

INTRODUCTION

Commercial or deposit money banks are central to the monetarist argument that money is exogenously determined in an economy. In practice, deposit money banks create money by extending credit and charging interest on loanable funds. More recently, the emergence of electronic payment platforms and agency banking in

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Nigeria, formally introduced around 2012 (Mustapha, 2018), has enhanced the capacity of banks to reach the unbanked population, often described as the "last mile," in a bid to deepen financial inclusion and achieve universal financial coverage. In particular, the Universal Financial Access (UFA) 2020 goal emphasized the need to integrate the unbanked population by providing access to transaction accounts that enable individuals to store, send, and receive money (World Bank, 2018). By incorporating the unbanked population through e-payment platforms and financial technology (FinTech) innovations such as Automated Teller Machines (ATMs), Point of Sale (POS) terminals, internet banking, blockchain, and mobile banking, commercial banks can mobilize idle funds outside the formal financial system, thereby expanding their capacity to create money through interest rate mechanisms within the economy. This transformation, driven by FinTech, can also be attributed to the high cost of establishing new bank branches, estimated at ₦250 million (Idris, 2021) in Nigeria, particularly in rural or low-income areas where income streams are limited and may not generate sufficient deposits to optimize profitability or return on assets (ROA).

As FinTech deepens, one critical dimension that has attracted considerable attention is agency banking. With its distinctive services, including peer-to-peer (P2P) transfers, cash withdrawals, cash deposits, and bill payments—often at charges comparable to transportation costs to physical bank branches—agency banking has gained widespread acceptance. Originating in Brazil and gaining significant traction in countries such as India and Colombia (Geopalakrishna, 2023), agency banking has become a global phenomenon. Following the 2006 Reserve Bank of India directive encouraging commercial banks to engage agents to deliver financial services outside traditional branches, approximately 90% of the adult population had access to basic financial services by 2021, compared with 58.7% in 2011 (EFInA, n.d.). Similarly, the proportion of adults with bank accounts increased from 56% in 2011 to 84% in 2024 (Montel, 2021). The positive impact of agency banking is even more pronounced in Africa, although the continent continues to face structural gaps in financial infrastructure. For instance, the average of five bank branches per 100,000 people (World Bank, n.d.; Ironsi, 2023) remains significantly lower than the approximately 200 ATMs and 30 bank branches per 100,000 adults observed in South Korea (World Bank, n.d.). Over time, however, this disparity has been increasingly mitigated by the growth of FinTech and e-payment platforms. In Nigeria, for example, about 49% of the adult population had access to basic financial services in 2022, compared to 34% in 2014 (World Bank, 2024). Furthermore, Africa accounted for approximately 69.23% of global agency banking transaction volume in 2022 (Statista, 2025). This impact is particularly evident in Kenya, where the M-Pesa mobile payment service, introduced by Safaricom in 2007, has significantly enhanced financial inclusion, commercial banks' performance, and productivity (Anazia & Nwachukwu, 2025; Wachira & Njuguna, 2023).

Similar to the Kenyan experience, the expansion of FinTech in Nigeria—driven by policy initiatives such as the National Financial Inclusion Strategy (NFIS 3.0), which aimed to reduce financial exclusion to 25% by 2024 (EFInA, 2023)—has stimulated the adoption of innovative financial solutions, including blockchain technology, mobile banking, POS systems, and internet banking. These innovations have enhanced customer acceptance and strengthened the competitive positioning of commercial banks within the financial system. This development aligns with the Technology Acceptance Model (TAM), which posits that perceived usefulness and ease of use are critical determinants of users' acceptance of technological innovations (Davies, 1989). A practical illustration can be observed in First Bank of Nigeria (FBN) Ltd, where innovations such as FirstMonie, introduced in 2010, the early adoption of ATMs in 1990, and enhanced security of customer deposits have reinforced its position as one of the leading banks in Nigeria. These efforts culminated in favorable ratings from Fitch, S&P, and Moody's in 2022. In the preceding year, FBN was ranked as the third-largest bank, accounting for approximately 11% of domestic banking assets (Akanbi, 2022). Additionally, it was recognized as the best bank in Nigeria for overall performance, profitability, efficiency, and risk-adjusted returns, based on The Banker's 2021 audit of the top 100 banks in Africa (Akanbi, 2022). Further reports indicate that FBN received the award for the most innovative bank in Africa in 2014 at the EMEA Finance African Banking Awards, as well as the Best Mobile Banking App in Nigeria in 2019 by Global Business Outlook (Akanji, 2022).

Despite these advancements, increasing competition from agency banking platforms such as OPay, MoniePoint, Paga, and PalmPay—characterized by flexible mobile applications, rapid transaction capabilities, and deeper penetration into rural areas with minimal traditional bank presence—continues to pose a significant threat to commercial banks in Nigeria. This intensifying competition, coupled with regulatory policies such as the

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recapitalization requirements introduced by the Central Bank of Nigeria (CBN) in March 2024—₦500 billion for international banks, ₦200 billion for national banks, ₦50 billion for regional banks, ₦20 billion for national non-interest banks, and ₦10 billion for regional non-interest banks—with a compliance deadline of March 31, 2026 (Ali, 2026), underscores the need for commercial banks to strengthen innovation in order to build customer trust, enhance acceptance, and optimize performance, particularly in terms of ROA. While existing empirical studies generally report positive effects of financial technology on the performance of commercial banks in Nigeria, Kenya, and other economies (Unachukwu & Chuckuma, 2026; Okoro et al., 2024; Muttai et al., 2023), many of these studies paid limited attention to rigorous econometric procedures necessary for producing reliable results. This limitation may indicate biased or misleading results, underscoring the need for a more robust empirical assessment of the impact of financial technology on the performance of commercial banks in Nigeria from 2012 to 2025. To this end, this study is guided by the following hypotheses.

H_{01}: ATMs have no significant impact on the performance of commercial banks in Nigeria

H_{02}: POS has no significant impact on the performance of commercial banks in Nigeria

H_{03}: MB has no significant impact on the performance of commercial banks in Nigeria

Theoretical Framework

This study is anchored on the Technology Acceptance Model (TAM), developed by Davis (1989), as its theoretical framework. The core constructs of the model are perceived usefulness (PU) and perceived ease of use (PEOU), implying that individuals are more likely to adopt an innovation if they perceive it to be both beneficial and easy to use (Ajibade, 2018). In essence, perceived usefulness refers to the degree to which a user believes that a particular innovation will enhance performance or overall well-being, while perceived ease of use relates to the extent to which the innovation can be applied with minimal effort and complexity (Mustapha, 2018). Within the context of this study, the TAM provides a relevant lens for understanding how FinTech innovations influence customer behavior and, by extension, the performance of commercial banks in Nigeria. Specifically, the model explains how commercial banks can deploy innovative financial solutions that are flexible, secure, user-friendly, and efficient to attract and retain customers. This is particularly important given the rising competition from agency banking platforms such as OPay, MoniePoint, Paga, and Kuda, which offer simplified account-opening processes, faster transaction speeds, and extensive penetration into rural and underserved areas where traditional banks have limited presence.

The increasing competition from these agency banks has compelled traditional banks such as Guaranty Trust Holding Company (GTCO), United Bank for Africa (UBA), and First Bank of Nigeria to intensify their innovation strategies. For instance, in response to the ease with which customers can obtain ATM cards from agent outlets operated by platforms like OPay and MoniePoint, GTCO has introduced ATM card-dispensing machines that allow customers to obtain their cards within 5 to 10 minutes, thereby eliminating the prolonged delays associated with traditional collection processes. Similarly, UBA has implemented POS-based services at its branches to facilitate quick cash withdrawals and deposits, reducing the need for customers to wait in long queues. This underscores the applicability of TAM in deepening customer acceptance and the growth of commercial banks in Nigeria.

Despite its wide applicability, TAM has been criticized for its limited relevance in institutional contexts where user choice is constrained by organizational or regulatory factors. Ajibade (2018) highlights this limitation by illustrating that the adoption of certain technological tools in library systems may depend more on institutional requirements than on perceived usefulness or ease of use. A similar situation exists in Nigeria's public sector, where employees are often required to maintain salary accounts with specific traditional banks, thereby limiting their ability to adopt alternative financial platforms such as OPay or MoniePoint, despite their perceived advantages.

Notwithstanding these criticisms, the TAM remains highly relevant to this study as it provides a robust framework for analyzing the relationship between FinTech adoption and the performance of commercial banks in Nigeria. The growing penetration of agency banking platforms—characterized by flexible mobile applications,

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simplified onboarding processes, virtual banking services, and reliable transaction systems—demonstrates how perceived usefulness and ease of use drive customer preference and adoption. Consequently, commercial banks must continuously innovate and refine their financial technology offerings to remain competitive. In view of the foregoing, the application of TAM in this study underscores the critical role of user perception in shaping the adoption of FinTech solutions and highlights how these perceptions translate into performance outcomes for commercial banks. By leveraging technologies that align with customer expectations for convenience, security, and efficiency, commercial banks can enhance their return on assets, improve profitability, and sustain their relevance within Nigeria's rapidly evolving financial ecosystem.

Empirical Review and Gaps in Literature

Unachukwu and Chukwuma (2026) examined the effects of financial technology on financial performance of commercial banks in Nigeria using an ex-post facto research design. The study employed annual time-series data from 2009 to 2024, with Point of Sale (POS), Mobile Banking (MB), Internet Banking (IB), and Automated Teller Machine (ATM) as explanatory variables and Return on Assets (ROA) as the dependent variable. Despite using time-series data, the authors adopted a random-effects model for estimation, which is methodologically inappropriate for single-country time-series analysis. Furthermore, although a random-effects framework was claimed, the model specification was a simple linear regression. The results indicated a significant positive impact of POS, MB, IB, and ATM on bank performance. The study recommended increased investment in digital banking infrastructure to enhance customer adoption and performance. However, the failure to align the estimation technique with the data structure and the absence of relevant pre- and post-estimation diagnostics limit the reliability of the findings.

Amah and Charles-Olimene (2025) evaluated the impact of FinTech on traditional banking and allied financial services in Port Harcourt, Nigeria. The study incorporated Digital Payment Systems and Blockchain and Cryptocurrency Technologies as explanatory variables, while Customer Satisfaction and Financial Accessibility served as outcome variables. A regulatory framework was introduced as a moderating variable. Using a descriptive survey design, primary data were collected from bank staff and customers and analyzed using Pearson correlation and multiple regression techniques. The findings revealed significant positive relationships between FinTech variables and both customer satisfaction and financial accessibility, with the regulatory framework exerting a significant moderating effect. The study recommended increased investment in digital infrastructure. However, reliance on perception-based primary data limits generalizability, and the absence of time-series or macro-financial indicators restricts its relevance for evaluating bank performance dynamics.

Osagu and Ehiedu (2025) investigated the impact of FinTech growth risks on bank performance in Nigeria, using annual time-series data from 2003 to 2023. The variables included Cybersecurity Risk (CYR), Operational Risk (OPR), Regulatory Compliance Risk (RCR), and Technology Adoption and Integration Risk (TAIR), with Return on Equity (ROE) as the dependent variable. Although the Johansen cointegration test indicated a long-run relationship, the study employed Ordinary Least Squares (OLS), which is unsuitable when cointegration is present. The Vector Error Correction Model (VECM) would have been more appropriate. The findings showed no significant short-run effects of the risk variables, although some exhibited positive coefficients. While diagnostic tests confirmed the model's adequacy, the inappropriate estimation technique undermines the robustness of the conclusion.

Okoro et al. (2024) analyzed the impact of financial technology on the performance of Nigerian commercial banks using annual time series data from 2010 to 2020. The study employed ATM, POS, and Internet transactions as explanatory variables, with Liquidity Ratio (LR) as the dependent variable. The study failed to conduct essential pre-estimation tests, such as unit root and cointegration analysis, yet applied OLS estimation. The results showed non-significant positive effects of ATM and POS, and a non-significant negative effect of internet banking on the performance of commercial banks in Nigeria. The absence of diagnostic testing raises concerns about model validity and potential violations of classical assumptions.

Muttai, Njoka, and Muchira (2023) assessed the effects of financial technology on bank performance in Kenya,

using monthly time-series data from 2012 to 2021. The variables included mobile banking, agency banking, internet banking, and ATM usage, with ROA as the dependent variable. Despite the time-series nature of the data, panel regression and ANOVA were employed, indicating methodological inconsistency. Although diagnostic tests were conducted, the unit root test did not clearly establish the order of integration, suggesting possible model misspecification. The results showed significant positive relationships between FinTech variables and bank performance, but the analytical inconsistencies weaken the credibility of the findings.

Osigbemhe, Nwoha, and Okwo (2023) examined the effect of financial technology on bank performance in Nigeria using annual data from 2009 to 2021. The variables included ATM, National Electronic Funds Transfer (NEFT), and Mobile Pay (MPAY), with ROA as the dependent variable. The study did not conduct unit root or cointegration tests and relied solely on linear regression. The results indicated non-significant negative effects of ATM and NEFT, and a non-significant positive effect of MPAY. The lack of econometric rigor limits the validity of its conclusion.

Otonne and Ige (2023) explored the influence of financial technology on banking services in Nigeria. Quarterly time series data for the period 2012 to 2019 was used for the study. Multiple outcome variables used for the study included return on assets (ROA), return on equity (ROE), Earnings per share (EPS), and price earnings ratio (PER), while the explanatory variables included

the value of point-of-sale transactions (POS), the value of mobile money transfer (MOB), value of automated teller machine transactions (ATM), and the value of online payment transfer (OPT). The unit root result indicated a mixed order of integration [$I(0)$ and $I(1)$]. The F-bound cointegration test showed no evidence of cointegration in one model and evidence in three models. The study adopted the ARDL model, which is largely unfit for multivariate analysis, against the Vector Autoregressive (VAR) model, which is equipped to analyze multiple time series dependent and independent variables simultaneously. The study found a positive impact of Fintech on the performance of commercial banks in Nigeria. Regardless, the study relied on an analytical technique unfit for the data set, given that the varying data collected for Access Bank and GT Bank for the period 2012 to 2019 are better estimated with panel methods such as pooled OLS, fixed effects, or random effects. Similarly, Otonne, Melikam and Ige (2023) analyzed FinTech adoption and bank performance using quarterly data. Despite identifying mixed integration, cointegration was not tested, and ARDL was applied across multiple models. Given the cross-bank nature of the data, panel methods would have been more suitable. The study reported mixed effects but lacked diagnostic validation.

Njogo and Adekonojo (2021) assessed the impact of financial technology on the performance of Guaranty Trust Bank (GTB) in Ogun State, Nigeria. Primary data were collected through structured questionnaires administered to 168 GTB staff in the state. Variables used for the study included

Customer satisfaction (CS) and Competitive Advantage (CA) as the dependent variables, and Mobile banking transactions (Mobile) with Artificial Intelligence (AI) as independent variables. For data analysis, the Pearson Product-Moment Correlation was adopted to show a statistically strong and positive relationship between mobile payments and customer satisfaction, as well as a strong positive relationship between artificial intelligence and competitive advantage in the study. The study recommended the need for technology adoption, notably artificial intelligence, to enhance the competitive advantage and productivity of GTB in the competitive financial market.

Mustapha (2018) examined E-payment technology effect on the performance of banks in Nigeria. Annual time series data for the period 2012 to 2017 was used for the study. This, however, is significantly short for time series analysis. The study used multiple dependent variables, including the performance index and the risk exposure variable, while the explanatory variables included ATM, POS, Mobile Money Transfer (MMT), and internet services (Web). The study failed to perform relevant pre-estimation tests and adopted panel regression, largely unfit for time series data, as an analytical technique. The results indicated that bank performance increased after the adoption of electronic payment technologies. It was recommended, in line with the result, that commercial banks should prioritize electronic payment channels to stimulate financial inclusion in Nigeria.

Overall, the empirical literature reveals consistent evidence of a positive relationship between financial

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technology and bank performance. However, significant methodological gaps persist. These include inappropriate model selection, failure to conduct unit root and cointegration tests, misuse of panel techniques for time-series data, absence of diagnostic testing, and overreliance on primary survey data. Additionally, many studies fail to distinguish between short-run and long-run dynamics, thereby limiting policy relevance. This study addresses these gaps by employing robust econometric techniques that account for mixed integration orders, cointegration, and dynamic adjustments, thereby providing more reliable evidence on the impact of financial technology on the performance of commercial banks in Nigeria.

METHODOLOGY

This study relied on an ex-post facto research design because it is useful for identifying the patterns, causes, and effects of an event or situation that has already occurred. Also, the design was adopted for this study because of its flexibility and cost-effectiveness, as it enables retrieval of processed data from a database, making it less expensive compared to experimental and ethnography designs. As such, annual time series data sourced from the CBN statistical bulletin and the National Bureau of Statistics (NBS) spanning from 2012 to 2025 were used in this study. This period was selected because it heralds the era of data collection and availability on FinTech and e-payment platforms, as well as the introduction of policies such as NFIS 3.0, which can provide sufficient information for this study.

The model adopted for this study is the Autoregressive Distributed Lag (ARDL) model developed by Pesaran and Pesaran (1997) and Pesaran and Shin (2001). ARDL combines autoregressive (regression of the past values of the dependent variable on itself) with distributed lags (introduction of lags of the explanatory variables) in a model (Stock & Watson, 2015). Put differently, Ezie and Ezie (2021) see ARDL as a technique in which the repressors and the regressand are related not only contemporaneously but also across historical (lagged) values. What this means is that ARDL involves multiple time series analysis, where the past values of the predictors (Xt) depicted as q-lags are introduced into an autoregression (Yt) known as p-lag to produce the model [ARDL (p,q)] shown as follows

$$y_t = \beta_0 + \beta_1 y_{t-1} + \beta_2 y_{t-2} .... + \beta_k y_{t-k} + \beta_0 x_t + \beta_1 x_{t-1} + \beta_2 x_{t-2} + ... + \beta_q x_{t-k} + \varepsilon_t \quad - - - - \quad (1.1)$$

Where;

Yt = regressand or dependent or endogenous or outcome variable

Xt = regressors or predictors or explanatory or independent variables

β_0 is the constant or intercept

$\beta_1 - \beta_q$ are parameters to be estimated

t-k is the lag length

u_t is the error term/white noise.

ARDL model is adopted as the most suitable for this study due to its desirable attributes, that included ease and flexibility in application in a mixed order of integration [*I*(0) and *I*(1)], unlike the Vector Autoregression (VAR), which applies to *I*(1)) integration, and the Ordinary Least Squares (OLS) that applies to *I*(0) integration. In furtherance, the model specified by Unachukwu and Chukwuma (2026) to examine the effects of financial technology on the financial performance of commercial banks in Nigeria for the period 2009 to 2024 was adopted for this study. The model follows;

$$ROA = \alpha O + \beta_1 POS + \beta_2 MB + \beta_3 IB + \beta_4 ATM + \varepsilon \quad - - - - - - - \quad (1.2)$$

Where

α = Constant Term

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β = Beta coefficients

ε = Error Term

ROA = Return on Assets

POS = Point of Sale

MB = Mobile Banking

IB = Internet Banking

ATM = Automated Teller Machine

Equation 1.2 was modified by retaining ROA, ATM, POS, and MB, while excluding IB. Thus, the explicit form of the current model is expressed as;

$$ROA_t = \beta_0 + \beta_1 ATM_t + \beta_2 POS_t + \beta_3 MB_t + \varepsilon \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (1.3)$$

Equation 1.3 is specified in an ARDL form expressed as;

$$ROA_t = \beta_o + \sum_{t=i}^{n} \beta_1 ROA_{t-i} + \sum_{t=i}^{n} \beta_2 ATM_{t-i} + \sum_{t=i}^{n} \beta_3 POS_{t-i} + \sum_{t=i}^{n} \beta_4 MB_{t-i} + \varepsilon_t \quad - \quad - \quad - \quad (1.4)$$

Where;

β_0 = intercept/constant

β_1, β_2, β_3, and β_4 are the coefficients of the parameter estimate.

t = time (2012 – 2025)

From equation 1.4, ATM, POS, and MB are expected to have positive signs, implying that an increase in β_2 to β_4 will increase Return on Assets of commercial banks in Nigeria. Thus $\beta_2 - \beta_4 > 0$.

While ARDL is suitable for a dataset integrated at level [$I(0)$] and in first difference [$I(1)$], it is largely ineffective when a cointegrating relationship is present, as exemplified by the F-Bound test. When this happens, the data set will require the Error Correction Mechanism (ECM) to address disequilibrium that may arise between the short and the long run. Thus, ECM becomes a suitable estimation technique for this study, rather than ARDL, to reconcile the short-run behavior of an economic variable with its long-run behavior, given the evidence of a cointegrating relationship established in Table 1.2. In other words, equation 1.5 below is a useful technique rather than the ARDL model specified in equation 1.4. The ECM is expressed as;

$$\Delta ROA_t = \beta_o + \sum_{t=i}^{n} \beta_1 \Delta ROA_{t-i} + \sum_{t=i}^{n} \beta_2 \Delta ATM_{t-i} + \sum_{t=i}^{n} \beta_3 \Delta POS_{t-i} + \sum_{t=i}^{n} \beta_4 \Delta MB_{t-i} + \phi \mu_{t-1} \quad - \quad - \quad (1.5)$$

Where;

ϕ = the coefficient of the error correction term

Pre-Estimation Tests

The essence of pre-estimation tests is to ascertain the most suitable technique for a dataset. Thus, a unit root test using the Augmented Dickey-Fuller (ADF) and a cointegration test using the F-bound test were carried out for this study. Unit root test examines the stationarity of the variables under consideration to avoid spurious results and to determine the cointegrating properties of all included variables. The unit root using the ADF is expressed as;

$$\Delta Y_t = \beta_1 + \beta_{2t} + \delta Y_{t-1} + \Delta Y_{t-1} + U_t \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad - \quad (1.6)$$

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Where:

Y_t = variable under investigation.

$\Delta Y_{t-1} = (Y_{t-1} - Y_{t-2})$ = Difference between the first two lagged values of the variable under investigation, and U_t = pure white noise error term. This test is performed on the following hypotheses;

$H0$: $\beta = 0$ (i.e β has a unit root),

$H1$: $\beta < 0$ (i.e β has no unit root).

The decision rule is to reject H_0 if the ADF t-statistic is negative and greater than the 5% critical value or the p-value is less than the conventional 0.05 (5%). Otherwise, accept H_0 when the p-value is greater than 0.05 and conclude that there is a unit root. Cointegration test using the F-bound is to determine whether there is evidence of a cointegrating or long-run relationship in the model. This is estimated from equation 1.5 expressed as;

$$\Delta ROA_t = \beta_o + \sum_{t=i}^{n} \beta_1 \Delta ROA_{t-i} + \sum_{t=i}^{n} \beta_2 \Delta ATM_{t-i} + \sum_{t=i}^{n} \beta_3 \Delta POS_{t-i} + \sum_{t=i}^{n} \beta_4 \Delta MB_{t-i} + \phi_1 ROA_{t-1} + \phi_2 ATM_{t-1} + \phi_3 POS_{t-1} + \phi_4 MB_{t-1} + \varepsilon_t \quad (1.7)$$

F-bound test is carried out under the following null and alternative hypotheses;

H_o: No cointegration exists between the variables.

H_1: Cointegration exists between the variables.

The decision-making rule is to reject H_0 if the calculated F-statistic is greater than the 5% critical upper bound $I(1)$ and lower bound $I(0)$ and conclude that there is a co-integrating relationship in the model. Accept H_0 if the F-statistic is below the upper and lower bounds and conclude that there is no co-integrating relationship in the model. Moreso, declare the result inclusive if the F-statistic value falls between $I(0)$ and $I(1)$ at 5%.

Post-Estimation Tests and Method of Hypothesis Testing

Relevant post-estimation or diagnostic tests, crucial to the classical or OLS assumptions, such as serial correlation, heteroscedasticity, normality, and stability, were estimated to ensure that the OLS assumptions are not violated in this study. The hypotheses for this study under H_0: $\beta^* = 0$ (Explanatory variables are not statistically significant in affecting ROA) are rejected when the p-value at the 5% threshold is less than 0.05. Do not reject H_0 if the p-value is greater than 0.05 and conclude that there is no significant impact of the explanatory variable on the outcome variable. Note that this test is applicable to the specific research variables, as the condition differs under post-estimation tests, especially for serial correlation, heteroscedasticity, and normality.

RESULTS AND DISCUSSION OF FINDINGS

Table 1.1: ADF unit root test Result

ADF test	I(0)			ADF test		I(1)		Remark
Variables	ADF t-test	5%	p-value	ADF t-test	5%	p-value	Order Integration	Stationary
ROA	-3.904519	-3.828975	0.0447***				I(0)	Stationary
ATM	-4.549548	-3.933364	0.0216***				I(0)	Stationary
POS	-2.857965	-3.828975	0.2054	-7.008706	-3.933364	0.0010***	I(1)	Stationary
MB	-3.457007	-3.828975	0.0873	-5.233385	-3.875302	0.0072***	I(1)	Stationary

Source: Author's Work Using Eviews 12 (2026)

The ADF results indicate a mixed order of integration across the variables. ROA and ATMs have ADF t-statistic (-3.904519 and -4.549548) that exceed their respective 5% critical values (-3.828975 and -3.933364), with p-

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values (0.0447 and 0.0216) below 0.05. Hence, H_0 (unit root) is rejected, confirming that ROA and ATM are stationary at level, *I*(0). In contrast, POS and MB have ADF t-statistic (-2.857965 and -3.457007) that are lower than their 5% critical values (-3.828975 and -3.828975), with p-values (0.2054 and 0.0873) exceeding 0.05. Thus, H_0 is not rejected, indicating the presence of unit roots at level (non-stationarity). However, after first differencing, POS and MB became stationary, as their ADF t-statistic (-7.008706 and -5.233385) exceed the 5% critical values (-3.933364 and -3.875302), leading to the rejection of H_0 and confirming stationarity at *I*(1). Overall, the dataset exhibits mixed order of integration, *I*(0) and *I*(1), which justifies the application of the ARDL modeling approach.

Table 1. 2: F-Bound Result

Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	8.866885	10%	3.47	4.45
K	3	5%	4.01	5.07
		2.5%	4.52	5.62
		1%	5.17	6.36

Source: Author's Work Using Eviews 12 (2026)

The F-bound test result shows an F-statistic of 8.866885, which exceeds both the lower bound *I*(0) = 4.01 and upper bound *I*(1) = 5.07 at the 5% level. Since the F-statistic is greater than both critical bounds, H_0 (no cointegration) is rejected. This confirms the presence of a long-run (cointegrating) relationship among the variables. Consequently, ECM is required to capture the short-run dynamics and adjust for deviations from the long-run equilibrium.

Table 1.3 ECM Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-187208.7	25286.87	-7.403394	0.0051
@TREND	13208.95	4720.225	2.798373	0.0679
D(ATM)	87.88804	3.439729	25.55086	0.0001
D(POS)	2529.190	1492.972	1.694064	0.1888
D(MB)	0.051779	0.000230	224.9618	0.0000
CointEq(-1)*	-0.237067	0.028148	8.422296	0.0035
R-squared	0.999946	Mean dependent var		157683.5
Adjusted R-squared	0.999901	S.D. dependent var		4039750.
S.E. of regression	40173.89	Akaike info criterion		24.34668
Sum squared resid	9.68E+09	Schwarz criterion		24.58913
Log likelihood	-140.0801	Hannan-Quinn criter.		24.25691
F-statistic	22244.38	Durbin-Watson stat		1.803069
Prob(F-statistic)	0.000000			

Source: Author's work using Eviews 12 (2026)

The estimates in Table 1.3 show that ATM has a positive coefficient (β = 87.88804), indicating that increased ATM usage enhances commercial banks' performance in Nigeria. The effect is statistically significant, as the p-value (0.0001) is less than 0.05. Thus, H_0 is rejected, confirming that ATM is a significant positive determinant of ROA, consistent with the a priori expectation.

POS also exhibits a positive coefficient (β = 2529.190), suggesting that greater POS penetration improves bank performance. However, its p-value (0.1888) exceeds 0.05, implying statistical insignificance. Therefore, H_0 is not rejected, indicating that POS does not have a significant impact on the ROA of commercial banks in Nigeria during the study period.

MB shows a positive and statistically significant impact on the performance of commercial banks, with a coefficient (β = 0.051779) and p-value (0.0000) below 0.05. This supports the rejection of H_0 and confirms MB as a significant positive predictor of ROA, aligning with theoretical expectations.

The error correction term (ECM = -0.23) is negative and correctly signed, indicating convergence toward the long-run equilibrium. This implies that disequilibrium is corrected at the speed of 23%, suggesting a relatively weak speed of adjustment in the model.

The adjusted R^2 (most suitable over R^2 when there are multiple explanatory variables) value (0.9999) indicates that 99.99% of the variation in bank performance is explained by ATM, POS, and MB, demonstrating strong explanatory power. Furthermore, the F-statistic p-value (0.000000) confirms that the model is jointly significant. Overall, the results suggest a well-fitted model with ATM and MB as key drivers of bank performance, while POS remains statistically insignificant despite its positive coefficient.

Table 1.4: Long Run Result

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	-16.35074	51.95173	-0.314730	0.7736
POS	-19683.98	29566.49	-0.665753	0.5532
MB	0.042067	0.004394	9.573390	0.0024

Source: Author's work using Eviews 12 (2026)

The long-run estimates in Table 1.4 indicate that ATM (β = -16.35074, p = 0.7736) and POS (β = -19683.98, p = 0.5532) exert negative but statistically insignificant impacts on ROA. This suggests that, over time, the expansion of ATM and POS channels do not translate into sustained improvement in bank performance. The negative signs may reflect high maintenance costs, infrastructure expenses, and operational inefficiencies associated with these channels, which can offset their potential long-term benefits. In contrast, Mobile Banking (MB) maintains a positive and statistically significant impact on ROA (β = 0.042067, p = 0.0024), indicating that digital banking innovations consistently enhance bank performance over time. This aligns with the expectation that mobile platforms improve efficiency, reduce transaction costs, and expand financial inclusion.

In comparison of the result in Table 1.4 with the ECM result, ATM and MB previously showed a significant positive impact, with POS exhibiting a non-significant positive impact. MB continued a long run significant positive impact, while ATMs and POS witnessed a non-significant decline in the long run. The divergence suggests that ATM's short-run benefits are not sustained in the long run, likely due to rising operational costs. POS remains insignificant in both periods, indicating a limited contribution. However, MB demonstrates consistency, retaining its positive and significant influence in both the short and long run, underscoring its strategic importance in Nigeria's banking sector.

Post-Estimation Tests

Table 1.5: Autocorrelation Test Result

F-statistic	1.687864	Prob. F(2,1)	0.4781
Obs*R-squared	9.257599	Prob. Chi-Square(2)	0.0630

Source: Author's work using Eviews 12 (2026)

The autocorrelation test result in Table 1.5 shows Prob. F(2,1) = 0.4781 and Prob. Chi-Square(2) = 0.0630, both exceeding the 0.05 significance level. Therefore, H_0 (no serial correlation) is accepted. This indicates the absence of autocorrelation in the model residuals. Hence, the estimates are reliable, and the model does not suffer from serial correlation problems.

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Table 1.6: Heteroscedasticity Test Result

F-statistic	0.541889	Prob. F(8,3)	0.7829
Obs*R-squared	7.092100	Prob. Chi-Square(8)	0.5267
Scaled explained SS	0.549350	Prob. Chi-Square(8)	0.9998

Source: Author's work using Eviews 12 (2026)

The heteroscedasticity test result in Table 1.6 shows Prob. F(8,3) = 0.7829, Prob. Chi-Square(8) = 0.5267, and Prob. Chi-Square (Scaled explained SS) = 0.9998, all greater than 0.05. Therefore, H_0 (homoscedasticity) is accepted, signifying constant variance in the model. This indicates that the residuals have constant variance, implying the absence of heteroscedasticity. Hence, the model is well specified, and the estimated coefficients are reliable for inference.

Normality Test Result

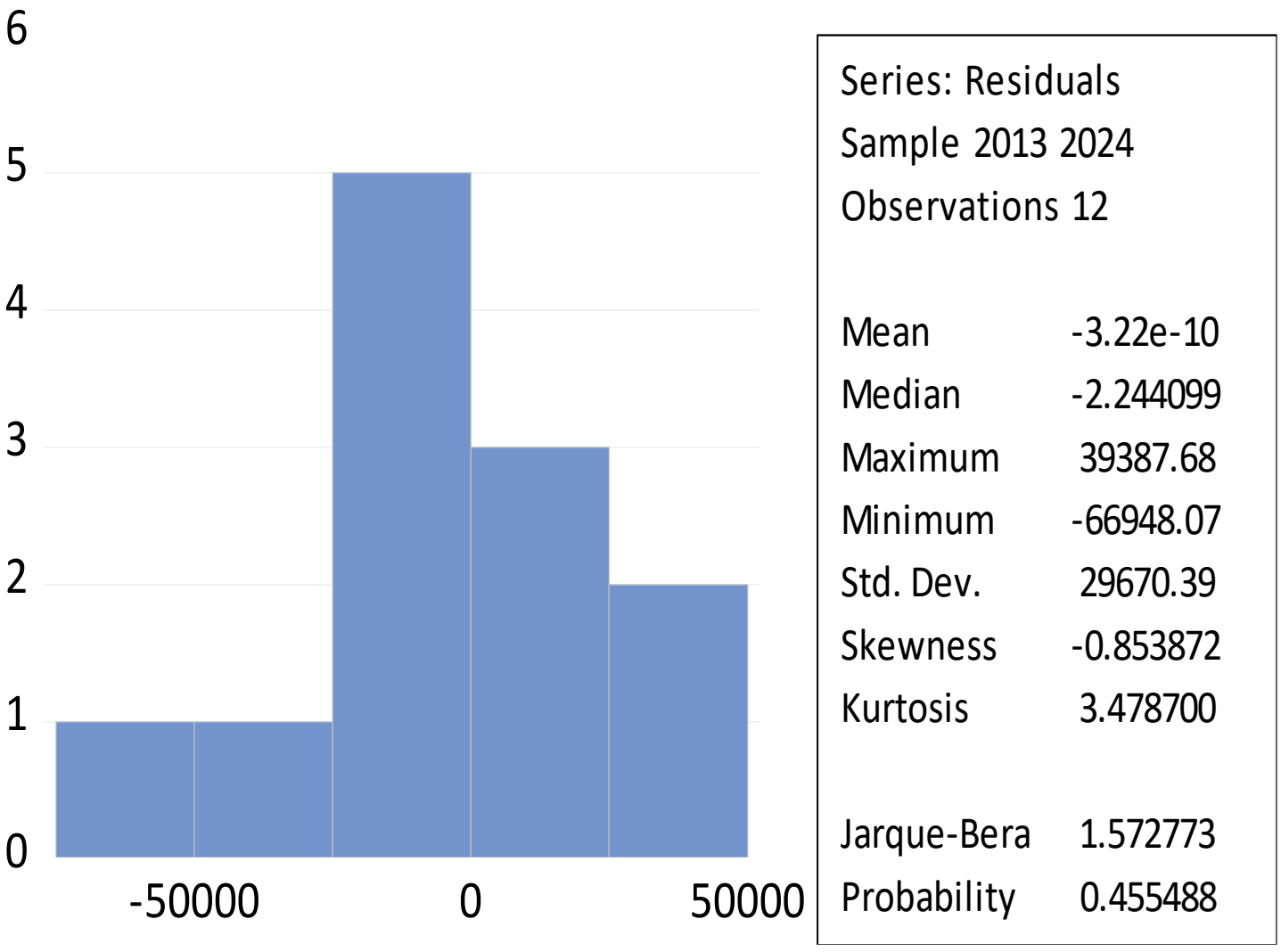

Figure 1.1: Normality Test

Source: Author's work using Eviews 12 (2026)

The normality test result in Figure 1.1 shows a Jarque-Bera statistic of 1.572773 with a corresponding p-value of 0.455488, which exceeds the 0.05 significance level. Therefore, H_0 (that the residuals are normally distributed) is accepted for this study. This indicates that the residuals follow a normal distribution. Hence, the model satisfies the normality assumption, supporting the validity of standard statistical inference and the reliability of the estimated results.

Stability Test Result

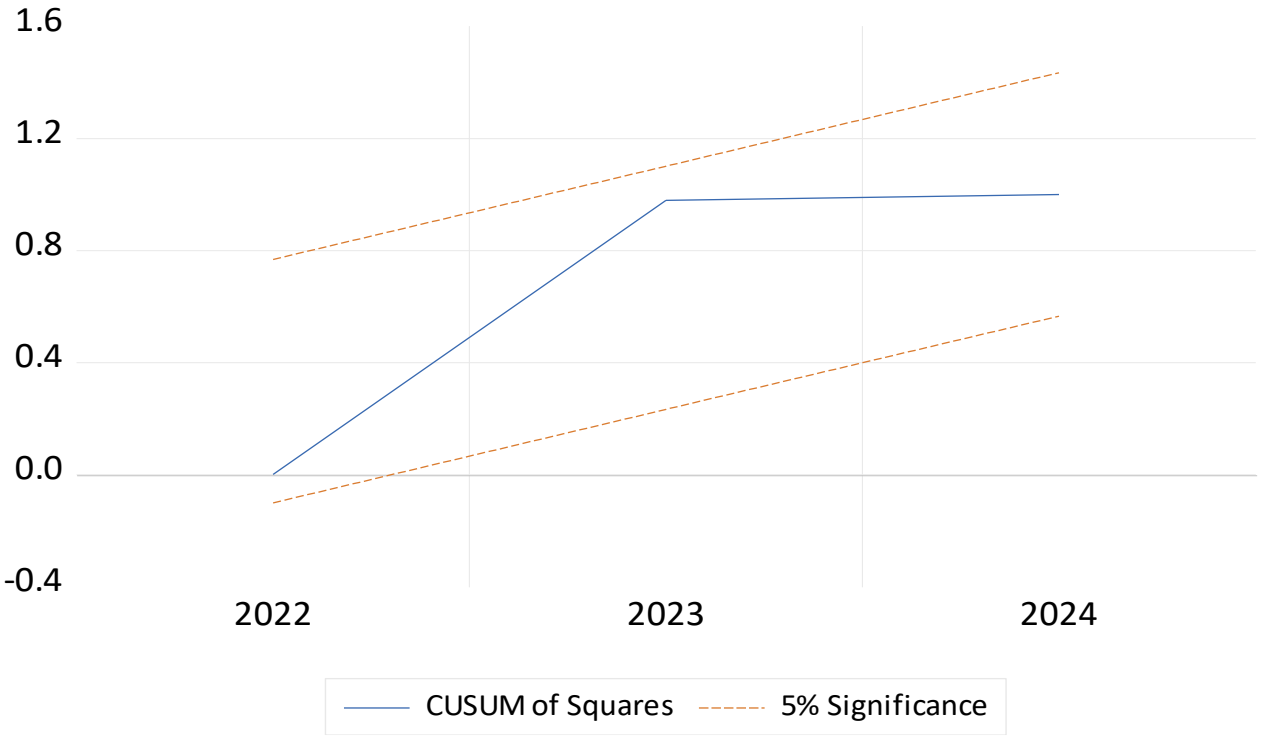

Figure 1.2: Stability Test Result

Source: Author's work using Eviews 12 (2026)

The CUSUM of Squares plot shows that the cumulative sum remains within the 5% significance bounds throughout the sample period (2012–2025). Since the blue line did not cross the critical boundaries (red lines), H_0 (that the model is stable) is accepted for this study. This indicates that the model is structurally stable over time, with no evidence of parameter instability or structural breaks, thereby enhancing the forecasting power of the model.

DISCUSSION AND POLICY IMPLICATIONS OF RESULTS

The result for ATMs showed a significant positive impact ($\beta = 87.88804$, $p = 0.0001$) in the short run and an insignificant negative impact ($\beta = -16.35074$, $p = 0.7736$) in the long run on ROA of commercial banks in Nigeria. This suggests that while ATMs impact significantly on the performance of commercial banks in the short run, the rising cost of ATMs with the penetration of alternative means such as POS will create a long-run negative impact on the performance of commercial banks in Nigeria. In the short run, the result aligns with the theoretical expectation and remains statistically significant. The short-run result aligns with the finding of Nwachukwu and Chukwuma (2026), which showed a significant positive impact of ATM on the performance of commercial banks in Nigeria. Similarly, Jegede (2014) showed a short-run positive impact of ATMs on the performance of banks in Nigeria, whereas the result of Osigbeemhe et al. (2023) contrasts with the current result, showing a non-significant short-run negative effect of ATMs on ROA in Nigeria. The long-term negative impact has crucial policy implications, advising bank managers to adopt cost-effective innovations to facilitate the onboarding of open banking or API banking. This will deepen service and data sharing through application programming interfaces (APIs), enabling collaboration with third parties. Additionally, it will provide value to customers and open up new business models for financial institutions and organizations, thereby deepening financial inclusion and improving the performance of commercial banks in Nigeria.

For POS transactions, the result revealed a non-significant positive impact ($\beta = 2529.190$; $p = 0.1888$) in the short run and a non-significant negative impact in the long run. This implies that although POS usage is positively associated with bank performance in the short-run, its long-run effect diminishes as agency banking platforms increasingly dominate this space. The growing acceptance of POS services offered by agency banks such as

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Opay, MoniePoint, and PalmPay is likely to crowd out the traditional role of commercial banks. This can be drawn from EFInA (2023) survey report, where financial service usage of agency banks rose significantly to 54% in 2023 from 4.4% in 2018, against a slower increase from 30% in 2016 to 57% in 2023 in traditional banks. At this pace, agency banks are strategically positioned to onboard new users, increase their revenue base and profitability, and, in turn, reduce the customer base and revenue of commercial banks. This finding has crucial policy implications. It has advised commercial bank managers on the need to expand their outreach through agent-based models or mini-branch structures in rural and underserved areas to mobilize idle funds and enhance financial inclusion. The result aligns with the work of Okoro et al. (2024), which showed a non-significant positive impact of POS on the performance of commercial banks in Nigeria.

In contrast, mobile banking (MB) demonstrates short-run and long-run significant positive impacts on the performance of commercial banks in Nigeria. This outcome may be attributed to the higher transaction volumes processed through bank-owned mobile applications, which typically offer broader functionality and higher transaction limits than agency banking platforms, often constrained by tiered account restrictions and relatively low daily transfer limits. The implication is that mobile banking remains a critical channel for sustaining and improving bank performance. Accordingly, bank managers are advised to strengthen digital security frameworks by integrating advanced authentication mechanisms, such as Google Authenticator, alongside traditional password systems to safeguard customer deposits. Continuous innovation and enhancement of mobile banking platforms will be essential for maintaining customer trust and improving the overall performance of commercial banks in Nigeria.

CONCLUSION AND RECOMMENDATIONS

This study examined the impact of FinTech on the performance of commercial banks in Nigeria from 2012 to 2025. The findings reveal that, in the short run, FinTech has a positive impact on bank performance: ATM and MB show a significant positive impact, while POS shows a positive but statistically insignificant impact. This implies a growing contribution of FinTech-driven channels to the operational efficiency and performance of commercial banks in Nigeria. However, in the long run, the results indicate a declining impact of FinTech on commercial banks' performance. This suggests that the increasing penetration of agency banking, particularly in underserved and previously unbanked areas often referred to as the “last mile,” may lead to a crowding-out effect on traditional banking institutions. This occurs when the flexible, accessible, and user-friendly nature of agency banks attracts more customers with improved return on assets, while a limited customer base might result in insolvency among commercial banks in the country. In practice, this increase in agency banks' customer base is illustrated in EFInA’s 2023 survey report, where the financial service agents rose significantly from 4.4% in 2018 to 54% in 2024 among agency banks, against a slower increase from 30% in 2016 to 57% in 2023 in traditional banks in Nigeria. In light of these findings, this study concludes that while FinTech significantly enhances the performance of commercial banks in the short run, its long-run impact diminishes considerably due to intensifying competition from agency banks. This is because agency banks utilize more adaptable and inclusive FinTech strategies, which are increasingly preferred for delivering financial services across Nigeria’s evolving financial landscape. Against this backdrop, the following policy recommendations are drawn for this study.

i. Commercial banks in Nigeria should invest in open banking and API-enabled platforms that allow secure data and service sharing with licensed third parties. This will promote collaboration, improve customer experience, expand digital product offerings, and create new revenue models across sectors. By adopting API banking, banks can strengthen innovation, deepen customer engagement, and improve overall competitiveness and performance in Nigeria’s evolving financial services market.
ii. For the Central Bank of Nigeria and financial regulators, the results on POS transactions highlight the urgency of strengthening the regulatory framework governing agency banking operations. The growing dominance of agent-based POS services necessitates policies that promote fair competition, interoperability, and consumer protection. Regulators should incentivize commercial banks to expand agent banking networks in underserved areas while ensuring standardization of transaction charges and service quality. This will enhance financial inclusion, prevent market concentration among agency banks, and support the sustained performance of commercial banks within Nigeria’s evolving financial system.

iii. For technology and innovation units within commercial banks, the significant impact of mobile banking in both the short and long run underscores the need for sustained investment in secure and user-centric digital platforms. Banks should enhance mobile application functionality, scalability, and security by integrating advanced authentication systems, such as multi-factor authentication. Additionally, expanding transaction limits and improving user experience will strengthen customer trust and adoption. This strategic focus on mobile banking will enable banks to maintain competitiveness, increase transaction volumes, and drive long-term profitability in Nigeria's digital financial landscape.

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