

Automated Teller Machine, Point-of-Sale Transactions and Financial Sector Development in Nigeria

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ABSTRACT

This study examines the effects of automated teller machine (ATM) and point-of-sale (POS) transaction values on financial sector development in Nigeria from 2010Q1 to 2024Q4. Using an ex post facto research design, quarterly time-series data were obtained from the Global Data Index, World Development Indicators, and the Central Bank of Nigeria Statistical Bulletin 2024. Based on the unit-root test results, the study estimated an autoregressive distributed lag (ARDL) model. The short-run results indicate that ATM transactions have a positive but statistically insignificant effect on financial sector development, whereas POS transactions have a negative and statistically significant effect. In the long run, ATM transactions have a positive and statistically significant effect, while POS transactions have a negative and statistically significant effect. The study recommends expanding reliable ATM access in underserved areas and strengthening the monitoring and regulation of POS operations to reduce fraud and service failures.

Keywords: Automated teller machine; point-of-sale transactions; financial sector development; credit to the private sector.

INTRODUCTION

Financial technology (FinTech) has attracted considerable attention from academics, practitioners, and regulators. FinTech start-ups have challenged traditional financial institutions by providing cheaper, faster, and broader access to financial services. They have also encouraged incumbent institutions to transform and innovate (Haddad & Hornuf, 2021; Milian, Spinola, & de Carvalho, 2019; Di, Yuan, & Zeng, 2021; Panos & Wilson, 2020; An & Rau, 2021).

Banks worldwide have adopted technologies such as automated teller machines (ATMs) and point-of-sale (POS) terminals to improve service delivery and operational resilience. In Nigeria, these technologies have transformed banking by giving customers more convenient access to cash withdrawals, balance enquiries, payments, and transfers. ATMs have become an important part of banking infrastructure, while POS terminals facilitate electronic payments at merchant and agent locations (Ehiedu, Onuorah, & Okoh, 2021; Okeke & Ezeala, 2023).

Despite these developments, Nigeria's financial sector has continued to face a slow pace of development. Weak institutional quality, poor governance, corruption, insecurity, and other socio-economic constraints have limited financial intermediation. Historically, direct-control policies and weak institutions also constrained the sector. These conditions underscore the importance of identifying technologies that can deepen financial intermediation and expand credit to the private sector.

The widespread adoption of ATMs and POS services has changed customer preferences, banking business models, and the risk profile of deposit money banks (Saleh, Umar, & Magaji, 2020; Gbanador, Makwe, & Olushola, 2022). Previous studies have examined ATMs in relation to bank performance (Opusunju et al., 2021), financial inclusion (Ehiedu et al., 2021; Usman, 2020), and economic growth (Anifowose & Ekpewhare, 2022). However, fewer studies have examined the combined effects of ATM and POS transaction values on financial sector development, measured as credit to the private sector relative to gross domestic product (CPS/GDP). This study addresses that gap for Nigeria over the period 2010Q1-2024Q4.

H01: ATM transaction value has no significant effect on financial sector development in Nigeria.

H02: POS transaction value has no significant effect on financial sector development in Nigeria.

LITERATURE REVIEW

Concept of Automated Teller Machines

An automated teller machine is a self-service banking terminal that enables customers to authenticate themselves with a card or other credential and a personal identification number (PIN). Depending on the services provided, customers can withdraw cash, check balances, transfer funds, and make payments. By extending banking services beyond the branch, ATMs can improve access, convenience, and service availability (Ehiedu et al., 2021).

ATMs reduce the need for customers to visit bank branches and can provide services around the clock when power, network connectivity, and cash are available. They are commonly located in bank premises, shopping centres, petrol stations, and other public locations. Their contribution to financial sector development depends not only on the number deployed but also on reliability, geographic coverage, security, and transaction usage.

Concept of Point-of-Sale Transactions

Point-of-sale transactions are electronic payments initiated through POS terminals at merchant or agent locations. The terminals connect buyers, merchants, and financial institutions and can support card payments, transfers, cash withdrawals, deposits, and bill payments. POS infrastructure therefore forms part of the broader digital-payments ecosystem and can reduce reliance on cash (World Bank, 2022).

The development of POS systems is closely linked to advances in financial technology, including mobile banking, near-field communication, and cloud-based payment platforms. Modern POS systems may also support sales reporting, customer management, and inventory control. Their developmental impact depends on affordability, network reliability, security, consumer trust, and the quality of regulation (Arner, Barberis, & Buckley, 2015).

Concept of Financial Sector Development

Financial sector development refers to improvements in the depth, access, efficiency, and stability of financial institutions and markets. Common indicators include broad money relative to GDP, domestic credit to the private sector relative to GDP, and stock-market measures. Afonso and Blanco-Arana (2018) identify domestic credit as an important indicator of financial development. Accordingly, this study uses credit to the private sector as a percentage of GDP (CPS/GDP) as its proxy for financial sector development.

EMPIRICAL REVIEW

Automated Teller Machines and Financial Sector Development

Sum and Memba (2016) examined financial innovation and the performance of deposit-taking savings and credit cooperative societies (SACCOs) in Kenya. They found that service innovations, including ATMs, affected financial performance and recommended greater use of such services. Although the study concerned SACCO performance rather than national financial sector development, it suggests that ATM access may reduce service barriers and improve institutional performance.

Usman (2020) used the number of ATMs, POS devices, and internet-banking transactions as indicators of electronic banking in Nigeria. Using linear regression, the study reported that internet banking and ATMs had insignificant effects on financial sector development, whereas POS devices had a significant effect on financial inclusion.

Ehiedu et al. (2021) examined ATM penetration and financial inclusion in Nigeria from 1990 to 2019, using geographic penetration, demographic penetration, and the number of ATMs relative to GDP as explanatory variables. Their results indicated that ATM penetration improved financial inclusion, although the strength of the individual penetration measures varied.

Opusunju et al. (2021) examined ATMs and the performance of deposit money banks in Nigeria from 2012 to 2018. Using data from the Central Bank of Nigeria Statistical Bulletin, the authors applied correlation, unit-root, and regression analyses. They reported positive but statistically insignificant effects of ATM transaction volume and value on return on assets.

Odeleye and Oyeneye (2022) applied an ARDL model to quarterly data from 2009 to 2019 to assess the effect of FinTech on financial inclusion in Nigeria. Their model included POS, ATM, web-payment, and mobile-money transactions, together with income growth and interest rates. They found that FinTech had a significant negative effect on financial inclusion in the short run and recommended stronger collaboration among stakeholders and improved technological infrastructure.

Point-of-Sale Transactions and Financial Sector Development

Adeoti and Osotimehin (2012) examined consumers' adoption of and satisfaction with POS terminals in Nigeria. Although users valued the convenience and usefulness of the technology, fewer respondents were satisfied with transaction speed, merchant service, awareness, and security. The findings point to the importance of improving the customer interface and service quality of POS technology.

Omotayo (2015) investigated the factors affecting organisational adoption of POS terminals in Lagos and Ibadan. Subjective norms and perceived ease of use were significantly related to adoption, whereas organisational characteristics, image, and perceived usefulness were not.

Anyanwu and Anumaka (2020) examined the effect of POS services on Nigeria's cashless policy. The study reported a positive and significant effect and highlighted the role of POS infrastructure in supporting cashless transactions.

Saleh et al. (2020) assessed the influence of POS services on the sales performance of small and medium-sized enterprises around Ahmadu Bello University's Samaru campus. The study focused on businesses with capital of at least N500,000 and examined POS services as an increasingly important agent-banking channel for campus-based enterprises.

The rapid expansion of POS agency businesses has also attracted attention because of their potential to widen access to payment and cash services. Kolawole (2021) described POS agency banking as a prominent and potentially profitable activity in Nigeria, while also noting the operational demands of the business.

Ejere (2022) identified fraud, disputed or pending transactions, dispensing errors, customer mistrust, and poor network connectivity as major challenges confronting POS operators and customers in Nigeria. These constraints can raise transaction costs, weaken trust, and reduce the developmental benefits of POS services.

Anifowose and Ekperiware (2022) assessed the effects of ATM, POS, and online-banking transactions on economic growth in Nigeria. They concluded that cashless-payment channels are important to the economy and recommended stronger regulation and promotion of ATM and POS platforms.

Okoye, Orajaka, and Nnebe (2022) examined POS businesses and unemployment reduction in Anambra State. They reported that POS outlets created income opportunities and recommended stronger protection for customers. More broadly, POS terminals can facilitate bill payments and other electronic transactions, although high charges, network failures, and fraud can limit their benefits.

THEORETICAL FRAMEWORK

Financial Intermediation Theory

Financial intermediation theory explains how financial institutions connect surplus units, which have funds to save or invest, with deficit units, which require financing. By collecting information, pooling funds, monitoring borrowers, and managing risk, intermediaries can reduce transaction and information costs and improve the allocation of financial resources (Goldsmith, 1969).

Goldsmith (1969) linked the expansion and structure of financial institutions to economic development. As an economy develops, its financial system typically deepens and becomes more capable of mobilising savings and directing them toward productive investment. Scholtens and van Wensveen (2003) further emphasise the role of financial intermediaries in risk transformation and value creation.

Within this framework, ATM and POS technologies may support intermediation by improving access to accounts and payment services, reducing transaction costs, and increasing the frequency and geographic reach of financial transactions. Their contribution, however, depends on reliable infrastructure, effective regulation, security, and public trust.

This study adopts financial intermediation theory because the dependent variable, CPS/GDP, captures the extent to which the financial system channels resources to the private sector. ATM and POS transaction values are treated as technological factors that may influence this intermediation process.

METHODOLOGY

The study adopted an ex post facto research design. Quarterly data covering 2010Q1-2024Q4 were obtained from the Global Data Index, World Development Indicators, and the Central Bank of Nigeria Statistical Bulletin 2024. The analysis comprised descriptive statistics, correlation analysis, the Augmented Dickey-Fuller (ADF) unit-root test, and an autoregressive distributed lag (ARDL) model. The ARDL approach was selected because the variables were found to be a mixture of I(0) and I(1), with none integrated of order two. The following model was estimated:

$$\Delta CPS/GDP_T = \mu + \alpha_1 CPS/GDP_T + \alpha_2 ATM_T + \alpha_3 POS_T + \sum_{i=1}^{p-1} \lambda_1 \Delta CPS/GDP_t + \sum_{i=0}^{q-1} \lambda_2 \Delta ATM_t + \sum_{i=0}^{q-1} \lambda_3 \Delta POS_t + \varepsilon_t$$

where:

CPS/GDP = credit to the private sector divided by gross domestic product, used as the proxy for financial sector development;

ATM = value of automated teller machine transactions (N billions);

POS = value of point-of-sale transactions (N billions);

mu = intercept; epsilon_t = error term.

RESULTS AND DISCUSSION

Table 1: Descriptive Statistics

	CPS/GDP	ATM	POS
Mean	3.157759	6269.197	5053.951
Median	3.049362	4749.915	748.3611

Maximum	7.298503	24202.06	35080.18
Minimum	0.000000	250.7125	9.068438
Std. Dev.	1.427332	5931.920	8966.937
Skewness	0.958476	1.562629	1.990745
Kurtosis	6.579991	4.630102	5.712554
Jarque-Bera	41.22759	31.06116	58.02554
Probability	0.000000	0.000000	0.000000
Sum	189.4655	376151.8	303237.1
Sum Sq. Dev.	120.1993	2.08E+09	4.74E+09
Observations	60	60	60

Source: Author's computation using EViews 13 (2026).

Table 1 presents the descriptive statistics for CPS/GDP, ATM transaction value, and POS transaction value across 60 quarterly observations.

CPS/GDP has a mean of 3.157759 and a median of 3.049362. Its skewness of 0.958476 indicates positive skewness, while its kurtosis of 6.579991 indicates a leptokurtic distribution with relatively heavy tails. The Jarque-Bera probability of 0.000000 leads to rejection of the null hypothesis of normality. The minimum value of zero also warrants verification because all four 2024 observations in Appendix A are recorded as zero.

ATM transaction value has a mean of 6,269.197 and a median of 4,749.915. The higher mean, positive skewness of 1.562629, and maximum of 24,202.06 indicate a strongly right-skewed distribution. Its kurtosis of 4.630102 is leptokurtic, and the Jarque-Bera probability of 0.000000 indicates non-normality.

POS transaction value has a mean of 5,053.951 and a median of 748.3611. The large gap between these values, together with skewness of 1.990745, indicates strong positive skewness rather than symmetry. The standard deviation of 8,966.937 shows substantial dispersion, while kurtosis of 5.712554 and a Jarque-Bera probability of 0.000000 indicate a leptokurtic, non-normal distribution.

Overall, all three variables depart from normality, and ATM and POS transaction values display substantial variation over the sample period. These descriptive statistics do not, by themselves, establish causal or statistically significant effects on financial sector development.

Table 2: Correlation Matrix

	CPS/GDP	ATM	POS
CPS/GDP	1.000000	-0.050867	-0.395156
ATM	-0.050867	1.000000	0.615152
POS	-0.395156	0.615152	1.000000

Source: Author's computation using EViews 13 (2026).

Table 2 shows weak negative correlations between CPS/GDP and ATM (-0.050867) and between CPS/GDP and POS (-0.395156). ATM and POS are moderately positively correlated (0.615152). Because no pairwise correlation approaches the commonly used threshold of 0.80, the matrix does not indicate severe pairwise multicollinearity. However, statistical significance cannot be inferred from the coefficients alone because the table does not report p-values.

Table 3: Summary of Unit-Root Tests

Variable	ADF Test Statistic	At Level (Panel I)		ADF Test Statistic	At First Difference (Panel II)		
		95% Critical ADF Value	Remark		95% Critical ADF Value	Status	Order of Integration
CPS/GDP	-7.1946	-2.9126	Stationary	-6.5332	-2.9135	Stationary	I(0)
ATM	-1.8749	-2.9117	Non-Stationary	-7.6502	-2.9126	Stationary	I(1)
POS	0.04198	-2.9117	Non-Stationary	-6.6754	-2.9126	Stationary	I(1)

Source: Author's computation using EViews 13 (2026).

The ADF results in Table 3 show that CPS/GDP is stationary at level because its test statistic (-7.194573) is more negative than the 5% critical value (-2.912631). CPS/GDP is therefore integrated of order zero, I(0). ATM and POS are non-stationary at level but become stationary after first differencing, so both are I(1). This mixture of I(0) and I(1) variables supports use of the ARDL bounds-testing approach, provided that no variable is I(2).

Table 4: Pairwise Granger-Causality Tests

Pairwise Granger Causality Tests			
Date: 06/28/26 Time: 18:25			
Sample: 2010Q1 2024Q4			
Lags: 1			
Null Hypothesis:	Obs	F-Statistic	Prob.
CPS/GDP does not Granger Cause ATM	60	4.03154	0.0495*
ATM does not Granger Cause CPS/GDP		0.01047	0.9188
POS does not Granger Cause CPS/GDP	60	4.62761	0.0358*
CPS/GDP does not Granger Cause POS		1.98529	0.1644

Source: Author's computation using EViews 13 (2026).

At the 5% significance level, Table 4 indicates unidirectional Granger causality from CPS/GDP to ATM ($p = 0.0495$), because the reverse direction is not significant ($p = 0.9188$). It also indicates unidirectional Granger causality from POS to CPS/GDP ($p = 0.0358$), while CPS/GDP does not Granger-cause POS ($p = 0.1644$). These findings describe predictive precedence and should not be interpreted as proof of structural causation.

Table 5: ARDL Bounds Test for Cointegration

Test Statistic	Value	Significant	I(0)	I(1)
F-statistic	19.33134	10%	2.08	3
K	2	5%	2.39	3.38
		2.5%	2.7	3.73
		1%	3.06	4.15

Source: Author's computation using EViews 13 (2026).

The bounds test evaluates the null hypothesis that no long-run relationship exists among the variables. Using the critical values reported in Table 5, the F-statistic of 19.33134 exceeds the 5% upper-bound critical value of 3.38. The reported result therefore indicates cointegration.

ARDL Short-Run Results

Table 6: ARDL Short-Run Results

Dependent Variable: CPS/GDP				
Method: ARDL				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
CPS/GDP(-1)	-0.274384	0.09039	-3.0356	0.0037
ATM	4.15E-05	2.52E-05	1.64211	0.1064
POS(-1)	-3.31E-05	1.83E-05	-1.8081	0.0262
C	0.769574	0.33969	2.2655	0.0275
D(POS)	-9.88E-05	3.28E-05	-3.0109	0.004
R-squared	0.929996	Mean dependent var		-0.057
Adjusted R-squared	0.912959	S.D. dependent var		0.97197
S.E. of regression	0.883924	Akaike info criterion		2.67205
Sum squared resid	42.19135	Schwarz criterion		2.84811
Log likelihood	-73.82537	Hannan-Quinn criter.		2.74077
F-statistic	4.032387	Durbin-Watson stat		1.81924
Prob(F-statistic)	0.006212			
* p-values are incompatible with t-bounds distribution.				
** Zero-lag variable.				

Source: Author's computation using EViews 13 (2026).

Table 6 presents the short-run ARDL estimates. The model is jointly significant ($F = 4.032387$, $p = 0.006212$). The R-squared value of 0.929996 and adjusted R-squared value of 0.912959 indicate that the regressors explain a high proportion of the within-sample variation in CPS/GDP. These fit measures should be interpreted together with the diagnostic tests and the time-series properties of the model.

ATM has a positive coefficient of 0.0000415 but is not statistically significant at the 5% level ($p = 0.1064$). POS(-1) has a negative coefficient of -0.0000331 and is statistically significant ($p = 0.0262$), while the contemporaneous change in POS, D(POS), is also negative and significant (coefficient = -0.0000988; $p = 0.0040$). Thus, the short-run results do not support a significant ATM effect, but they do indicate a negative POS effect.

Table 7: ARDL Long-Run Results

Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM	0.745513	0.202908	3.674152	0.0005
POS(-1)	-2.116738	0.323996	-6.533217	0.0000
C	2.804731	0.640943	4.375944	0.0001

Source: Author's computation using EViews 13 (2026).

Given the reported evidence of cointegration, Table 7 presents the estimated long-run coefficients. ATM has a positive coefficient of 0.745513 and is statistically significant at the 1% level ($p = 0.0005$). Holding other factors

constant, a one-unit increase in ATM transaction value, measured in the units used in the model, is associated with a 0.745513-unit increase in CPS/GDP in the long run.

POS has a negative coefficient of -2.116738 and is statistically significant at the 1% level ($p < 0.001$). Accordingly, a one-unit increase in POS transaction value, measured in the units used in the model, is associated with a 2.116738-unit decrease in CPS/GDP in the long run. The magnitude of both coefficients should be interpreted with reference to any scaling or transformation applied during estimation.

Table 8: Diagnostics Test

Breusch–Godfrey LM(1)	LM = 0.8605	0.3536	Do not reject no serial correlation
Breusch–Pagan–Godfrey	LM = 5.2411	0.2634	Do not reject homoskedasticity
White heteroskedasticity	LM = 8.3947	0.8678	Do not reject homoskedasticity
Ramsey RESET (2 terms)	F = 0.7131	0.4953	Do not reject functional form
Recursive-residual CUSUM	Max boundary ratio = 0.3019	—	Within 5% bounds
Chow breakpoint: 2020Q1	F = 0.8057	0.5517	Do not reject parameter stability
Chow breakpoint: 2023Q1	F = 0.0851	0.9942	Do not reject parameter stability

Source: Author's computation using EViews 13 (2026).

The diagnostic tests collectively confirms that the estimated model is well-specified and reliable, as every null hypothesis, indicating no serial correlation, homoskedasticity, correct functional form, and structural stability, cannot be rejected at the 5% significance level. Specifically, the Breusch–Godfrey test ($p = 0.3536$) rules out first-order autocorrelation, while both the Breusch–Pagan–Godfrey ($p = 0.2634$) and White ($p = 0.8678$) tests find no evidence of heteroskedasticity, ensuring efficient and consistent standard errors. The Ramsey RESET test ($p = 0.4953$) supports the chosen linear functional form, and the CUSUM test, with a maximum boundary ratio of 0.3019, stays well within the 5% critical bounds, indicating stable coefficients over time. Finally, the Chow breakpoint tests for 2020Q1 ($p = 0.5517$) and 2023Q1 ($p = 0.9942$) both fail to detect any significant structural breaks, implying that the model's parameters remain stable across these potential shock periods. Overall, these results provide strong empirical support for the model's validity, making it suitable for hypothesis testing and forecasting without major econometric concerns.

DISCUSSION OF FINDINGS

The results suggest that ATM transaction value is positively associated with financial sector development in the long run, although its short-run coefficient is not statistically significant. Greater ATM usage may support intermediation by improving access to accounts, cash, payments, and transfers. However, this result differs from the short-run negative FinTech effects reported by Odeleye and Oyeneeye (2022), indicating that the effect may depend on the outcome measure, model specification, infrastructure, and period studied.

POS transaction value is negative and statistically significant in both the reported short-run and long-run estimates. Possible explanations include high transaction charges, unreliable network connectivity, fraud, and disputed or failed transactions, all of which can weaken trust and increase transaction costs (Ejere, 2022). Nevertheless, the negative coefficient should not be treated as proof that POS technology inherently reduces financial development. Data quality, model specification, coefficient scaling, and the diagnostic issues identified above should be resolved before a definitive causal interpretation is made.

CONCLUSION AND POLICY RECOMMENDATIONS

This study examined the effects of ATM and POS transaction values on financial sector development in Nigeria from 2010Q1 to 2024Q4. The reported short-run estimates show a positive but statistically insignificant ATM effect and a negative, statistically significant POS effect. The reported long-run estimates show a positive and statistically significant ATM effect and a negative, statistically significant POS effect. These findings should be interpreted subject to verification of the bounds-test specification, the serial-correlation output, and the zero CPS/GDP observations reported for 2024.

Based on the findings, the following policy recommendations are proposed:

- i. Bank management and regulators should promote the reliable deployment, maintenance, and geographic spread of ATMs, particularly in underserved areas. Policies should focus on uptime, cash availability, security, network quality, and consumer access rather than merely increasing the number of machines.
- ii. FinTech firms, banks, and regulators should strengthen oversight of POS operators and improve dispute resolution, pricing transparency, fraud prevention, network reliability, and consumer protection. These measures can reduce transaction failures and help POS services contribute more effectively to financial sector development.

REFERENCES

1. Adeoti, O. O., & Osotimehin, K. O. (2012). Adoption of point-of-sale terminals in Nigeria: Assessment of consumers' level of satisfaction. *Research Journal of Finance and Accounting*, 3(1), 1-5.
2. Afonso, A., & Blanco-Arana, M. C. (2018). Financial development and economic growth: A study for OECD countries in the context of crisis (REM Working Paper No. 046-2018). ISEG-Lisbon School of Economics and Management.
3. An, J., & Rau, R. (2021). Finance, technology and disruption. *The European Journal of Finance*, 27(4-5), 334-345.
4. Anifowose, T., & Ekperiware, M. (2022). The effect of automated teller machines, point-of-sale terminals and online-banking transactions on economic growth in Nigeria. *Open Access Research Journal of Science and Technology*, 4(2), 16-33.
5. Anyanwu, G. I., & Anumaka, C. I. (2020). Point of sale and cashless policy in Nigeria: Challenges and prospects. *Asian Journal of Economics, Business and Accounting*, 20(2), 42-57.
<https://doi.org/10.9734/ajeba/2020/v20i230323>
6. Arner, D. W., Barberis, J., & Buckley, R. P. (2015). The evolution of FinTech: A new post-crisis paradigm? *Georgetown Journal of International Law*, 47(4), 1271-1319.
7. Central Bank of Nigeria. (2024). Statistical Bulletin 2024. Central Bank of Nigeria.
8. Di, L., Yuan, G. X., & Zeng, T. (2021). The consensus equilibria of mining gap games related to the stability of blockchain ecosystems. *The European Journal of Finance*, 27(4-5), 419-440.
<https://doi.org/10.1080/1351847X.2020.1776352>
9. Ehiedu, V. C., Onuorah, A. C., & Okoh, E. (2021). Automated teller machine (ATM) penetration and financial inclusiveness in Nigeria: A tripod banking system approach. *Indian Journal of Economics and Business*, 20(3), 1093-1104.
10. Ejere, E. (2022, March 21). Rising fraud threatens POS business. *The Hallmark News*.
<https://hallmarknews.com/rising-fraud-threatens-pos-business/>
11. Gbanador, M. A., Makwe, E. U., & Olushola, O. A. (2022). Financial innovation and performance of deposit money banks in Nigeria. *IIARD International Journal of Banking and Finance Research*, 8(2), 37-50. <https://doi.org/10.56201/ijbfr.v8.no2.2022.pg37.50>
12. Goldsmith, R. W. (1969). *Financial structure and development*. Yale University Press.
13. Haddad, C., & Hornuf, L. (2021). The impact of FinTech start-ups on financial institutions' performance and default risk (CESifo Working Paper No. 9050). CESifo.
14. Kolawole, O. (2021, July 15). A deep dive into the activities of POS agents in Nigeria. *Techpoint Africa*.
<https://techpoint.africa/2021/07/15/posbusiness-in-nigeria/>
15. Milian, E. Z., Spinola, M. D. M., & de Carvalho, M. M. (2019). FinTechs: A literature review and research agenda. *Electronic Commerce Research and Applications*, 34, 100833.

16. Odeleye, A. T., & Oyeneye, I. (2022). Impact of financial technology (FinTech) on financial inclusion in Nigeria. *FUOYE Journal of Finance and Contemporary Issues*, 2(1), 72-86.
17. Okeke, I. C., & Ezeala, G. (2023). The effect of financial innovation on the performance of deposit money banks in Nigeria. *African Banking and Finance Review Journal*, 1(1), 116-130.
18. Okoye, V. C., Orajaka, U. P., & Nnebe, E. G. (2022). Impact of POS business in reducing unemployment rate in Anambra State. *International Academic Journal of Management and Marketing*, 7(2), 50-62.
19. Omotayo, F. (2015). Factors affecting adoption of point-of-sale terminals by business organisations in Nigeria. *International Journal of Academic Research in Business and Social Sciences*, 5(10), 115-129.
20. Opusunju, M. I., Akyuz, M., & Aku, S. A. (2021). Automated teller machine and performance of deposit money banks in Nigeria. *International Journal of Disciplines Economics & Administrative Sciences Studies*, 7(30), 456-461.
21. Panos, G. A., & Wilson, J. O. S. (2020). Financial literacy and responsible finance in the FinTech era: Capabilities and challenges. *The European Journal of Finance*, 26(4-5), 297-301.
22. Saleh, M. A., Umar, R. T., & Magaji, Z. B. (2020). Assessment of the influence of point-of-sale services on the sales performance of small and medium-scale enterprises in Ahmadu Bello University, Zaria, Kaduna State. *Al-Hikmah Journal of Educational Management and Counselling*, 3(1).
23. Scholtens, B., & van Wensveen, D. (2003). The theory of financial intermediation: An essay on what it does (not) explain (SUERF Studies No. 2003/1). SUERF.
24. Sum, R., & Memba, F. (2016). The effect of financial innovation on the financial performance of deposit-taking SACCOs in Kenya: A case of Kiambu County. *International Journal of Social Sciences and Information Technology*, 2(3), 435-458.
25. Usman, M. U. (2020). The effect of financial technology on financial inclusion in Nigeria [Unpublished project]. Baze University.
26. World Bank. (2022). The Global Findex Database 2021: Financial inclusion, digital payments, and resilience in the age of COVID-19. World Bank. <https://doi.org/10.1596/978-1-4648-1897-4>

APPENDIX

Appendix A: Quarterly Data

YEAR		CPS_GDP	ATM	POS
2010	Q1	3.36485	891.198	14.0297
	Q2	3.36485	608.178	11.3378
	Q3	3.36485	407.09	9.68406
	Q4	3.36485	287.935	9.06844
2011	Q1	2.75803	250.713	9.49094
	Q2	2.75803	295.423	10.9516
	Q3	2.75803	422.065	13.4503
	Q4	2.75803	630.64	16.9872
2012	Q1	2.64736	1241.46	24.3625
	Q2	2.64736	1485.78	28.8555
	Q3	2.64736	1683.9	33.2665
	Q4	2.64736	1835.82	37.5956
2013	Q1	2.88111	1760.23	26.6346

	Q2	2.88111	1892.29	36.8829
	Q3	2.88111	2050.69	53.1325
	Q4	2.88111	2235.43	75.3832
2014	Q1	3.32255	2511.29	112.693
	Q2	3.32255	2722.78	143.323
	Q3	3.32255	2934.68	176.331
	Q4	3.32255	3147	211.717
2015	Q1	3.26674	3448.36	257.709
	Q2	3.26674	3626.06	294.56
	Q3	3.26674	3768.73	330.497
	Q4	3.26674	3876.36	365.521
2016	Q1	7.2985	3747.69	370.153
	Q2	7.2985	3865.75	415.141
	Q3	7.2985	4029.28	471.006
	Q4	7.2985	4238.28	537.75
2017	Q1	3.19432	4538.99	589.388
	Q2	3.19432	4820.44	688.28
	Q3	3.19432	5128.86	808.442
	Q4	3.19432	5464.25	949.876
2018	Q1	2.54488	6113.88	1115.37
	Q2	2.54488	6388.31	1298.23
	Q3	2.54488	6574.81	1501.24
	Q4	2.54488	6673.37	1724.41
2019	Q1	2.60768	6465.71	2041.82
	Q2	2.60768	6475.71	2275.66
	Q3	2.60768	6485.09	2500.03
	Q4	2.60768	6493.84	2714.92
2020	Q1	2.80702	4679.39	2787.16
	Q2	2.80702	5415.93	3036.36
	Q3	2.80702	6880.88	3329.35
	Q4	2.80702	9074.23	3666.14

2021	Q1	3.04936	15169.5	1311.52
	Q2	3.04936	17550.3	2829.97
	Q3	3.04936	19390	5486.31
	Q4	3.04936	20688.9	9280.51
2022	Q1	3.22738	18783.9	17549.2
	Q2	3.22738	20065.9	22284.5
	Q3	3.22738	21871.9	26823.1
	Q4	3.22738	24202.1	31164.9
2023	Q1	4.3966	6137.17	7486.28
	Q2	4.3966	6501.97	8377.8
	Q3	4.3966	9672.33	10285
	Q4	4.3966	10336.6	14886.7
2024	Q1	0	7165.56	23284.1
	Q2	0	7467	25160.7
	Q3	0	6361.69	26822.1
	Q4	0	7218.34	35080.2

Notes:

ATM denotes automated teller machine transaction value, measured in billions of naira.

POS denotes point-of-sale transaction value, measured in billions of naira.

Source: Central Bank of Nigeria Statistical Bulletin (2024).