



Cashless Policy and the Nigeria Financial Sector Development: An Empirical Investigation

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Abstract: This study investigated the effect of cashless policy instruments on financial sector development in Nigeria over the period 2014–2024 using quarterly data. Cashless policy proxies included automated teller machine (ATM) transactions, point-of-sale (POS) transactions, internet banking (IB), and mobile banking (MB), while financial sector development was measured using a composite index. The Autoregressive Distributed Lag (ARDL) framework was employed to estimate both short-run and long-run dynamics. The results showed that ATM, MB and POS indicated positive and significant effect on the financial sector development in the short run. In the long run, MB and IB were significant to enhance financial sector performance. The study further confirmed a moderate speed of adjustment toward equilibrium. The study therefore concluded that cashless policy had contributed to the growth of Nigeria financial system, albeit marginally. The control variables mostly exhibited the predicted behavior. This study recommended increased investments in technology by Nigerian banks and financial institutions to further increase seamless cashless transactions. It was also essential for the government to strengthen cybersecurity measures and uphold data privacy laws to raise public confidence in the system.

Keywords: Cashless policy, financial sector development, ARDL, Nigeria.

1. INTRODUCTION

Payment systems have evolved significantly throughout economic history to support economic transactions and commercial activities. In the earliest phase of exchange, the barter system served as the primary means of conducting transactions. However, the inefficiencies associated with barter trade, a system constrained by the requirement for a mutual coincidence of wants, made transactions inefficient and difficult to coordinate. These shortcomings eventually led to the emergence of money as a standardized and generally accepted monetary instrument (Uyan, 2017). This development was followed by the emergence of a cash-based economy, in which most retail and commercial transactions were carried out using physical currency. Although the cash-based system facilitated trade, it also imposed considerable costs on individuals, financial institutions, and governments. For instance, governments incur substantial expenses related to currency printing and replacement due to the rapid wear and tear of notes in circulation (Osazevaru and Yomere, 2015). Furthermore, the widespread use of cash encourages the holding of large amounts of money outside the formal financial system, thereby weakening the capacity of monetary policy to maintain price stability while supporting sustainable economic growth.

Cash-dominated transactions can also increase the risk of illicit activities such as money laundering and currency counterfeiting. Fortunately, advancements in information and communication technology (ICT) have gradually transformed traditional payment mechanisms and enabled the development of electronic financial system. These technological innovations have created efficient platforms for conducting financial transactions without relying extensively on physical cash (Hamid, Mehmood and Ahmad, 2018). Unlike the barter system and cash dominated economy, a cashless environment describes an economic system in which financial transactions are carried out with little or no dependence on physical currency. In such a system, payment instruments are largely dominated by alternatives such as electronic transfers, point-of-sale system, mobile banking platform, and online payment channels, making it possible for individuals and businesses to make payments for goods and services and receive money transfers electronically (Ene, Abba and Fatokun, 2019).

The financial sector occupies a central position in any economy because of its intermediation function. It performs an intermediation function by mobilizing

surplus funds from households and other saving units and channeling them into productive investments within the real sector. The financial sector broadly consists of all financial institutions engaged in economic activities within a given economy, including banks and other financial intermediaries (CBN, 2017). Through these institutions, the financial system promotes economic growth, facilitates capital formation, and ensures the efficient operation of the payment system. In addition, financial institutions reduce transaction costs, improve information flow, enhance risk diversification, and provide liquidity within the financial system.

A cashless policy fosters financial sector development by modernizing the payment system, enhancing financial inclusion, promoting efficiency and transparency in transactions, and providing banks with better tools for managing and improving their services (Nwani, Nwaimo and Kanu, 2020). This shift from cash to electronic transactions creates a more streamlined environment, reduces operational costs, expands ease of access to formal financial services, thereby fostering the growth and development of the banking and broader financial sector (CBN, 2013).

Nigeria financial system embraced nationwide cashless economy about twelve years ago, precisely in 2014 amidst optimism that it would boost the financial sector development. Experts have argued that Nigeria's aspiration to become one of the leading economies in the world may be difficult to achieve without fully embracing a cashless payment system. The infrastructure provision for the effective implementation of the programme was vigorously promoted by the Central Bank of Nigeria (CBN), deposit money banks, and other stakeholders within the financial system. To support the implementation of the cashless policy, several payment infrastructures were introduced, comprising electronic payment channels such as automated teller machines (ATMs), point-of-sale (POS) terminals, internet-based banking systems, and mobile banking platform. More recently, there is upsurge of fintech institutions anchored largely on cashless operations which is geared towards financial inclusion in Nigeria. Legal and regulatory frameworks were also enacted by the CBN and financial crimes commissions for the smooth implementation of the initiative. For instance, the Economic and Financial Crimes Commission (EFCC) enforces regulations by investigating and prosecuting financial crimes, particularly those involving large cash movements, under the Money Laundering Prohibition Act and the Proceeds of Crime Act.

But despite all these noble efforts by the relevant authorities, the sad experiences occasioned by cash dominated economy seems not to have left its stranglehold on the Nigeria financial sector. Long queues are still common occurrences in our banking halls and ATM galleries. Cheques are still widely used (Nnanwobu et al, 2011). High volume of currencies and their attendant printing costs continue to form part of government budgetary allocation. Our inflationary upsurge amongst other things is also being blamed on large portion of our broad money staying outside the formal banking system. This situation limits the effectiveness of monetary policy and complicates such efforts by the CBN to manage inflation. In addition, the adoption of electronic payment systems faces obstacles such as inadequate digital infrastructure in rural areas, cybersecurity concerns, and insufficient consumer protection mechanisms (Oneill, Bello, Adebisi, and Ogungbire, 2020).

It is obvious that without immediate intervention by the government to further review and increase efforts to correct these anomalies, these noble policies and actions of the government to enhance financial sector efficiency may not be fully realized. Government's efforts to comply with the SDG 1 (reducing poverty) may also not be feasible. The adoption of the cashless policy towards attainment of financial growth can be a catalyst in achieving the SDG goal by promoting financial inclusion which ensures that more people effectively access and utilize financial services offered by formal financial institutions.

Against this background, this study examines the effect of Nigeria's cashless policy on financial sector development. The primary objective of this study is to provide empirical evidence that can guide the government and financial institutions in enhancing the effectiveness of digital payment initiatives.

This study advances the existing body of knowledge through several significant contributions. First, a substantial proportion of earlier studies investigating Nigeria's cashless policy relied on datasets that predated the nationwide implementation of the policy in 2014. Our empirical survey showed that a good number of the studies were done years before 2014; specifically, the starting years of their datasets mostly began before 2014 (for instance see Enueshike, Anyanwu and Moses, 2025), which may limit the reliability of their findings. Second, most existing research focuses primarily on banking performance indicators such as profitability or operational efficiency, thereby overlooking broader measures of financial sector development. This leaves out other critical financial providers, hence providing a narrow consideration of the

policy. Besides, our study used a composite index and quarterly data of financial sector development, thus providing more robust empirical evidence. Previous studies have predominantly used annual dataset. Third, the existing studies mostly lack a standardized and relevant indicators of cashless policy, making it difficult to compare findings or guide policy. Some use cheques to denote cashless indicator (see Nwani, Nwaimo and Kanu (2020)). Thus leaving out vital and relevant indicators for determining the relationship between the key variables under investigation in this study. Fourth, there exists contradictory results in the reviewed works, while some are showing positive results, others indicate negative outcomes. And fifth, our study has the greatest number of periods, forty-four data points unlike the previous works that contain very few datasets which are mostly less than fifteen periods. The larger the periods, the more reliable, credible and robust will be the results. Therefore, the present study aims to contribute context-specific evidence on how cashless policy impacts the expansion and development of the financial sector.

2. REVIEW OF RELATED LITERATURE

2.1. Conceptual Review

Cashless Policy

A cashless policy is a financial framework in which economic transactions are conducted primarily through electronic payment channels rather than the physical exchange of currency. This system relies on digital payment instruments, including internet-based banking platforms, point-of-sale terminals, mobile banking services, and automated teller machines (ATMs). The core objective of a cashless system is to enhance transaction efficiency, increase financial inclusion, reduce risks associated with cash handling, and enhance transparency within the financial system (Mieseigha and Ogbodo, 2023).

Globally, the concept of a cashless economy has gained considerable attention, particularly in advanced economies where digital payment systems have become deeply integrated into everyday economic activities. Efficient electronic payment systems generate several macroeconomic benefits, including increased bank deposits, expanded availability of loanable funds, improved financial sector efficiency, and enhanced financial inclusion. Ajayi (2014) argues that increased use of digital payment instruments can also strengthen the effectiveness of monetary policy by improving the traceability and management of financial transactions.

When these benefits are fully realized, they can significantly contribute to financial and economic development. Scholars generally suggest that the adoption of cashless payment systems can stimulate financial sector development through improved efficiency and broader access to financial services.

POS Transactions

Point-of-sale (POS) transactions refer to financial transactions executed through POS terminals, commonly using debit or credit cards. This payment channel has witnessed substantial adoption in recent years, attributable to its convenience, efficiency, and improved security features. It is mostly used in retail outlets such as shopping malls, fuel stations, open markets among others

Internet Bank Transactions

Internet banking transactions, also referred to as web-based transactions, involve the execution of financial activities such as payments and fund transfers through online platforms accessed via web browsers on computers or similar devices. As noted by Siyanbola (2013), this form of banking entails the use of internet-enabled electronic tools to carry out financial operations. It allows users to perform a wide range of routine activities, including balance inquiries, account transfers, bill payments, stop-payment instructions, and loan applications.

With the rapid expansion of internet access and the continuous growth of e-commerce, online financial transactions have become an increasingly important channel for both individuals and businesses to conduct financial activities in a convenient and secure manner (Uzochukwu and Okoli, 2016; Imagha et al., 2023). One key advantage of internet banking is the speed of transaction processing, as most online transactions are completed within seconds or minutes, providing immediate confirmation and reducing delays. This is particularly beneficial for e-commerce operations, where timely payment processing enhances customer satisfaction and improves order fulfillment efficiency. Furthermore, compared to traditional cash-based systems, web-based transactions offer improved transparency and stronger security features.

Mobile Banking

Mobile banking provides bank customers with convenient access to financial services on the move through dedicated applications installed on smartphones

or tablets. This platform enables users to perform transactions anytime and from virtually any location. Through mobile devices, customers can access a variety of services, including balance inquiries, transaction history, account verification, bill payments, fund transfers, stop-payment instructions, and other customer support functions (Okon and Amaegbaeri, 2019; Adewoye, 2013).

Mobile banking can therefore be described as the delivery of banking and financial services via mobile telecommunication technologies. It has gained widespread acceptance among users, particularly the youths, due to its convenience, accessibility, and relatively low infrastructure requirements. As a result, it has become one of the most widely adopted platforms in the delivery of electronic banking services.

Automated Teller Machine (ATM)

An Automated Teller Machine (ATM) is a self-service electronic device that enables bank customers to carry out cash withdrawals and other financial transactions by securely verifying their identity through a personal identification number (PIN). ATMs allow users to carry out transactions at any time of the day without requiring a physical visit to a bank branch, as they are widely located in places such as shopping malls, retail outlets, and fuel stations. The widespread use of ATMs is largely attributed to their convenience, as they simplify routine banking activities such as cash withdrawals and balance inquiries. In addition to these functions, ATMs also support services such as fund transfers, bill payments, and mobile airtime recharge.

2.2. Contextual Review

The Central Bank of Nigeria (CBN) initiated the Cashless Policy Framework in 2012 to reduce the predominance of cash transactions to address inefficiencies associated with their use, while promoting the adoption of digital payment systems. The policy was first implemented in Lagos State of Nigeria as a pilot program before expanding to other states in 2014. It imposed cash withdrawal and deposit limits for individuals and businesses to discourage excessive reliance on physical cash (Ezuwore-Obodoekwe, Eyisi, Emengini and Chukwubuzo, 2014). Individuals were initially limited to ₦500,000 per day, while corporate organizations had a cap of ₦3 million, with penalties for exceeding these limits. The goal of the cashless policy was to increase financial efficiency, curb corruption, and promote financial inclusion by

encouraging the use of electronic banking, mobile payments, and online transactions (Zakari, 2023).

According to Ahmed and Sur (2023), increased access to mobile technology and internet services has played a critical role in advancing the adoption of digital banking within Nigeria. The expansion of fintech companies, which deliver innovative financial services via mobile applications and USSD channels, has further strengthened the movement toward a cashless economy. Online transactions are facilitated by major payment platforms such as Paystack, Interswitch, Flutterwave, and Quickteller. As more Nigerians embrace digital financial services, the long-term success of the cashless policy will depend on addressing existing challenges and enhancing public trust in electronic transactions. Challenges such as poor internet access, low digital literacy, inadequate banking infrastructure and resistance to change have slowed full implementation. Furthermore, concerns have been expressed about data privacy and cybersecurity risks (Adeleye, Omotayo and Omolewa, 2020). Despite these obstacles, the policy has significantly contributed to Nigeria's transition towards a modern and technology-driven financial system (Ezeocha, 2024).

Internet banking and electronic transactions in Nigeria experienced exponential growth between 2014 (inception date of the policy) and 2024, with digital transactions surging by over 1,500 percent between 2018 and 2024. By 2024, web and mobile transactions processed over ₦2.27 quadrillion (\$1.57 trillion), driven by a 72.63 percent rise from 2023 levels, cementing Nigeria's position as a top African digital payments economy. In 2024, Nigeria Interbank Settlement System (NIBSS) reported 11.2 billion total electronic transactions, up from 9.7 billion in 2023. The boom is driven by increased partnerships between banks and fintechs, rising mobile penetration (over 63% in 2024), and enhanced security frameworks (CBN, 2025). The industry continues to grow in 2025, with Q1 2025 electronic transactions reaching ₦284.99 trillion, a 17.7% increase from the same period in 2024 (CBN, 2025).

2.3. Theoretical Framework

Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) is a widely recognized theoretical framework that explains the mechanism through which individuals adopt new

technologies. Developed by Davis (1989), the model highlights two key determinants of technology acceptance: perceived usefulness and perceived ease of use. Perceived usefulness describes the extent to which an individual believes that the use of a particular technology will enhance their performance, whereas perceived ease of use refers to the degree to which the technology is viewed as user-friendly and requires minimal effort to operate.

The TAM framework has been widely applied in studies on digital banking and electronic payment systems. It asserts that adoption is significantly influenced by users' perceptions of usefulness and perceived simplicity in operation. In the context of the Nigerian financial system, the uptake of digital financial services, including mobile banking, POS transactions, and internet banking platforms, is largely influenced by these key factors.

One of the strengths of TAM is its ability to explain variations in technology adoption across different demographic groups. For instance, individuals in urban areas, who typically possess higher levels of education and greater exposure to technology, are more inclined to adopt electronic payment systems than their counterparts in rural areas with limited access to banking infrastructure. A comprehensive understanding of these dynamics is critical for policymakers in crafting effective strategies to accelerate the adoption of the cashless policy. Additionally, external factors such as government policies, financial literacy, and trust in banking institutions play a significant role in influencing technology acceptance. While the CBN has implemented various initiatives to encourage digital transactions, resistance from some consumers and businesses remains a challenge. Addressing these concerns requires targeted awareness campaigns, improved security measures, and incentives for digital payment adoption.

Empirical studies have validated the applicability of TAM in Nigeria's financial sector. For example, Olatunji and Olasanmi (2020) reported that perceived usefulness and perceived simplicity in operation exert a significant influence on the adoption of mobile banking services in Nigeria. The study highlighted that reducing transaction costs and improving the reliability of digital payment platforms could enhance adoption rates.

Despite its contributions, the Technology Acceptance Model (TAM) exhibits certain limitations, particularly its emphasis on individual perceptions, with limited consideration for external factors such as economic conditions, infrastructure,

and regulatory policies. In the context of Nigeria's cashless policy, addressing these broader challenges is essential for ensuring widespread adoption and long-term sustainability. The Technology Acceptance Model (TAM) provides a robust analytical framework for examining consumer behavior in the adoption of digital financial services. By leveraging insights from this model, the CBN and financial institutions can design more effective strategies to promote cashless transactions and enhance the overall development of Nigeria's financial sector.

2.4. Empirical Review

Empirical evidence on the effect of cashless policy in Nigeria and other emerging economies has largely focused on banking sector performance and macroeconomic outcomes, with relatively limited attention given to financial sector development as a broader construct. Existing studies provide mixed and sometimes conflicting results.

For instance, Nwakoby, Chukwu, and Oghenetega (2020) examined the effect of the cashless policy on the profitability of deposit money banks in Nigeria over the period 2009–2019 using the Autoregressive Distributed Lag (ARDL) technique. Their study employed indicators such as POS transactions, ATM usage, mobile banking, and web payments, with profit before tax as the dependent variable. The findings indicate that the cashless policy had a negative and statistically insignificant impact on bank profitability. Similarly, Ugbede, Yahaya and Ediche (2019) analyzed the relationship between electronic payment systems and the financial performance of deposit money banks, utilizing regression analysis. Electronic banking was proxied by ATM, internet banking, and POS transactions, while profitability served as the performance indicator. The results indicated that ATM transactions exhibited no statistically significant influence on profitability, whereas POS and internet banking showed positive and significant impacts.

In a similar study, John et al. examined the performance of Nigeria's payment system under the cashless policy by examining variables such as cheque usage, fund transfers, and ATM transactions. Their analysis showed a decline in cheque usage alongside increased reliance on electronic payment channels, particularly interbank transfers and ATM transactions, suggesting a gradual transition toward a cashless system. Focusing on specific digital channels, Okon and Amaegberi (2019) investigated the impact of mobile banking on bank profitability using panel data

from selected Nigerian banks over the period 2007–2016. Employing panel unit root tests and the Seemingly Unrelated Regression Estimation (SURE) technique, the study found that mobile banking, ATM usage, and POS transactions all had positive and statistically significant effects on bank performance. More recent evidence by Adu and Williams (2023) employed panel regression analysis on data from five commercial banks between 2013 and 2020 to examine the impact of ATM, NEFT, POS, and other electronic banking transactions on financial performance. The study reported that all selected electronic payment indicators had a significant positive impact on bank performance.

Beyond profitability, some studies have examined the relationship between cashless policy and financial inclusion. For example, Ene, Abba and Fatokun (2019) applied econometric techniques to examine the effect of electronic banking channels, represented by ATM and POS usage, on financial inclusion in Nigeria. The findings demonstrated that POS transactions had a positive and statistically significant impact on financial inclusion. Similarly, Ayo and Babajide (2012) explored the role of the cashless policy in enhancing financial inclusion in Nigeria and reported that the policy significantly increased access to banking services, particularly in rural areas, through mobile banking and POS platforms. Similarly, Okafor et al. (2020) reported that the cashless policy has transformed banking operations by encouraging the adoption of digital platforms and automated services, thereby improving efficiency and customer satisfaction.

At the macroeconomic level, Madugba (2020) investigated the relationship between the cashless policy and economic growth, employing Ordinary Least Squares (OLS) over the period 2008–2018. The findings revealed that ATM, RET, and web-based transactions had no significant effect on real GDP, while POS transactions were found to be a significant determinant of economic growth. Furthermore, Oluwaseun and Adebayo (2019) explored the implications of cashless transactions for economic growth and concluded that digital payments enhance financial efficiency, reduce transaction costs, and increase the velocity of money, thereby contributing positively to economic development.

Overall, the empirical literature presents divergent findings regarding the effects of cashless policy, reflecting differences in methodology, variables, and scope of analysis. More importantly, most of these studies concentrate on banking sector performance, financial inclusion, or macroeconomic outcomes, with very limited

emphasis on financial sector development. This exposes a critical gap in the existing literature and underscores the need for further empirical investigation into the impact of cashless policy on financial sector development in Nigeria

3. METHODOLOGY

This study relies on quarterly secondary data comprising major indicators such as mobile banking, internet banking, point-of-sale (POS), and automated teller machine (ATM) transactions, alongside a composite index of financial sector development. Inflation and interest rates are incorporated as control variables. The choice of variables is anchored on existing empirical literature, and the data were sourced from authoritative publications of the Central Bank of Nigeria (CBN), including its Annual Reports and Statistical Bulletin, as well as data from National Bureau of Statistics. The sample covers quarterly periods from 2014Q1 to 2024Q4, totaling 44 periods.

3.1. Model Specification

The linear functional relationship of our research model can be represented thus:

$$\text{FSD} = f(\text{MB}, \text{IB}, \text{POS}, \text{ATM}, \text{INF}, \text{INT}) \quad 1$$

Where;

FSD denotes financial sector development;

MB represents mobile banking;

IB signifies internet banking;

POS refers to point-of-sales transactions;

ATM denotes automated teller machine transactions.

Inflation and interest rates were included in the model as control variables given their strong linkage with financial sector growth (Majid, 2007).

The econometric estimation of the functional relationship can be specified thus:

$$\text{FSD} = \alpha_0 + \alpha_1 \text{MB} + \alpha_2 \text{IB} + \alpha_3 \text{POS} + \alpha_4 \text{ATM} + \alpha_5 \text{INF} + \alpha_6 \text{INT} + \xi_t \quad 2$$

α_0 is the constant, and α_1 to α_6 are the parameters of the repressors. ξ_t is the error term, which captures the impact of omitted or exogenous factors affecting

financial sector development. The a priori expectation are $\alpha_1 - \alpha_4 > 0$, whereas $\alpha_5 - \alpha_6 < 0$.

FSD reflects depth, access, stability and efficiency capturing private sector credit (as a percentage of GDP), broad money (M2) relative to GDP, bank deposits (% of GDP) and stock market turnover ratio (stocks traded to capitalization).

3.2. Technique of Data Analyses

The study employed a series of analytical procedures to achieve its objectives. These include preliminary tests (including descriptive statistics and unit root tests), the Autoregressive Distributed Lag (ARDL) model, as well as a set of diagnostic estimations such as autocorrelation, heteroscedasticity, normality, stability, and model reliability.

To determine the stationarity characteristics of the variables, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests were employed. The ADF test extends the conventional Dickey-Fuller (1979) approach to ensure reliable stationarity assessment. The Phillips-Perron (PP) test, on the other hand, serves as a complementary approach, incorporating non-parametric adjustments to correct for DF procedure.

The ADF model specification is presented as follows:

$$\Delta y_t = \psi y_{t-1} + \sum_{i=1}^p \alpha_i \Delta y_{t-i} + \xi_t \quad 3$$

Autoregressive Distributed Lag (ARDL) Model

The study utilizes the Autoregressive Distributed Lag (ARDL) methodology developed by Pesaran and Shin (1999) to estimate the specified relationships. This approach represents a dynamic modeling framework that incorporates lagged values of both dependent and explanatory variables (Greene, 2008).

One of the key strengths of the ARDL model is its ability to estimate both short-run dynamics and long-run equilibrium relationships concurrently. In addition, it offers considerable flexibility in handling variables with different orders of integration, including I(0), I(1), or a combination of both, without requiring pre-testing for uniform integration order. The technique is also well-suited for analyses involving relatively small sample sizes.

Accordingly, the ARDL specification for this study is presented as follows:

$$y_t = \alpha + \sum_{i=1}^p \gamma_i y_{t-i} + \sum_{j=1}^k \sum_{i=0}^q X_{j,t-i} \beta_{j,i} + \xi_t \quad 4$$

In this specification, Y_t denotes the dependent variable vector, while X_t represents the regressors, exhibiting integration at level $I(0)$ or at the first difference $I(1)$. β and γ_j represent the coefficients. with α as the intercept. The lag orders are given by k , p , and q , and ξ_t denotes the disturbance term.

Substituting the study variables into this framework to estimate both short-run dynamics and long-run equilibrium relationships, we derived the following:

$$\Delta FSD_t = \alpha_{01} + \sum_{i=1}^p \alpha_{1i} \Delta FSD_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta MB_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta IB_{t-i} + \sum_{i=1}^q \alpha_{4i} \Delta POS_{t-i} + \sum_{i=1}^q \alpha_{5i} \Delta ATM_{t-i} + \sum_{i=1}^q \alpha_6 \Delta INF_{t-i} + \sum_{i=1}^q \alpha_7 \Delta INT_{t-i} + \varpi_{1p} MB_{t-1} + \varpi_{2p} IB_{t-1} + \varpi_{3p} POS_{t-1} + \varpi_{4p} ATM_{t-1} + \varpi_{5p} INF_{t-1} + \varpi_{6p} INT_{t-1} + \xi_t \quad 5$$

The coefficients of the short- term are $\alpha_1 - \alpha_7$ while that of long term are $\varpi_1 - \varpi_6$.

Error correction model specification for determination of speed of adjustments is stated thus:

$$\Delta FSD_t = \alpha_{01} + \sum_{i=1}^p \alpha_{1i} \Delta MB_{t-i} + \sum_{i=1}^q \alpha_{2i} \Delta IB_{t-i} + \sum_{i=1}^q \alpha_{3i} \Delta \ln POS_{t-i} + \sum_{i=1}^q \alpha_{4i} \Delta \ln ATM_{t-i} + \sum_{i=1}^q \alpha_5 \Delta INF_{t-i} + \sum_{i=1}^q \alpha_6 \Delta INT_{t-i} + \lambda ECT_{t-1} + \xi_t \quad 6$$

Where:

The parameter λ reflects the speed at which deviations from short-run disequilibrium are corrected to restore long-run equilibrium.

$\alpha_1 - \alpha_6$ are the coefficients of the variables and α_0 the intercept.

Operational Definition of Variables in the Model

Table 1: Description of Variables

Type	Variables	Abbreviations	Definitions
Dependent variable	Financial Sector Development	FSD	Overall contribution of the financial sector to the economy, measured by its aggregate sectoral GDP over the study period.

Type	Variables	Abbreviations	Definitions
Dependent variables and Control variables	Mobile Banking	MB	Captures the total value of mobile banking transactions within the study period and reflects the level of financial inclusion and the depth of fintech adoption.
	Internet Banking	IB	Measured by the total volume of internet-based banking transactions over the study period, representing a major channel for digital financial transfers
	Point-of-Sales	POS	Denotes the POS transactions during the study, indicating the intensity of cashless retail payments.
	Automated Teller Machine	ATM	Expresses the over-all ATM transactions over the study period.
	Inflation Rate	INF	measures the aggregate inflation in the entire economy
	Interest Rate	INT	It indicates the benchmark interest rate, i.e., MPR

Source: Researcher's compilation 2025

4. RESULTS AND DISCUSSION

Descriptive Statistics

Descriptive statistics are employed to examine the distributional features of the dataset. The analysis includes key indicators such as the mean, median, standard deviation, skewness, kurtosis, and normality tests. The mean and median reflect the central tendency, whereas the standard deviation measures the extent of variability in the data.

Table 2: Descriptive Statistics

	POS	ATM	MB	IB	FSD	INF	INT
Mean	7.13	7.55	6.63	8.24	0.39	16.10	14.75
Median	6.92	7.45	6.34	8.00	0.38	14.40	13.75
Std. dev	1.35	0.62	2.17	1.54	0.07	7.08	3.94
Skewness	0.38	0.62	0.34	0.38	0.37	1.32	1.97
kurtosis	1.83	2.28	1.78	1.87	1.71	3.90	6.22
JB Stat	3.54	3.78	3.59	3.41	4.08	14.37	47.42
JB Prob	0.16	0.15	0.16	0.18	0.12	0.00	0.00

Source: Author's Eviews computation

Table 2 reveals that the mean and median values for each variable are closely comparable, suggesting a low degree of dispersion. This is particularly with the major variables (cashless policy indicators and the dependent variable). Their low standard deviations show confirmatory evidence of the unanimity of their means. This is not the same with the control variables (INF and INT) which registered high dispersions. On kurtosis, all the major variables are platykurtic leaving only the control variables with leptokurtic feature. All the series reveal moderate and positive skewness. Further, all the variables of interest exhibit normality, their respective probability values are larger than 0.05. however, this is not the same with the control variables.

Unit Root Test

Given that the dataset consists of time series observations, it is crucial to determine the stationarity properties of the variables, as the presence or absence of stationarity significantly affects their statistical properties and behavior. Establishing the order of integration is therefore necessary in order to select an appropriate econometric model for analyzing the relationships among the variables.

Table 3: Augmented Dickey Fuller and Philips Perron Unit Root Tests

<i>ADF Unit Root Test (Trend and Intercept)</i>				
<i>VARIABLES</i>	<i>STAT</i>	<i>CRITICAL VALUE(5%)</i>	<i>PROB</i>	<i>DECISION</i>
FSD	-4.12	-3.32	0.01	1(0)
ATM	-4.21	-3.49	0.01	1(0)
POS	-4.98	-2.93	0.01	1(0)
IB	-3.63	-2.93	0.02	1(0)
MB	-3.40	2.93	0.02	1(0)
INF	-3.45	-2.93	0.02	1(0)
INT	-4.06	-3.52	0.01	1(0)
<i>PP Unit Root Test (Trend and Intercept)</i>				
FSD	-4.12	-3.32	0.01	1(0)
ATM	-5.46	-3.63	0.00	0(0)
POS	-5.98	-3.73	0.00	1(0)
IB	-3.63	-2.93	0.02	1(0)
MB	-5.40	-2.93	0.00	1(0)
INF	-3.47	-2.93	0.01	1(0)
INT	-4.06	-3.52	0.01	1(0)

Source: Extracted from Eviews

The Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests were applied to determine the stationarity characteristics of the variables. The results indicate the presence of mixed integration orders, with variables integrated at both $I(0)$ and $I(1)$ levels. While the majority of the variables are stationary at first difference, ATM exhibits stationarity at level. In light of this mixed integration structure, the Autoregressive Distributed Lag (ARDL) model is considered an appropriate estimation technique for analyzing the relationships among the variables.

Table 4: Short Run, Long Run and Error Correction Estimates

Short Run Results				Long Run Results		
Variable	Coeff	T-Stat	Prob.	Coeff	T-Stat	Prob
FSD(-1)	0.752	11.964	0.000			
LNATM	0.054	2.265	0.032	0.019	0.511	0.613
LNATM(-1)	-0.049	2.070	0.048			
LNIB	0.044	1.040	0.307	0.248	-4.095	0.000
LNIB(-1)	-0.002	-0.032	0.974			
LNMB	0.164	2.814	0.020	0.189	2.264	0.032
LNMB(-1)	0.136	2.218	0.035			
LNPOS	0.039	2.579	0.038	0.006	0.057	0.954
LNPOS(-1)	0.037	-1.412	0.169			
INF	2.380	0.121	0.904	0.002	2.009	0.055
INT	-0.000	2.895	0.019	-0.002	2.635	0.024
Goodness of Fit						
R2	0.999					
F-statistic	11624.94		0.000			
Error Correction Model						
ECM(-1)		-0.247	-10.263			
0.000						
Diagnostic Tests						
D-W stat	2.089					
B-G LM Test:	3.113		0.062			
Het- BPG	1.302		0.269			
JB- Normality	11.014		0.004			
Ramsey T-stat	0.445		0.659			
Redundancy Test	9.630		0.000			

Source: Eviews

In the short run, ATM transactions exert a positive and statistically significant influence on financial sector development, with a marginal effect of about 5

percent. This indicates that an increase in ATM transactions led to a corresponding improvement in financial sector performance. However, the lagged value of ATM transactions shows a negative effect, indicating that past ATM usage may slightly reduce financial sector development by about 5 percent. The limited effectiveness of ATM usage in reducing cash dependency may be explained by the fact that many users primarily relied on ATMs for cash withdrawals rather than for facilitating cashless transactions.

In contrast, internet banking demonstrates positive coefficients in both current and lagged periods; however, these effects are not statistically significant. This suggests that increased usage of internet banking did not translate into meaningful improvements in financial sector development over the study period. This result is consistent with the findings of Madugba (2020), and Samuel and Emenyi (2024), who reported that internet banking transactions did not exert a significant influence on real gross domestic product.

In respect to mobile banking and its impact on the financial sector development, it showed inspiring evidence. Specifically, there were significant positive outcomes on the financial sector by 0.164 and 0.136 respectively both in the current and lagged period, this finding differs from the result of Enueshike et al., (2025). Mobile banking improved on the financial sector development within the period under our purview. Whereas on the point of sales, there is a mixture of significant and non-significant outcomes. The current result present positive and significant results on financial sector while the previous year reveal positive but non-significant values. The control variables of inflation and interest rates show respectively insignificant and significant impacts on financial sector. The results indicate that inflation exerts a positive influence on financial sector development, whereas interest rate shows a negative effect, suggesting that higher interest rates tend to hinder sectoral growth. Notably, the estimated coefficients of the key variables—ATM, internet banking (IB), and point-of-sale (POS)—are largely consistent with theoretical expectations, with the exception of the lagged values of ATM and IB. The negative sign associated with the interest rate also conforms to a priori expectations.

With regard to the cointegration analysis, the findings provide strong evidence of the existence of a long-run relationship between cashless policy indicators and financial sector development. At the 5 percent significance level, the computed F-statistic (10.37) surpasses both the lower bound $I(0)$ value of 2.27 and the

upper bound $I(1)$ value of 3.28, thereby confirming the presence of a stable long-run equilibrium relationship among the variables. In essence, although short-run fluctuations may occur, the variables tend to converge over time. This suggests that cashless policy has the potential to have a sustained long-term effect on the growth of the financial sector.

The error correction model (ECM), which reflects the rate at which short-run disequilibrium converges to long-run equilibrium, is appropriately signed and statistically significant. The coefficient of the error correction term is -0.247, with a probability value of 0.00, indicating that approximately 24.7 percent of short-run deviations are corrected within each period. This reflects a good speed of adjustment and confirms that financial sector development responds meaningfully to shocks arising from changes in cashless transaction activities.

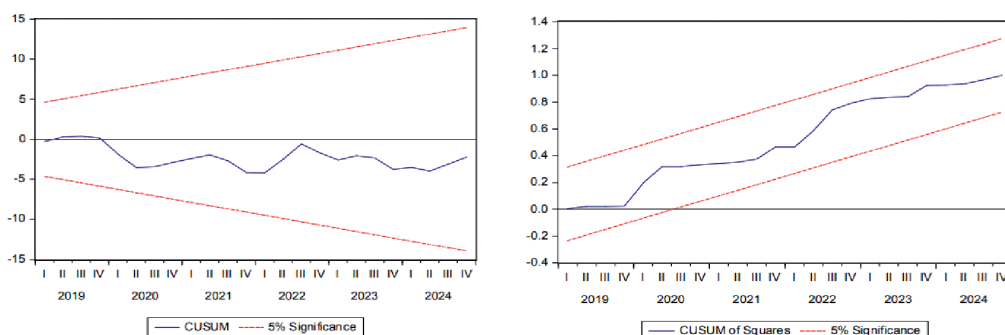
The long-run estimates reveal that automated teller machine (ATM) and point-of-sale (POS) transactions are 0.019 and 0.006, with associated p-values of 0.613 and 0.954, respectively. This indicates that both variables do not have a statistically significant effect on financial sector development in the long run. In contrast, internet banking and mobile banking show positive and statistically significant effects. Specifically, internet banking has a coefficient of 0.248 ($p = 0.00$), while mobile banking records a coefficient of 0.189 ($p = 0.032$), suggesting that both variables play a significant role in enhancing financial sector development over time. It translates that 1 unit rise in IB and MB increased the growth of the financial sector by 24% and 18% respectively. In addition, the directional influence of the control variables indicates that the inflation and interest rates all have adverse effects on financial sector growth. These results are in consonance with macroeconomic concept, which posits that excessive inflation and high interest rates often suppress productive investment and diminish overall financial sector performance.

To establish the robustness of the model, many diagnostics were conducted. The goodness of fit, R^2 (at 99%) is high meaning that a large proportion of the financial sector development is explained by the combination of cashless policy indicators. The F-statistic is significant at the 5 percent level, confirming the overall goodness of fit and joint significance of the model. Specifically, the F-value of 11624.94 with a probability of 0.000 indicates that the explanatory variables, representing cashless policy indicators, jointly exert a significant influence on financial sector development in Nigeria. With respect to residual diagnostics, the results show no evidence of

serial correlation. The Breusch-Godfrey (B-G LM) test, which is more robust than the Durbin-Watson statistic for detecting higher-order autocorrelation, confirms the absence of autocorrelation in the model. In addition, the heteroscedasticity test reveals that the error terms are homoscedastic, indicating constant variance of the residuals.

Regarding model stability, both parameter and structural stability were verified using Ramsey's RESET test and recursive techniques, including the CUSUM and CUSUM of squares tests (see graphs 1 and 2). The results from these tests indicate that the model is stable over the sample period. Furthermore, the redundant variable test confirms that none of the explanatory variables are superfluous, as all variables are statistically relevant at a probability value of 0.000.

Overall, the post-estimation diagnostic results provide strong evidence that the model satisfies the key assumptions underlying the estimation technique, thereby supporting the reliability and robustness of the findings.



Graph 1: CUSUM Graph 2. CUSUM of squares

5. CONCLUSION

Our study is inspired by the need to appraise the influence of cashless policy on Nigerian financial system. Nigeria Government has since 2014 joined the league of progressive economies to adopt this policy with high hope of accelerating modernization of its payment system, promoting efficiency and transparency in financial transactions, improving financial services, and of course fostering the growth of its financial sector.

This study reveals that automated teller machines, mobile banking, and point-of-sale transactions positively and significantly influenced financial

sector development. Conversely, internet banking, despite having a positive coefficient, did not exert a statistically significant effect. This outcome may be linked to infrastructural deficiencies, particularly poor internet connectivity and inconsistent power supply. Many regions, particularly rural and underserved areas, still lack reliable internet connectivity and access to necessary technology. Additionally, we established that the two key variables: cashless policy and financial sector development are cointegrated, exhibits the expected negative sign and is statistically significant. The speed of adjustment is impressive, suggesting high chances of returning to equilibrium rapidly. In the long run, mobile and internet banking were significant to enhance financial sector performance, with point of sales and automated teller machine however indicating non-significant results. From these results, we can therefore conclude that cashless policy has contributed to the growth of Nigeria financial system, albeit marginally. Although it has not impacted the growth of financial sector to the desired effect within the studied period, there is strong indication that there is increasing acceptance of the policy in the country.

This study adopted the Autoregressive Distributed Lag (ARDL) approach and conducted preliminary analyses, including relevant diagnostic tests, to ensure the robustness and reliability of the findings. Given the wide-ranging potential benefits of the cashless policy, a rigorous empirical evaluation using an appropriate methodological framework is essential. The study is further anchored on the Technology Acceptance Model (TAM), which provides a strong theoretical basis for analyzing the adoption of digital financial innovations.

This study recommends increased investments in technology by Nigerian banks and financial institutions to facilitate seamless cashless transactions, which will drastically reduce incidents of network downtime, glitches and slow processing speeds for both users and service providers, and therefore leads to more contribution of the policy to the financial sector. Furthermore, the Central Bank of Nigeria should review and rationalize the charges imposed by commercial banks and digital payment platforms to facilitate wider adoption of the cashless policy. Moreover, the government should reinforce cybersecurity frameworks and ensure effective enforcement of data privacy regulations in order to enhance public trust and confidence in electronic payment systems. Many Nigerians fear that their personal and financial information may be compromised during digital transactions.

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