

Mobile Banking Adoption and Financial Deepening in Nigeria

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Abstract

This study investigates the relationship between mobile banking adoption and financial deepening in Nigeria, focusing on how digital financial innovations influence the depth of the financial system. Financial deepening was proxied by the ratio of money supply to gross domestic product (M2/GDP), while mobile banking adoption was measured by the number, volume, and value of mobile banking transactions. Time-series data and the Autoregressive Distributed Lag (ARDL) modelling technique were employed to examine the magnitude and direction of the relationship between mobile banking indicators and financial deepening. The empirical results reveal mixed outcomes across the explanatory variables. Specifically, mobile banking users and the volume of mobile banking transactions had statistically significant negative effects on M2/GDP. This suggests that increases in user adoption and transaction frequency, contrary to a priori expectations, are associated with a reduction in measured financial deepening within the Nigerian economy. Conversely, the value of mobile banking transactions showed a positive but statistically insignificant relationship with M2/GDP, indicating that while higher transaction values may contribute to financial deepening, the effect is not strong enough to be statistically meaningful over the study period. Based on this, the study recommended that the Central Bank of Nigeria should strengthen the structural integration between mobile banking platforms and the formal banking system by improving interoperability between mobile money operators and deposit money banks and ensuring that increased user adoption translates into increased deposit mobilization and credit creation within the formal financial sector. Also, policies should focus on increasing the scale and efficiency of high-value digital transactions by reducing transaction costs, strengthening cybersecurity systems, and improving trust in digital payment platforms.

Keywords: Financial Deepening, Financial Inclusion, Digital Finance, Mobile Money, Financial Innovation

1.0 Introduction

The global financial system has undergone profound structural transformation over the past few decades, driven largely by rapid advancements in information and communication technology (ICT), financial innovation, and digitalization of banking services. These developments have significantly altered the mechanisms through which financial services are produced, distributed, and consumed. In particular, digital financial services have emerged as a key driver of financial system efficiency, inclusiveness, and depth. Among these innovations, mobile banking has become one of the

most transformative tools reshaping the banking landscape, especially in developing economies where traditional financial infrastructure remains underdeveloped.

Mobile banking connotes the use of mobile devices, such as smartphones and feature phones, to conduct financial transactions including funds transfer, deposits, withdrawals, balance inquiries, bill payments, savings mobilization, and access to credit services. It represents a branch of digital financial services that reduces reliance on physical banking infrastructure, while expanding access to financial services across diverse population segments. In developing countries, mobile banking plays a particularly critical role in bridging the gap between formal financial institutions and unbanked or underbanked populations (Adegbite & Machethe, 2020).

In Sub-Saharan Africa, mobile banking has gained remarkable traction due to the rapid expansion of mobile telecommunications networks, declining cost of mobile devices, and increasing digital literacy. Nigeria, as the largest economy in Africa, has witnessed substantial growth in mobile banking adoption over the past decade. The financial sector has undergone significant reforms led by the Central Bank of Nigeria (CBN), aimed at promoting financial inclusion and strengthening financial intermediation. Key policy interventions include the cashless policy initiative (introduced in 2012), the National Financial Inclusion Strategy (NFIS), and the licensing of mobile money operators to expand digital financial services. Despite these policy interventions, financial exclusion remains a major structural challenge in Nigeria. A significant proportion of the adult population, particularly in rural and informal sectors, remains outside the formal financial system. This persistent exclusion underscores the importance of alternative financial delivery channels such as mobile banking, which is expected to reduce transaction costs, eliminate geographical barriers, and improve access to financial service (Cull, Ehrbeck & Holle, 2014).

Notably, financial deepening entails the increasing provision, accessibility, and usage of financial services within an economy. It is commonly measured using indicators such as the ratio of broad money (M2) to GDP, domestic credit to the private sector, financial asset accumulation, and the degree of financial intermediation. According to financial development theory, a deeper financial system enhances savings mobilization, improves capital allocation efficiency, reduces liquidity constraints, and ultimately promotes long-term economic growth. However, from a theoretical standpoint, mobile banking is expected to contribute to financial deepening through multiple channels. First, it enhances financial inclusion by integrating previously unbanked populations into formal financial systems. Second, it improves transaction efficiency by reducing the cost and time associated with financial transactions. Third, it expands financial intermediation by increasing deposit mobilization and credit accessibility. Fourth, it facilitates the formalization of informal financial activities, thereby increasing the depth and stability of the financial system. These mechanisms collectively suggest a positive relationship between mobile banking adoption and financial deepening.

Empirical literature supports the argument that digital financial services, including mobile banking, contribute to financial system development. Studies such as Busari & Jayeoba (2025) revealed that mobile banking improves access to financial services, increases savings behaviour, and enhances the efficiency of banking operations, particularly in developing economies. Similarly, evidence from Nigeria indicates that mobile payment systems significantly influence financial inclusion and banking sector performance through increased transaction volumes and reduced

operational costs (Chiejina & Ike, 2025). However, other studies suggest that the effectiveness of mobile banking is moderated by institutional and infrastructural constraints such as poor internet penetration, limited financial literacy, weak regulatory enforcement, and cybersecurity risks.

Despite the rapid expansion of mobile banking services in Nigeria, the extent to which its adoption translates into measurable financial deepening remains ambiguous. While mobile banking usage has increased significantly, Nigeria continues to exhibit relatively low levels of financial deepening compared to peer emerging economies. The financial system still shows limited penetration of credit to the private sector, high reliance on cash-based transactions, and persistent dominance of informal financial mechanisms such as thrift societies, rotating savings groups, and informal lending channels. Furthermore, empirical findings on the relationship between mobile banking adoption and financial deepening remain inconsistent and fragmented. Some studies report strong positive effects, suggesting that mobile banking enhances financial inclusion and deepens financial intermediation. In contrast, other studies find weak, indirect, or context-dependent effects, arguing that mobile banking alone may not be sufficient to drive structural financial deepening without complementary improvements in infrastructure, regulation, and institutional quality. This inconsistency in empirical outcomes creates a significant knowledge gap in the literature.

More critically, most existing studies in Nigeria tend to focus on financial inclusion as the primary outcome variable, rather than financial deepening, which is a broader and more macroeconomic measure of financial system development. Financial inclusion captures access, while financial deepening captures both access and intensity of financial usage within the economy. The distinction between these concepts is important because an increase in access does not necessarily translate into deeper financial intermediation or increased financial sector contribution to GDP. Hence, it is in the light of this that the study seeks to investigate the extent to which mobile banking adoption enhances financial deepening in Nigeria.

The specific objectives of the study include:

- To examine the effect of Mobile banking users on financial deepening in Nigeria;
- To investigate the extent to which Mobile banking transactional volume influence financial deepening in Nigeria;
- To examine the relationship between Mobile banking transactional value and financial deepening in Nigeria.

2.0 Literature review and theoretical framework

2.1 Theoretical framework

2.1.1 Financial intermediation theory

Financial intermediation theory provides a fundamental framework for understanding the role of financial institutions in economic development and financial system expansion. The theory was prominently developed by John Gurley and Edward Shaw in 1960, and later expanded by Ronald McKinnon in 1973 and Shaw in 1973, who emphasized the importance of financial liberalization and deepening in developing economies. The central proposition of the theory is that financial intermediaries, such as banks and other financial institutions, serve as conduits between surplus

economic units (savers) and deficit units (borrowers). By channeling funds from those with excess liquidity to those in need of capital, intermediaries facilitate efficient resource allocation and promote economic growth. This process is critical in reducing transaction costs, minimizing information asymmetry, and enhancing liquidity within the financial system (Yakubu & Dasuki, 2018).

According to McKinnon and Shaw, financial deepening occurs when there is an expansion in the range, accessibility, and utilization of financial services. Indicators of financial deepening include increased savings mobilization, higher levels of credit to the private sector, and growth in financial assets relative to gross domestic product (GDP). Financial intermediaries play a crucial role in achieving these outcomes by improving the efficiency of financial markets and increasing the volume of financial transactions (Akinwale & Kyari, 2021).

In the context of modern financial systems, technological innovations such as mobile banking have significantly enhanced the efficiency and reach of financial intermediation. Mobile banking platforms enable financial institutions to extend their services beyond traditional branch networks, thereby reaching previously unbanked and underserved populations. This expansion of access contributes to increased financial inclusion, which is a key component of financial deepening. Furthermore, mobile banking reduces transaction costs and improves the speed and convenience of financial transactions, thereby increasing the overall volume of financial activities within the economy. By facilitating savings mobilization, improving access to credit, and enhancing transaction efficiency, mobile banking strengthens the intermediation process and contributes to the deepening of the financial system. However, despite its relevance, the financial intermediation theory has been criticized for its limited consideration of informal financial systems, which remain significant in many developing economies. This study is anchored on the financial intermediation theory, as it provides a macroeconomic perspective on how improvements in financial service delivery can enhance financial system performance (Kyari & Al-Hudithi, 2022).

2.1.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM), developed by Fred Davis in 1989, is one of the most widely used theoretical frameworks for explaining user adoption of information systems and digital technologies. The model is rooted in the Theory of Reasoned Action, and seeks to explain how users come to accept and use new technologies based on their perceptions and attitudes. The core premise of TAM is that an individual's intention to use a particular technology is determined by two key factors: perceived usefulness and perceived ease of use. Perceived usefulness refers to the extent to which an individual believes that using a technology will enhance their performance or improve outcomes, while perceived ease of use refers to the extent to which the technology is perceived as being free from effort. According to Davis (1989), these two factors influence the user's attitude toward the technology, which in turn affects their behavioural intention to use it. Behavioural intention is considered a strong predictor of actual usage. Thus, the model establishes a causal chain linking user perceptions to actual technology adoption (Ovia, 2005).

In the context of mobile banking, perceived usefulness may include factors such as convenience, speed, cost savings, and accessibility, while perceived ease of use relates to the simplicity, user-friendliness, and navigability of mobile banking applications. When users perceive

mobile banking as both useful and easy to use, they are more likely to adopt and continuously use the technology. Subsequent extensions of TAM have incorporated additional variables such as trust, perceived risk, social influence, and facilitating conditions, particularly in studies conducted in developing countries. These extensions recognize that technology adoption is influenced not only by individual perceptions, but also by external factors such as infrastructure, cultural norms, and institutional environment. For instance, in the Nigerian context, issues such as network reliability, cybersecurity concerns, and digital literacy levels play a significant role in shaping mobile banking adoption (Akinwale & Kyari, 2021).

The relevance of TAM to financial deepening lies in its ability to explain the behavioural drivers of mobile banking adoption. Since financial deepening depends partly on the extent to which individuals and businesses utilize financial services, understanding the factors that influence technology adoption becomes essential. Increased adoption of mobile banking leads to higher levels of financial participation, which contributes to the expansion and deepening of the financial system. However, TAM has been criticized for its simplicity and its limited ability to capture the complexity of real-world technology adoption behaviour. Critics argue that the model does not adequately account for social, cultural, and environmental factors, which can significantly influence user behaviour. The theory is relevant to the study as it explains how individual adoption of mobile banking contributes to increased financial system usage, thereby facilitating financial deepening.

2.2 Literature review

2.2.1 Mobile Banking and Financial Deepening Nexus

The nexus between mobile banking adoption and financial deepening has attracted increasing scholarly attention within the broader literature on financial development and digital finance. Financial deepening, commonly defined as the expansion in the size, efficiency, and inclusiveness of the financial system, is influenced not only by institutional development, but also by technological innovations that enhance access to and usage of financial services. In this regard, mobile banking is widely regarded as a transformative innovation capable of accelerating financial deepening, particularly in developing economies such as Nigeria, where traditional banking infrastructure remains limited and unevenly distributed (Olayemi & Michael, 2019).

Extant literature suggests that the relationship between mobile banking and financial deepening operates through several interrelated transmission mechanisms. These channels collectively enhance the depth, breadth, and efficiency of the financial system. One of the most prominent pathways through which mobile banking contributes to financial deepening is the financial inclusion channel. Mobile banking reduces traditional barriers to financial access, such as distance to bank branches, high transaction costs, and documentation requirements, thereby enabling previously unbanked populations to participate in the formal financial system. Scholars argue that by integrating excluded populations into formal finance, mobile banking expands the deposit base, increases the number of financial transactions, and enhances monetary circulation within the economy. This expansion in participation contributes directly to financial deepening by increasing the ratio of financial assets to GDP and improving financial intermediation (Ofori-Dwumfuo & Dankwah, 2013).

Another important mechanism is the efficiency channel, which emphasizes the role of mobile banking in improving the operational efficiency of financial systems. Mobile banking platforms significantly reduce transaction costs associated with traditional banking services, including transportation costs, waiting time, and administrative expenses. They also enhance the speed and reliability of financial transactions. Moreover, the savings mobilization channel highlights the role of mobile banking in encouraging savings behavior among individuals and households. By providing convenient, secure, and accessible platforms for depositing and managing funds, mobile banking lowers the barriers to saving and promotes financial discipline. In many developing economies, a significant portion of savings occurs outside the formal financial system. Mobile banking helps to formalize these savings by integrating them into the banking sector, thereby increasing the pool of funds available for investment. This process enhances financial intermediation and contributes to financial deepening through increased deposit mobilization and improved capital formation.

In addition, mobile banking also contributes to financial deepening through the credit expansion channel. By facilitating access to credit services, particularly for individuals and small businesses that are traditionally excluded from formal lending systems, mobile banking enhances financial intermediation and economic participation (Okoro & Nwosu, 2017). Digital transaction records generated through mobile banking platforms provide valuable data that financial institutions can use to assess creditworthiness. This reduces information asymmetry and enables the provision of microcredit and other financial products to underserved populations. Increased access to credit stimulates investment, entrepreneurship, and economic activity, all of which are critical components of financial deepening.

2.3 Empirical reviews

Busari and Jayeoba (2025) examined the impact of mobile money services on financial inclusion and bank performance in Nigeria using time-series data and econometric modeling. The study found that mobile money services significantly improve financial inclusion by increasing access to financial services and enhancing transaction volumes.

Chiejina and Ike (2025) analyzed the effect of mobile payments on financial inclusion in Nigeria. Using the time series and regression analysis, the study revealed that mobile payment systems positively influence financial inclusion and transaction efficiency.

Kyari and Al-Hudithi (2022) investigated the determinants of mobile banking adoption in Nigeria, using the survey data and structural equation modeling. The study found that perceived usefulness and perceived ease of use are significant predictors of mobile banking adoption, consistent with the Technology Acceptance Model.

Using cross-country data from the Global Findex Database, Demirgüç-Kunt et al. (2018) examined the role of digital financial services in promoting financial inclusion and financial development across both developed and developing economies. The study employed descriptive and econometric analyses to assess trends in account ownership, digital payments, and access to financial services. The findings revealed that digital financial services, including mobile banking and mobile money, significantly improve financial inclusion by lowering access barriers and increasing participation in formal financial systems. The study further established that increased inclusion

contributes to financial deepening by expanding the deposit base and enhancing financial intermediation.

Cull et al. (2014) examined the relationship between financial access, financial development, and economic growth using cross-country data. The study employed regression analysis to assess the impact of access to financial services on economic performance. The findings indicated that improved access to financial services leads to increased savings, higher investment levels, and enhanced financial intermediation. These outcomes contribute to financial deepening and economic growth.

Mbiti and Weil (2011) investigated the economic impact of mobile banking in Africa, with a particular focus on Kenya. Using survey data and econometric analysis, the study found that mobile banking services significantly increased savings behaviour and financial participation among users.

3.0 Methodology

Based on the theories under reviewed and the hypotheses of the study, a model showing the effect and relationship amongst/between the variables of interest shall be specified in consonance with the work of Chiejina and Ike (2025).

$$M2/GDP = \partial_0 + \partial_1 LOGMBU + \partial_1 LOGVOT + \partial_1 LOGVAT + \partial_1 LOGFLI + \varepsilon$$

The ARDL model is utilized to basically ascertain the long and short run connection between mobile banking adoption and financial deepening of the country. The ARDL method has many benefits when compared with other co-integration techniques, and can be used notwithstanding if the underlying variables are wholly 1(0), 1(1) or jointly co-integrated, and can also be estimated with little sample features. The study shall design the ARDL model for appraisal as stated beneath:

$$\begin{aligned} \log M2/GDP = & \alpha_0 + \sum_{k=1}^n \alpha_1 \Delta \log M2/GDP + \sum_{k=1}^n \alpha_2 \Delta \log MBU + \sum_{k=1}^n \alpha_3 \Delta \log VOT + \sum_{k=1}^n \alpha_4 \Delta \log VAT \\ & + \sum_{k=1}^n \alpha_5 \Delta \log FLI + \partial_1 \log M2/GDP + \partial_2 \log MBU + \partial_3 \log VOT + \partial_4 \log CCHVAT \\ & + \partial_5 \log FLI + \varepsilon \end{aligned}$$

4.0 Data analyses and Discussion of findings

	M2GDP	MBU	VAT	VOT	FIL
Mean	7.300000	710.3273	15.26818	14.71273	24.46364
Median	5.400000	135.0000	9.500000	3.000000	19.00000
Maximum	22.00000	2800.000	65.00000	95.00000	70.00000
Minimum	0.100000	0.500000	0.500000	0.010000	1.000000
Std. Dev.	7.091779	953.1812	18.19190	25.97605	22.35909
Skewness	0.684993	1.030892	1.635753	2.169416	0.638134
Kurtosis	2.192721	2.500596	4.840152	6.649558	2.119069
Jarque-Bera	2.317850	4.125326	12.91483	29.46600	2.204493
Probability	0.313823	0.127115	0.001569	0.000000	0.332124
Sum	160.6000	15627.20	335.9000	323.6800	538.2000
Sum Sq.	2228.540	30180068	12078.43	18932.07	23664.84
Sum Sq. Dev.	1056.160	19079642	6949.848	14169.86	10498.51
Observations	22	22	22	22	22

The mean values indicate the average behaviour of each variable over time. Financial deepening, proxied by M2GDP, records a mean of 7.30, suggesting that, on average, money supply constitutes a moderate proportion of GDP in Nigeria. The median value (5.40) is slightly lower than the mean, indicating a modest upward skew in the distribution. Mobile banking users (MBU) exhibit a relatively high mean of 710.33 compared to a median of 135.00. This substantial difference suggests that the distribution is influenced by periods of rapid growth in mobile banking adoption, particularly in recent years. Similarly, the value of transactions (VAT) has a mean of 15.27 and a median of 9.50, while the volume of transactions (VOT) shows a mean of 14.71 and a median of 3.00. The noticeable gaps between means and medians in these variables point to asymmetric distributions driven by a few large observations. Financial literacy (FIL) records a mean of 24.46 and a median of 19.00, indicating a relatively consistent level of financial awareness across the sample period, albeit with some upward movement.

The standard deviation measures the degree of variability in each variable. Mobile banking users (MBU) exhibit the highest dispersion (953.18), indicating substantial fluctuations in the number of users over time. This reflects the rapid and uneven growth of mobile banking adoption in Nigeria. Similarly, volume of transactions (VOT) has a high standard deviation (25.98), followed by value of transactions (VAT) at 18.19. These figures suggest that mobile banking activities are highly volatile, likely due to technological expansion, policy changes, and shifts in user behaviour. Financial deepening (M2GDP) shows a standard deviation of 7.09, indicating moderate variability relative to its mean. Financial literacy (FIL) also demonstrates considerable variation (22.36), suggesting that levels of financial awareness have not been entirely stable over the study period.

The dispersion characteristics of the variables are further illuminated by examining their ranges, defined as the difference between maximum and minimum values. The results reveal substantial variability across the mobile banking indicators. Specifically, mobile banking users (MBU) range from 0.50 to 2800.00, while the volume of transactions (VOT) spans from 0.01 to 95.00, and the value of transactions (VAT) ranges from 0.50 to 65.00. These wide intervals indicate pronounced fluctuations over time and underscore the dynamic and rapidly evolving nature of mobile banking activities in Nigeria. Such variability is consistent with periods of accelerated digital financial expansion, regulatory shifts, and technological adoption, which tend to produce uneven growth patterns in emerging financial systems.

Further insights into the distributional structure of the variables are provided by the skewness and kurtosis statistics. The skewness coefficients indicate that all variables are positively skewed, implying right-tailed distributions in which extreme high values occur more frequently than extreme low values. In particular, the volume of transactions (VOT) exhibits a high degree of positive skewness (2.17), followed by the value of transactions (VAT) at 1.64 and mobile banking users (MBU) at 1.03. These values suggest significant asymmetry and point to the presence of episodic surges in mobile banking activities, likely driven by rapid technological adoption and increased financial inclusion initiatives during specific periods. Such patterns are typical of financial innovation variables, where growth tends to occur in bursts rather than in a smooth, linear manner.

The kurtosis statistics provide additional evidence regarding the shape of the distributions. Financial deepening (M2GDP) and financial literacy (FIL) exhibit kurtosis values of 2.19 and 2.12 respectively, which are close to the benchmark value of 3 associated with a normal distribution. This suggests that these variables are relatively well-behaved, with moderate tail thickness and limited susceptibility to extreme observations. In contrast, the value of transactions (VAT) and, more prominently, the volume of transactions (VOT) display kurtosis values of 4.84 and 6.65, respectively. These values indicate leptokurtic distributions, characterized by pronounced peaks and heavy tails. The implication is that these variables are more prone to extreme values or outliers, a feature commonly observed in financial and transaction-based data where large, infrequent shocks can occur.

To formally assess the normality of the series, the Jarque-Bera test was employed. The results reveal a mixed pattern. The probability values for M2GDP (0.3138), MBU (0.1271), and FIL (0.3321) exceed the conventional 5 percent significance level, indicating that the null hypothesis of normal distribution cannot be rejected for these variables. This suggests that they conform reasonably well to the assumptions of normality, which is desirable for many econometric techniques. However, the results for VAT ($p = 0.0016$) and VOT ($p = 0.0000$) indicate a rejection of the null hypothesis of normality. This confirms that these variables deviate significantly from a normal distribution, likely due to the combined effects of positive skewness and excess kurtosis. The non-normal behavior of these transaction-based variables can be attributed to structural changes, rapid digitalization, and the presence of extreme observations associated with spikes in transaction activity.

Dependent Variable: M2 GDP

Method: ARDL

Date: 05/22/26 Time: 12:03

Sample: 2005 2025

Included observations: 21

Lag selection: Automatic (deplags=2, reglags=2)

Selected model: ARDL(1,1,1,0,0) using AIC (162 models evaluated)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Distributed-lag Regressors				
Dependent				
M2_GDP(-1)	0.692341	0.049892	13.87679	0.0000
Independent				
MBU	-0.001648	0.000168	-9.806816	0.0000
MBU(-1)	0.001322	0.000174	7.591030	0.0000
VAT	-0.008948	0.020445	-0.437632	0.6688
VAT(-1)	-0.006695	0.005194	-1.288991	0.2199
VOT	0.002193	0.012055	0.181934	0.8584
FIL	0.147455	0.019061	7.736089	0.0000
Deterministic Regressors				
C	-0.084030	0.026805	-3.134828	0.0079
R-squared	0.999968	Mean dependent var	7.642857	
Adjusted R-squared	0.999950	S.D. dependent var	7.077611	
S.E. of regression	0.049818	Akaike info criterion	-2.878553	
Sum squared resid	0.032264	Schwarz criterion	-2.480640	
Log likelihood	38.22481	Hannan-Quinn criter.	-2.792196	
F-statistic	57666.10	Durbin-Watson stat	2.201723	
Prob(F-statistic)	0.000000			

*Note: p-values and any subsequent test results do not account for model selection.

Source: Eviews 14

The coefficient of the lagged dependent variable, M2_GDP(-1), is positive and statistically significant at the 1 percent level ($\beta = 0.692341$; $p = 0.0000$). This result implies that past levels of financial deepening significantly influence current levels of financial deepening in Nigeria. Specifically, about 69.2 percent of the previous year's financial deepening is transmitted into the current period, indicating persistence and stability in the Nigerian financial system, and the contemporaneous coefficient of mobile banking users (MBU) is negative and statistically significant ($\beta = -0.001648$; $p = 0.0000$). This finding suggests that, in the short run, an increase in the number of mobile banking users reduces financial deepening. This negative effect may be attributed to the early stages of digital financial adoption, where many users engage primarily in basic financial transactions that do not substantially enhance savings mobilization or formal financial intermediation. It may also reflect infrastructural challenges, low digital trust, and inadequate utilization of advanced mobile banking services.

However, the lagged value of mobile banking users, MBU(-1), is positive and statistically significant ($\beta = 0.001322$; $p = 0.0000$). This indicates that mobile banking users positively contribute

to financial deepening over time, and this implies that as individuals become more accustomed to mobile banking platforms and financial technologies, the usage of these services improves access to financial products, increases participation in the formal financial system, and enhances the mobilization of financial resources. Therefore, while the short-run effect appears negative, the long-run implication of mobile banking adoption is beneficial to financial sector development in Nigeria. Also, the coefficient of mobile banking transaction volume (VAT) is negative and statistically insignificant in both the current period ($\beta = -0.008948$; $p = 0.6688$) and the lagged period ($\beta = -0.006695$; $p = 0.2199$). This indicates that the number of mobile banking transactions does not significantly affect financial deepening in Nigeria during the period under review. The insignificance may suggest that the frequency of transactions alone is insufficient to stimulate financial sector development, especially when transactions are dominated by small-value transfers that do not significantly increase liquidity within the formal financial system.

Similarly, the coefficient of mobile banking transaction value (VOT) is positive but statistically insignificant ($\beta = 0.002193$; $p = 0.8584$). This finding implies that although increases in the value of mobile banking transactions may theoretically support financial deepening through enhanced monetary circulation and financial intermediation, the observed effect is weak and not statistically meaningful. This may reflect structural inefficiencies in the financial system, limited integration between mobile money platforms and conventional banking institutions, or inadequate financial inclusion mechanisms. In addition, Financial literacy (FIL) exhibits a positive and statistically significant relationship with financial deepening ($\beta = 0.147455$; $p = 0.0000$). This result indicates that financial literacy plays a crucial role in promoting financial deepening in Nigeria. Specifically, a one-unit increase in financial literacy leads to approximately a 14.7 percent increase in financial deepening, holding other variables constant. The implication is that individuals with higher levels of financial knowledge and awareness are more likely to utilize formal financial services such as savings accounts, digital banking platforms, credit facilities, and investment products. Consequently, improved financial literacy enhances financial inclusion, strengthens confidence in the financial system, and contributes to the expansion of the financial sector.

The constant term is negative and statistically significant ($\beta = -0.084030$; $p = 0.0079$), suggesting that in the absence of the explanatory variables included in the model, financial deepening would decline. Although the constant term has limited direct economic interpretation, its significance indicates the presence of other underlying structural factors affecting financial deepening in Nigeria. The goodness-of-fit statistics reveal that the model performs exceptionally well. The coefficient of determination ($R^2 = 0.999968$) indicates that approximately 99.99 percent of the variations in financial deepening are explained by the independent variables included in the model. Similarly, the adjusted R^2 value of 0.999950 confirms the strong explanatory power of the model after adjusting for degrees of freedom. Furthermore, the F-statistic of 57666.10 with a probability value of 0.000000 indicates that the overall model is statistically significant. This means that the explanatory variables jointly exert significant effects on financial deepening in Nigeria. The Durbin-Watson statistic of 2.201723 further suggests the absence of serious autocorrelation problems in the model, since the value is close to the benchmark value of 2.

Dependent Variable: M2_GDP				
Method: ARDL				
Date: 05/26/26 Time: 14:58				
Sample: 2006 2025				
Included observations: 20				
Lag selection: Automatic (deplags=2, reglags=2)				
Selected model: ARDL(1,1,2,1) using AIC (54 models evaluated)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long-run Regressors				
<u>Linear: Dependent</u>				
M2_GDP(-1)	-0.024707	0.067841	-0.364194	0.7226
<u>Linear: Independent</u>				
MBU(-1)	-0.000264	0.000128	-2.056037	0.0643
VAT(-1)	0.223933	0.052515	4.264212	0.0013
VOT(-1)	-0.079687	0.013734	-5.802132	0.0001
<u>Deterministic</u>				
C	-0.102806	0.066183	-1.553351	0.1486
Short-run Regressors: Linear (Independent)				
D(MBU)	-0.002088	0.000397	-5.264128	0.0003
D(VAT)	0.156122	0.029023	5.379148	0.0002
D(VAT(-1))	-0.094217	0.051136	-1.842454	0.0925
D(VOT)	-0.107949	0.019414	-5.560509	0.0002
R-squared	0.985834	Mean dependent var		1.090000
Adjusted R-squared	0.975531	S.D. dependent var		0.678931
S.E. of regression	0.106202	Akaike info criterion		-1.344790
Sum squared resid	0.124067	Schwarz criterion		-0.896711
Log likelihood	22.44790	Hannan-Quinn criter.		-1.257321
F-statistic	95.68763	Durbin-Watson stat		2.326775
Prob(F-statistic)	0.000000			

Source: Eviews 14

Long-Run Relationship

The long-run results showed that the lagged value of mobile banking users, MBU(-1), had a negative coefficient and was statistically significant at the 10 percent level ($\beta = -0.000264$; $p = 0.0643$). This implies that, in the long run, an increase in the number of mobile banking users slightly reduces financial deepening in Nigeria. The negative relationship may suggest that despite the increasing adoption of mobile banking services, many users remain concentrated in low-value or informal financial activities that do not significantly contribute to formal financial intermediation or liquidity expansion within the banking sector. Mobile banking transaction volume, VAT(-1), exhibited a positive and statistically significant effect on financial deepening ($\beta = 0.223933$; $p = 0.0013$). This result indicated that an increase in the volume of mobile banking transactions significantly enhances financial deepening in Nigeria. Specifically, a one-unit increase in transaction volume leads to approximately a 22.4 percent increase in financial deepening, holding other factors constant. This finding suggests that higher transaction activity through mobile banking platforms improves monetary

circulation, encourages the use of formal financial services, and strengthens financial sector development.

In contrast, mobile banking transaction value, $VOT(-1)$, had a negative and statistically significant relationship with financial deepening ($\beta = -0.079687$; $p = 0.0001$). This implies that increases in the monetary value of mobile banking transactions reduce financial deepening in Nigeria. The negative relationship may reflect the possibility that large transaction values are concentrated among a limited segment of users or are channeled toward consumption activities rather than productive financial intermediation. It may also indicate inefficiencies in the transmission of digital financial flows into the formal banking system. The coefficient of the lagged dependent variable, $M2_GDP(-1)$, is negative but statistically insignificant ($\beta = -0.024707$; $p = 0.7226$), indicating that the previous level of financial deepening does not exert a significant long-run influence on the current level of financial deepening within the model specification. The constant term is negative and statistically insignificant ($\beta = -0.102806$; $p = 0.1486$), suggesting that the intercept does not play a significant role in explaining financial deepening when the explanatory variables are held constant.

Short-Run Relationship

The short-run dynamics revealed that the first difference of mobile banking users, $D(MBU)$, had a negative and statistically significant effect on financial deepening ($\beta = -0.002088$; $p = 0.0003$). This indicates that short-run increases in mobile banking users reduce financial deepening. The result may reflect adjustment costs associated with rapid digital financial expansion, inadequate financial literacy, or the predominance of basic mobile banking activities that do not significantly deepen the financial sector. The first difference of mobile banking transaction volume, $D(VAT)$, is positive and statistically significant ($\beta = 0.156122$; $p = 0.0002$). This finding implies that increases in transaction volume immediately enhance financial deepening in the short run. Increased transaction activities through mobile banking platforms likely improve financial accessibility, increase liquidity circulation, and promote greater integration into the formal financial system.

However, the lagged difference of transaction volume, $D(VAT(-1))$, is negative and weakly significant at the 10 percent level ($\beta = -0.094217$; $p = 0.0925$). This suggests that although transaction volume positively affects financial deepening contemporaneously, its effect diminishes over time and may even become adverse due to transaction saturation, inefficiencies, or temporary shocks within the financial system. Similarly, the first difference of mobile banking transaction value, $D(VOT)$, has a negative and statistically significant coefficient ($\beta = -0.107949$; $p = 0.0002$). This implies that increases in the value of mobile banking transactions reduce financial deepening in the short run. The result may indicate that higher-value digital transactions are not effectively mobilized into productive savings and investments within the formal financial sector.

Test of hypotheses

The hypotheses of the study were tested using the probability values of the ARDL regression estimates at a 5% level of significance. The decision rule states that the null hypothesis should be rejected where the probability value is less than 0.05, otherwise the null hypothesis should be accepted.

Hypothesis one

Null Hypothesis (H_{01}): Mobile banking users have no significant effect on financial deepening in Nigeria.

From the ARDL result, the probability value for MBU and MBU(-1) are 0.0000, which are less than 0.05, thus, the null hypothesis is rejected, and it was concluded mobile banking users exert a significant effect on financial deepening in Nigeria.

Hypothesis two

Null Hypothesis (H_{02}): Mobile banking transaction volume has no significant effect on financial deepening in Nigeria.

The probability values for VOT and VOT(-1) are 0.6688 and 0.2199 respectively, which are greater than 0.05, thus, the null hypothesis was accepted, and it was concluded that mobile banking transaction volume does not have a significant effect on financial deepening in Nigeria.

Hypothesis three

Null Hypothesis (H_{03}): Mobile banking transaction value has no significant effect on financial deepening in Nigeria.

The probability value for VAT is 0.8584, which is greater than 0.05, thus, the null hypothesis was accepted, and it was concluded that mobile banking transaction value has no significant effect on financial deepening in Nigeria.

Discussion of findings

The ARDL result revealed that mobile banking users significantly influence financial deepening in Nigeria. The coefficient of MBU was negative in the current period (-0.001648) but positive in the lagged period (0.001322), indicating that although mobile banking usage may initially exert adjustment pressures on financial deepening, its long-run effect becomes positive and significant over time. This finding suggests that increased adoption of mobile banking services enhances financial inclusion, improves access to financial services, and broadens participation in the formal financial sector. The result aligns with Salimon (2018) and the financial innovation theory which posits that technological advancement in banking promotes financial sector development and economic participation.

The result further showed that mobile banking transaction volume (VAT) had a negative but statistically insignificant relationship with financial deepening. Both the current and lagged values of VAT failed the significance test at the 5 percent level. This implies that the frequency or quantity of mobile banking transactions alone may not sufficiently stimulate financial deepening in Nigeria. The insignificant effect is in line with Emenike & Amu (2021), and could be attributed to infrastructural deficiencies, poor network connectivity, cyber-security concerns, and the dominance of low-value transactions which may not substantially contribute to financial sector expansion.

Similarly, mobile banking transaction value (VOT) exhibited a positive but insignificant relationship with financial deepening. The implication is that increases in the monetary value of mobile banking transactions do not automatically translate into deeper financial intermediation within the

Nigerian economy. This is in consistent with Ezech & Nkamnebe (2020), and may arise from limited integration between digital financial services and the broader financial system, as well as inadequate confidence in electronic payment systems among some segments of the population.

The overall fitness of the model was strong as indicated by the R-squared value of 0.999968, implying that approximately 99.9 percent of the variations in financial deepening were explained by the explanatory variables included in the model. In addition, the F-statistic probability value of 0.000000 confirmed that the overall model was statistically significant. The Durbin-Watson statistic of 2.20 further indicated the absence of serious autocorrelation problems in the model.

Conclusion

This study examined the effect of mobile banking on financial deepening in Nigeria using the Autoregressive Distributed Lag (ARDL) estimation technique. Specifically, the study investigated the influence of mobile banking users, mobile banking transaction volume, and mobile banking transaction value on financial deepening proxied by M2/GDP. The adoption of the ARDL approach enabled the study to capture both the dynamic and long-run relationships among the variables. The empirical findings revealed that mobile banking users exert significant effect on financial deepening in Nigeria. The significance of mobile banking users indicates that increased adoption and usage of digital banking platforms contribute positively to the expansion of financial services and the integration of more individuals into the formal financial system. This finding suggests that mobile banking has become an important channel for improving access to banking services, particularly in a developing economy such as Nigeria where traditional banking infrastructure remains inadequate in some rural and underserved areas. However, findings showed that mobile banking transaction volume and transaction value did not exert statistically significant effects on financial deepening during the period under review. Although these variables displayed expected relationships with financial deepening, their insignificance suggests that the mere increase in the frequency or value of mobile banking transactions may not automatically translate into substantial financial sector expansion. This may be attributed to structural and institutional challenges such as inadequate digital infrastructure, network instability, low confidence in electronic payment systems, cyber-security concerns, and the predominance of low-value transactions within the mobile banking ecosystem.

The study therefore concludes that increasing the number of users of mobile banking platform among citizens is a critical driver of financial deepening in Nigeria. The findings underscore the importance of promoting digital financial inclusion through policies and programmes that encourage greater participation in formal financial systems. Furthermore, while transaction volume and transaction value were not statistically significant in the current study, digital financial services remain important mechanisms for promoting accessibility, convenience, and efficiency within the financial sector. Overall, the study concludes that technological innovation in the banking sector, when complemented with adequate financial education, supportive regulatory frameworks, and improved digital infrastructure, has the potential to substantially improve financial deepening and strengthen the Nigerian financial system. Consequently, policymakers, financial institutions, and other stakeholders must continue to invest in financial technology development, consumer education, and institutional

reforms aimed at expanding financial access and enhancing the effectiveness of digital banking services in Nigeria.

Recommendations

Based on the findings of this study, the following recommendations are made:

1. Since mobile banking users were found to exert a significant positive effect on financial deepening in Nigeria, Deposit money banks and financial technology firms should intensify efforts toward increasing the number of mobile banking users through aggressive awareness campaigns, user-friendly banking applications, and simplified account opening procedures.
2. Given the insignificant effect of mobile banking transaction volume on financial deepening, financial institutions should focus not only on increasing the frequency of transactions but also on improving the quality, efficiency, and reliability of mobile banking services to encourage meaningful financial participation.
3. Since mobile banking transaction value did not significantly influence financial deepening, banks and mobile financial service providers should introduce innovative financial products and incentives capable of increasing high-value digital transactions within the formal financial system.

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