



FINANCIAL INNOVATION, INCLUSION, AND SME FINANCING IN NIGERIA: EVIDENCE FROM AN EMPIRICAL INVESTIGATION

UKAIGWE UGOCHUKWU FRANCIS¹, ANTHONY ORJI², AKPESUE JOSEPH FANEN³
AND ONYINYE I. ANTHONY-ORJI⁴

Department of Economics, University of Nigeria, Nsukka, Nigeria

E-mails: ¹uukaigwe@gmail.com; ²anthony.orji@unn.edu.ng; ³akpesuejoseph@gmail.com;

⁴onyinye.anthony-orji@unn.edu.ng

Received: 17 October 2024; Revised: 18 November 2025;

Accepted 22 November 2025; Publication: 30 December 2025

Abstract: Driven by the pressing need to tackle the financing hurdles that Small and Medium-scale Enterprises (SMEs) face in Nigeria, this study delves into the impact of financial innovation and inclusion on SME financing. We adopted a mixed-methods approach, combining quantitative and qualitative analyses to gain a deeper understanding. Our analysis drew on secondary data, from the Central Bank of Nigeria's Statistical Bulletin (2022). We examined the relationships between SME financing and various financial innovation variables, including Automated Teller Machines (ATMs), Point of Sales (POS) terminals, Mobile Payments (MP), and Loans from Rural Branches of Commercial Banks (LRBCB). Our findings, based on the Autoregressive Distributed Lag (ARDL) model, reveal that ATMs, MP, and LRBCB have a positive and significant impact on SME financing, while POS terminals have a positive but insignificant impact in the short run, becoming significant in the long run. Overall, our study demonstrates that financial innovation and inclusion have a significant impact on SME financing in Nigeria. We recommend that policymakers and financial institutions expand ATM networks and promote POS technology integration in SMEs, while also enhancing digital financial literacy through targeted initiatives.

To cite this paper:

Ukaigwe Ugochukwu Francis, Anthony Orji, Akpesue Joseph Fanen and Onyinye I. Anthony-Orji (2025). Financial Innovation, Inclusion, and Sme Financing in Nigeria: Evidence from An Empirical Investigation. *Journal of Quantitative Finance and Economics*. 7(2), 203-218. <https://DOI:10.47509/JQFE.2025.v07i02.04>

Keywords: Financial Innovation, Inclusion, SME Financing, ARDL model, and Nigeria

JEL Classifications: O16; E58; Q42; G32; C22; N17

1. INTRODUCTION

Small and medium-scale enterprises (SMEs) have continued to receive renewed interest from different national governments and international bodies such as the World Bank and the International Monetary Fund (IMF), as a veritable tool for promoting income distribution employment and economic growth in various nations. (IMF,2023). Recent quality studies have validated previous studies that had empirically established a strong relationship between a growing SME sector and economic growth in different countries (Adegboye & Iweriebor, 2015; Osano & Languitone, 2015). According to recent data released by the World Bank, 90% of business entities and an estimated 50% of jobs globally were directly related to SMEs, with the result that 40% of gross domestic product (GDP) in emerging economies, including Nigeria, is attributable to the business activities in SMEs sector (World Bank, 2021). It is not surprising that many governments, especially emerging countries, are making frantic attempts to support the expansion of SMEs as a viable avenue to drive economic growth and development in their diverse nations. (Beck & Cull, 2014; Wellalage & Fernande,2019).

By definition, Small and medium enterprises (SMEs) are business entities whose assets, revenue and operational scope fall below certain limits or thresholds set forth by national governments and authorities. Their classification is normally based on the number of employees, values of fixed assets, production and technologies capacities, cash flow and management characteristics of individual firms. In Nigeria, SMEs are defined by the Central Bank of Nigeria (CBN) as any business outfit with operational revenue of less than 100 million naira and with staff strength not exceeding 300 employees (PwC's MSME Survey, 2020). A significant majority of business entities around the world are regarded as SMEs (Kim & Nguyen, 2021). Despite the significant role SMEs play in driving growth, they are often faced with a myriad of challenges (Andries *et al.*, 2018). Lack of financial innovations and restricted credit availability are a couple of these issues facing SMEs, especially in Nigeria. These challenges can put firms under strain and impair their performance in

several ways. Financially constrained businesses are typically unable to take advantage of untapped business or investment opportunities that might boost their operational effectiveness, profitability, and potential for growth. Financial limitations may also prevent a company from obtaining outside funding. To overcome these challenges faced by SMEs, financial inclusion and financial innovations are among the many frantic efforts by the government to boost SMEs' performances in the country. (OECD 2020). Financial innovation is a ubiquitous term and connotes the creation of new financial products, services, or processes to improve financial service delivery. (Ajide, 2016). Financial inclusion on the other hand refers to the availability and accessibility of financial services and products to all segments of society, especially those who are traditionally underserved or excluded from the formal financial system. (CBN,2012). The Nigerian government through the Central Bank of Nigeria (CBN) has been partnering with other financial institutions through its regulatory frameworks, incentives, and direct assistance to increase the ease of accessing finance by SMEs (PwC's MSME Survey, 2020). Its objective focuses on ensuring that people can access reliable banking services including ownership of functional bank accounts and access to loans, insurance, etc. Some of the financial innovations and inclusion instruments introduced to improve financial services in Nigeria include the automated teller machine (ATM) Mobile banking, Mobile Payment (MP) and Point-of-Sale (POS). CBN (as cited in Ogidi & Pam, 2021) remarked that the introduction of financial innovations and inclusion policies in Nigeria's financial system has witnessed a notable increase in the number of financial institutions. Adigun (2013) observed that an increase in the number of financial institutions as a result of financial inclusion and financial innovation will lead to increased access to financial services for several millions of people in the country, including SME owners because such access will increase the volume of financial depositories in banks. This will in turn increase savings and investments, thereby enhancing wealth creation, availability of loanable capital for investments and increased access to credit by SMEs.

Despite the Nigerian government's initiatives to promote financial inclusion and support SMEs, such as establishing SMEDAN and the Development Bank of Nigeria, the sector continues to struggle with accessing credit and financial services. A staggering financing gap of \$158.1 billion

persists, with only half of SMEs able to access bank credit. Furthermore, financial exclusion remains a pervasive issue in Nigeria, with over 38 million adults, or 36% of the population, lacking access to formal financial services. This exclusion disproportionately affects rural areas, where over half of adults are financially excluded, and women, are more likely to be excluded than men.

Driven by the pressing need to tackle the financing hurdles that Small and Medium-scale Enterprises (SMEs) face in Nigeria, this study delves into the impact of financial innovation and inclusion on SME financing in Nigeria. This study aims to contribute to the development of effective policies and interventions that can bridge the financing gap and promote the growth of SMEs in Nigeria. By identifying the key challenges and constraints facing SMEs, this study can inform the design of targeted interventions that can improve access to credit and other financial services.

The rest of the paper is organized as follows. The next Section is an overview of the literature, while Section 3 presents the data and methodology. The empirical results are discussed in Section 4, while Section 5 concludes the paper with policy recommendations.

2. AN OVERVIEW OF THE LITERATURE

In the following review of the extant literature, we focused on the linkages between financial inclusion and financial innovation in SME financing in Nigeria.

Linkages between financial inclusion and SME financing in Nigeria

Most studies employed diverse methodologies to analyze the impact of financial inclusion on SME financing in Nigeria. For example, Okeke *et al.* (2020), Mpirirwe and Moses (2023), Owolabi (2017), and Atueyi *et al.* (2019) utilized different approaches to investigate the relationship between financial inclusion and SME financing. Some studies demonstrate an insignificant impact of financial inclusion on SMES development in Nigeria. For instance, Oladosu, *et al.* (2023) conducted a study to assess the implications of bank credits in deepening small and medium scale enterprises (SMEs) performance in Nigeria. The study adopted the ARDL model and used data from the CBN bulletin and NBS. Findings from the study show that bank credit and agricultural finances exert a positive but insignificant impact on deepening small and

medium-scale enterprises (SMEs) performance in Nigeria. Similarly, Ubesie (2017) investigated the impact of deposit money banks' lending on small and medium-sized firm growth in Nigeria. The study used an ex-post facto research approach with secondary data from the Central Bank of Nigeria (CBN) Statistical Bulletin 2015 and the National Bureau of Statistics (NBS) covering 1986-2015. The data was analyzed using the ordinary least squares regression approach, after a stationarity test on the variables. The study indicates that loan from deposit money banks has no substantial impact on the growth of small and medium-sized firms in Nigeria and medium-sized businesses. These findings are contrary to Mpirirwe and Moses (2023) who demonstrated that financial inclusion and innovation are positively and significantly impacting SMEs in Uganda. Ibor *et al.* (2017) examined how financial inclusion affects the performance of micro, small, and medium enterprises (MSMEs) in Nigeria, the findings indicate that financial inclusion has a positive and significant impact on the operations and growth of MSMEs. Some studies express support for the positive impact of financial inclusion on economic growth (Onwukanjo *et al.* 2024; Orji *et al.* 2024; and Afolabi 2020). Others have observed that financial inclusion slows growth (Nkwede 2015).

Linkages between financial innovation and SME financing in Nigeria

Ayunku & Eweke (2020) examined the influence of bank lending and macroeconomic dynamics on small and medium-sized enterprises in Nigeria, using yearly data from 1992 to 2016. The non-linear ARDL model was used to analyze the connection between variables in both the short and long term. The Augmented Dickey-Fuller (ADF) and Philip Perron's (PP) tests indicated that no variables were I(2). The Bounds test for cointegration verified the presence of a long-term link. Non-linear ARDL results indicate that increases in bank lending, government tax income, and negative shocks in interest rates, inflation, and currency rates led to a decline in SMEs' performance in Nigeria, both in the long and short term. Furthermore, negative shocks tend to be more significant than positive ones. Using the same regression technique Oladosu, *et al.* (2023) conducted a study to assess the implications of bank credits in deepening small and medium scale enterprises (SMEs) performance in Nigeria. The study adopted the ARDL model and used data from the CBN bulletin and NBS. Findings from the study show that bank credit and

agricultural finances exert a positive but insignificant impact on deepening small and medium-scale enterprises (SMEs) performance in Nigeria. Effiom and Edet (2020), demonstrated a positive and substantial impact of financial innovation on the productivity of small and medium-sized enterprises (SMEs) in Nigeria. In a separate study, Atueyi *et al.* (2019) conducted research that examined the impact of electronic banking on the performance of Small and Medium Scale Enterprises (SMSE) in Nigeria within the time frame of 1981-2018. Findings from the study indicated that electronic banking has a positively significant impact on the performance of small and medium-scale enterprises. Furthermore, it was found that point of sale and Automated Teller Machine (ATM) also have positive significant effects on the performance of Small and Medium Scale Enterprises (SMSE) in Nigeria. Other studies show that financial innovation has a positive impact on economic growth and entrepreneurship development. (Ozurumba and Onyeiwu 2019; Abebe and Kegne (2023).

3. DATA AND METHODOLOGY

3.1. The Data

In this study, we utilized secondary data for analysis. Data for variables such as Automated Teller Machines (ATMs), Point of Sales (POS) terminals, Mobile Payments (MP), and Loans from Rural Branches of Commercial Banks (LRBCB) and SMEs were sourced from World Bank Development Indicator (WDI,2021). The data is a quarterly time series data of both the dependent and explanatory variables dating from 2011 to 2021.

3.2. Model specification

The functional of the form of the model is specified as follows:

$$SMEF = (LRBCB, POS, ATM, MP) \quad (1)$$

The modelling technique employed is ARDL (Autoregressive Distributed Lag) and was estimated using OLS (Ordinary Least Squares). ARDLs are usually denoted with the notation ARDL (p, q_1, q_2, \dots, q_k), where p is the number of lags of the dependent variable, q_1 is the number of lags of the first explanatory variable, and q_k is the number of lags of the k -th explanatory variable. Thus, generally, an ARDL (p, q_1, q_2, \dots, q_k) is specified as follows:

$$y_t = \phi + \sum_{i=1}^p a_i y_{t-i} + \sum_{j=1}^k \sum_{i=0}^{q_j} \beta_{j,ixj,t-i} + \varepsilon_t \tag{2}$$

Where ε_t is the error term, ϕ is a constant term, and α_i and $\beta_{j,i}$ are respectively the coefficients of lags of the dependent variable, y_t , and lags of the k regressors $x_{j,t-i}$ for $j=1,2,3,4,\dots, k$.

Hence, the specific ARDL model for this study is expressed as follows:

$$SMEF_t = \phi + \sum_{i=1}^p a_i SMEF_{t-i} + \sum_{i=0}^{q_1} \beta_{1i} LRBCB_{t-i} + \sum_{i=0}^{q_2} \beta_{2i} POS_{t-i} + \sum_{i=0}^{q_3} \beta_{3i} ATM_{t-i} + \sum_{i=0}^{q_4} \beta_{4i} MP_{t-i} + \varepsilon_t \tag{3}$$

where p, q_1, q_2 and q_3 are the respective maximum lags of the dependent variable (SMEF) and the lags of the four (4) explanatory variables (LRBCB, POS, ATM, MP). Likewise, $\alpha_i, \beta_{1i}, \beta_{2i}, \beta_{3i}$ and β_{4i} are respectively the coefficients associated with the lags of the dependent variable (SMEF) and the lags of the four (4) explanatory variables (LRBCB, POS, ATM, and MP). Accidentally, some of the explanatory variables may have no lagged terms (*i.e.*, where $q_j = 0$). Such variables are called static or fixed regressors. Explanatory variables with one or more lagged terms are called dynamic regressors. In the ADRL equation, the dependent variable is SMEF, while the explanatory variables are independent LRBCB for loans to rural commercial banks, POS for Point-of-Sale, ATM for Automated Teller Machine and MP for Mobile Payment. They are clearly stated as follows:

SMEF = Proportion of SME's contribution to GDP as a proxy for SME financing.

LRBCB = Loans of Rural Branches of Commercial Banks

POS = Point-of-Sale

ATM = Automated Teller Machine

MP = Mobile Payment

The use of the ARDL model for estimating explanatory variables of SME financing is justified for several compelling reasons. First and foremost, the ARDL model is well-suited for analysing time-series data, making it an

excellent choice for understanding the dynamic relationships between financial variables and SME financing over time. SME financing is often influenced by various factors that evolve not only in the short term but also in the long run, such as economic policies, market conditions, and lending practices. The ARDL model, with its capacity to capture both short-term and long-term effects, allows researchers to comprehensively examine these intricate relationships. Furthermore, SME financing is often characterized by the presence of lagged effects, as past financing decisions and economic conditions continue to impact the current financial state of these enterprises. The ARDL model readily accommodates lagged variables, providing a powerful tool for capturing this temporal dimension in SME financing research.

Table 1: Description of variables and data sources

<i>Variables</i>	<i>Measurement</i>	<i>Data source</i>
Small and medium-scale enterprises (SMEs)	Proportion of SMEs' contribution to GDP as a proxy for SME's financing	Central bank of Nigeria statistical bulletins 2022
Automated Teller Machines (ATMs),	Values in billions of naira automated teller machines	Central bank of Nigeria statistical bulletins 2022
Point of Sales (POS) terminals	Value of billions of naira	Central bank of Nigeria statistical bulletins 2022
Mobile Payments (MP)	Value of billions of naira	Central bank of Nigeria statistical bulletins 2022
Loans from Rural Branches of Commercial Banks (LRBCB)	Loans to rural branches of commercial banks in billions of naira.	Central Bank of Nigeria statistical bulletins 2022.

Source: authors' computation, 2022

4. EMPIRICAL RESULTS AND DISCUSSION

The correlation matrix statistics in Table 2 show the relationship between the dependent or endogenous variable (SME financing [SMEF]), and independent or exogenous variables (parameters of SMEF) – Automated Teller Machine (ATM), Mobile Payment (MP), Point of Sale (POS) and Loans of Rural Branches of Commercial Banks (LRBCB). Results indicate that Automated Teller Machine (ATM) is significantly correlated to SME financing (SMEF) ($r = 0.569$, $P = 0.0006$). Similarly, Mobile Payment (MP) is significantly correlated to SME financing (SMEF) ($r = 0.806$, $P = 0.0000$). Furthermore, Point of Sale (POS) had a significant relationship with SME financing (SMEF) ($r = 0.571$, P

= 0.0005). However, Loans of Rural Branches of Commercial Banks (LRBCB) had a positive but insignificant relationship with SME financing (SMEF) ((r = 0.052, P = 0.773).

Table 2: Correlation Matrix

<i>Covariance Analysis: Ordinary</i>				
<i>Variables</i>	<i>SMEF</i>	<i>ATM</i>	<i>MP</i>	<i>POS</i>
ATM	0.56877			
<i>t-Statistic</i>	3.850205			
<i>Probability</i>	0.0006			
MP	0.805871	0.692221		
<i>t-Statistic</i>	7.578068	5.340445		
<i>Probability</i>	0.0000	0.0000		
POS	0.570724	0.605157	0.747907	
<i>t-Statistic</i>	3.869802	4.232311	6.273188	
<i>Probability</i>	0.0005	0.0002	0.0000	
LRBCB	0.052311	0.114929	0.107108	0.073482
<i>t-Statistic</i>	0.291653	0.644166	0.599804	0.410239
<i>Probability</i>	0.7725	0.5242	0.553	0.6845

Table 3 below presents the result of the unit test using the Augmented Dickey-Fuller (ADF) Test. The table shows that the series small and medium enterprises financing (SMEF) contributions of POS, MP and LRBCB to SMEs financing as a proxy are integrated at order one (first differences), *i.e.* they are *I* (1) series while ATM was integrated at order zero (level), *i.e.* they are *I*(0) series. Furthermore, SMEF was also integrated at zero level *I* (0).

Table 3: Unit root test

<i>Variables</i>		<i>Intercept</i>			<i>I(d)</i>
		<i>ADF T-Statistics</i>	<i>5% Critical Value</i>	<i>Prob.</i>	
SMEF	Level	-5.311907	-3.557759	0.0008	<i>I</i> (0)
POS	Level	-5.929481	-3.562882	0.0002	<i>I</i> (1)
	1 st Difference				
MP	Level	-3.798227	-3.622033	0.0354	<i>I</i> (1)
	1 st Difference				
LRBCB	Level	-5.147539	-3.562882	0.0000	<i>I</i> (1)
	1 st Difference				
ATM	Level	-4.139747	-3.557759	0.0137	<i>I</i> (0)

Source: authors' construct

Since the unit root tests produce mixed orders of integration and by implication, the adoption of the ARDL Bounds co-integration test to determine whether a long-run relationship exists among the variables is justified. The result of the ARDL bounds test is presented in Table 4. As shown in the table, an F-statistic value of 20.90944 was obtained in the analysis, at lower and upper bounds of 2.86 and 4.01 respectively at a 5% confidence level. Given that the F-statistic value of 20.90944 is by far higher than upper and lower bounds of the critical value bounds at 10%, 5% and 2.5%, a long-run relationship is said to exist among the variables, viz. small and medium enterprises financing (SMEF), Automated Teller Machine (ATM), Mobile Payment (MP), Point of Sale (POS) and Loans of Rural Branches of Commercial Banks (LRBCB).

Table 4: Bound test

F-Bounds Test		Null Hypothesis: No levels of relationship		
Test Statistic	Value	Signif.	I (0)	I (1)
F-statistic	20.90944	10%	2.45	3.52
K	4	5%	2.86	4.01
		2.5%	3.25	4.49
		1%	3.74	5.06

Source: authors' construct.

4.1. Regression Result

Table 5 presents the result of the long-run form of the ARDL. The endogenous variable is SME financing (SMEF), while the exogenous variables are Automated Teller Machine (ATM), Mobile Payment (MP), Point of Sale (POS) and Loans of Rural Branches of Commercial Banks (LRBCB). All the variables with their abbreviations are listed in the first column of Table 5, while the second column contains the coefficients of the variables. The third and the fourth column contained standard error values and T-statistics respectively, while the fifth column contained the probability values of the coefficients. The results gleaned from Table 5 indicate that the lag value of the dependent variable positively impacts on current value of SME financing (SMEF) in Nigeria. The results show that Automated Teller Machine (ATM) transactions had a positive and significant impact on SME financing (SMEF) ($\beta = 0.14$, $P = 0.01$). This implies that H_{01} : Automated Teller Machine (ATM) does not significantly impact SME financing is rejected, while the alternative is accepted. Point

of Sale (POS) had a positive impact on SMEs financing (SMEF), though the impact is not statistically significant, yet the first ($\beta = 0.12$, $P = 0.00$), second ($\beta = 0.91$, $P = 0.00$) and third ($\beta = 0.24$, $P = 0.02$) lagged values of the coefficients are positive and significant and thus strengthens the exogeneity of POS as a parameter of SMEF. This implies that H_{0_2} : Point of Sales (POS) does not significantly impact SME financing is accepted. The result further shows that LRBCB yielded a coefficient of 0.092 at a significant P-value of 0.00, and therefore suggests that the loans issued by commercial banks in the rural areas are significantly contributing to SME financing (SMEF) in Nigeria. The results reveal that Mobile Payment (MP) yielded a co-efficient of 2.10 at a p-value of 0.00. This result indicates that MP significantly impacts SME financing. Therefore, H_{0_3} : Mobile Payment (MP) does not significantly impact SME financing is rejected, and the alternative is accepted. As for hypothesis 4, the coefficient obtained for Loans of Rural Branches of Commercial Banks (LRBCB) was 0.09, which was found to be significant at a p-value of 0.00. Given that the p-value is less than 0.05 significant level, H_{0_4} , which states that Loans of Rural Branches of Commercial Banks (LRBCB) do not significantly impact SME financing is rejected, and thus establishes that LRBCB has a significant impact on SME financing.

These outcomes imply in proportion that a 1% increase in the amount of ATM and MP would respectively lead to a 0.14% and 2.10% increase in the value of SME financing (SMEF), while a 1% in increase in LRBCB and POS would lead to a corresponding 0.09% and 0.009% increase in the value of SMEs financing (SMEF). These results are in part consistent with economic theories. This short-run estimation provides evidence about the growing significance of ATMs, mobile payments, and online transfers as flexible and efficient financial initiatives for facilitating access to finance by SME owners. The R-squared value of 0.999510 is nearer to 1 and implies that the model demonstrated a good fit, effectively indicating that 99% variability in the SMEs financing (SMEF) is accounted for by exogenous variables (ATM, POS, MP and LRBCB). Furthermore, the F-statistics obtained was 443.61 at 0.00 probability value and thus significant at a 5% confidence level. This implies that the parameter estimates are statistically significant in the joint estimation of the model at a 0.05 significant level. The Error Correction Model (ECM) coefficient of -0.944235 is statistically significant, indicated by a p-value of

0.0000. This suggests that there is a strong correction mechanism in place, where deviations from the long-run equilibrium are corrected at a rate of approximately 94.4% per period. In other words, about 94.4% of the previous period's deviation from the equilibrium is corrected in the current period. This indicates a relatively fast adjustment process towards the long-run equilibrium. The Durbin-Watson statistic of 1.983144 indicates that there is no significant pattern in the residuals, suggesting that the regression model is reliable.

Table 5: Long-run regression result of ARDL

<i>Variable</i>	<i>Coefficient</i>	<i>Std. Error</i>	<i>t-Statistic</i>	<i>Prob.*</i>
SMEF (-1)	-0.672951	0.260716	-2.581163	0.0494
ATM	0.137674	0.032463	4.241006	0.0082
ATM (-1)	0.587272	0.084527	6.947753	0.0009
POS	0.009313	0.015366	0.606129	0.5709
POS (-1)	0.109758	0.016428	6.681090	0.0011
MP	2.100513	0.187569	11.19862	0.0001
MP (-3)	-0.129324	0.029709	-4.353063	0.0073
LRBCB	0.091597	0.017551	5.218882	0.0034
LRBCB (-1)	0.158293	0.028141	5.624930	0.0025
ECM	-0.944235	0.079037	-13.71805	0.0000
C	6.688038	1.751553	3.818346	0.0124
R-squared	0.999510	Mean dependent var		24.10151
Adjusted R-squared	0.997257	S.D. dependent var		0.979834
S.E. of regression	0.051317	Akaike info criterion		-3.204277
Sum squared resid	0.013167	Schwarz criterion		-2.072722
Log likelihood	70.46202	Hannan-Quinn criter.		-2.849888
F-statistic	443.6093	Durbin-Watson stat		1.983144
Prob(F-statistic)	0.000001			

Source: Authors' computation using E-views

4.2. Robustness checks

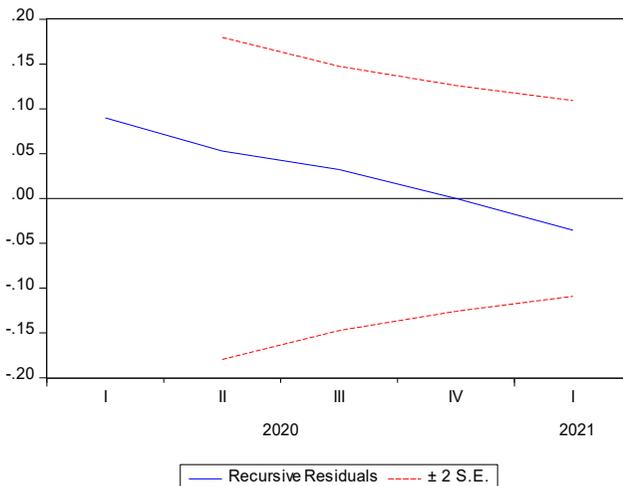
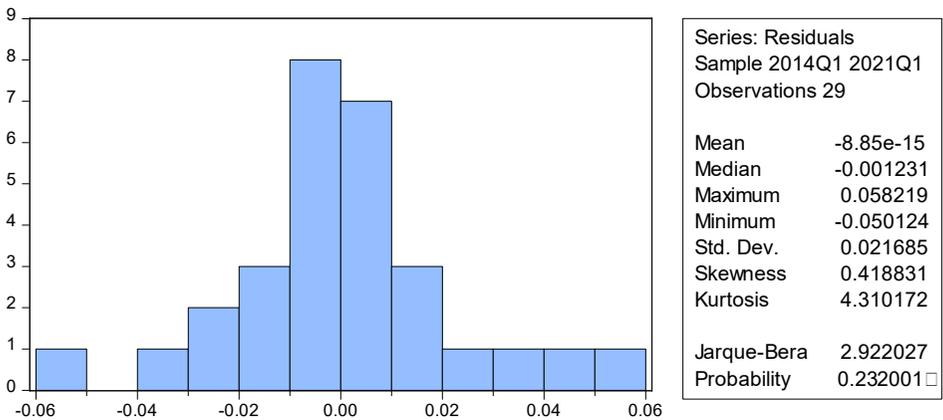
Table 6 presents the results for serial correlation, heteroscedasticity, and Ramsey RESET tests. The results indicate that the regression model does not suffer from serial correlation, heteroscedasticity, or model misspecification issues. The F-statistic of 0.0802 and ObsR2 of 0.0538 for the Breusch-Godfrey LM test suggest no serial correlation. The Heteroscedasticity Test results, with an F-statistic of 0.4407 and ObsR2 of 0.3664, indicate homoscedasticity. The Ramsey RESET Test results, with a Jacque-Bera statistic of 2.922027

and a probability value of 0.232001, suggest a correct model specification. Consequently, these results provide evidence that the model is reliable and can be used for inference and prediction purposes. Figure 1 also presents a test of the stability of the model. This post-estimation diagnostic test suggests that **the** Recursive Residuals of Squares' line did not cross the 5% boundary line. Therefore, the researcher concludes that the coefficient of model estimates significantly are stable.

Table 6: Serial Correlation; Heteroscedasticity and Ramsey RESET Test Results

<i>Breusch-Godfrey LM Test</i>		<i>Heteroscedasticity Test</i>		<i>Ramsey RESET Test</i>	
F-statistic	Obs* R ²	F-statistic	Obs* R ²	Jacque bera	prob
0.0802	0.0538	0.4407	0.3664	2.922027	0.232001

Source: authors' construct



5. CONCLUSION AND POLICY RECOMMENDATIONS

This research was driven by the pressing need to tackle the financing hurdles that Small and Medium-scale Enterprises (SMEs) face in Nigeria and the lack of literature on how financial inclusion and innovation jointly impact Small and Medium-scale Enterprises (SMEs) financing in Nigeria. Thus, this study used an empirical approach to investigate how Automated Teller Machines (ATM), Mobile Payment (MP), Loans of Rural Branches of Commercial Banks (LRBCB) and point of sale (POS) impact SMEs in Nigeria using Autoregressive distributed lag model (ARDL). The result demonstrated that Automated Teller Machines (ATM), Mobile Payment (MP), and Loans of Rural Branches of Commercial Banks (LRBCB) positively impact SMEs financing except Point of Sales (POS) which had a positive but insignificant impact on SMEs financing in the current period but exert a positive impact in lag 1. Following the above results, the study recommends that financial institutions expand ATM networks to enhance SMEs' access to cash and transactions. Banking institutions should prioritize security enhancements and simplify mobile banking platforms to attract a wider customer base. Policymakers and financial institutions should promote the integration of POS technology in SMEs through targeted initiatives and training programs. To improve SMEs' access to financing, policymakers should create an enabling regulatory environment that encourages responsible lending practices. This includes establishing transparent and fair lending policies. Policymakers should design programs that facilitate easier access to financing through rural commercial banks, specifically earmarking funds for SMEs. Rural commercial banks should explore innovative financial products tailored to SMEs' unique needs, such as flexible repayment schedules, lower interest rates, and streamlined application processes. By customizing financial solutions, financial institutions can better address SMEs' diverse financial requirements.

References

- Abebe, A., & Kegne, M. (2023). The role of microfinance institutions on women's entrepreneurship development. *Journal of Innovation and Entrepreneurship*, 12(1), 17.
- Adegboye, A. C., & Iweriebor, S. (2018). Does access to finance enhance SME innovation and productivity in Nigeria? Evidence from the World Bank

- enterprise survey. *African Development Review*, 30(4), 449-461, <https://doi.org/10.1111/1467-8268.12351>
- Ajide, F.M. (2016). Financial innovation and sustainable development in selected countries in West Africa. *Journal of Entrepreneurship Management and Innovation*, 12(3), 85-111.
- Andries, A. M., Marcu, N., Oprea, F., & Tofan, M. (2018). Financial infrastructure and access to finance for European SMEs. *Sustainability (Switzerland)*, 10(10), <https://doi.org/10.3390/su10103400>
- Ayunku, P.E. & Eweke, G.O. (2020). Banks's credit, macroeconomic dynamics and the performance of small and medium scale enterprises in Nigeria: a non-linear ARDL Approach. *European Journal of Business and Management Research*, 5(1), 1-7
- Beck, T., & Cull, R. (2014). SME finance in Africa. *Journal of African Economies*, 23(5), 583-613, <https://doi.org/10.1093/jae/eju016>
- Central Bank of Nigeria (CBN) (2017). National Financial Inclusion Strategy. <https://www.cbn.gov.ng/FinancialInclusion/2017/2020%20Financial%20Inclusion%20Strategy.pdf>
- Central Bank of Nigeria, statistical bulletins 2023.
- Effiom, L. & Edet, S. E. (2020): Financial innovation and the performance of small and medium scale enterprises in Nigeria, *Journal of Small Business & Entrepreneurship*, 3(3), 337 - 348; DOI: 10.1080/08276331.2020.1779559
- Kim, H. T., & Nguyen, Q. (2021). Managers' loss aversion and firm debt financing: Some insights from Vietnamese SMEs. *Finance Research Letters*, 102046. <https://doi.org/10.1016/j.frl.2021.102046>
- Mpirirwe, A., & Moses, A. (2023). Financial innovations and financial inclusion among commercial banks in Uganda. *International Journal of Entrepreneurship and Business Management*, 2(1), 43-58
- Mpirirwe, C. & Moses, A. (2023). Financial innovations and financial inclusion among commercial banks in Uganda. *International Journal of Entrepreneurship and Business Management*, 2(1), 43-58
- OECD (2020). *Financing SMEs and entrepreneurs: Understanding and developing an OECD scoreboard*, <https://doi.org/10.1787/9789264166769-3-en>
- Ogbuabor, J. E., Emeka, E. T., Orji, A., & Onuigbo, F. N.(2023a). The effects of international financial inflows on economic complexity in Africa: does institutional quality play a moderation role? *Journal of Economic Policy Reform*, 1-22

- Oladosu, i. o. implications of bank credits in deepening small and medium scale enterprises (SMEs) performance in Nigeria.
- Orji, A., Aza, G. C., Anthony-Orji, O. I., & Isaac, N. (2022). Foreign direct investment-firm productivity nexus in West Africa: New empirical insights from firm-level data. *Journal of Public Affairs*, 22(4), e2661.
- Osano, H. M., & Languitone, H. (2015). Factors influencing access to finance by SMEs in Mozambique: Case of SMEs in Maputo central business district. *Journal of Innovation and Entrepreneurship*, 5(1), <https://doi.org/10.1186/s13731-016-0041-0>.
- Owolabi, T. (2017). The impact of economic features and physical performance of selected SMEs in Nigeria. *Review of Financial Studies*, 13(5), 09-19
- Ozurumba, C. O. & Onyeiwu, C. (2019). Impact of financial innovation on economic growth in Nigeria. *International Journal of Economics, Commerce and Management*, 7(8), 1-14. <http://ijecm.co.uk/>
- PwC's MSME Survey (2020). Building to last Nigeria, report. <https://www.pwc.com/ng/en/assets/pdf/pwc-msme-survey-2020-final.pdf>
- Wellalage, N. H., & Fernandez, V. (2019). Innovation and SME finance: Evidence from developing countries. *International Review of Financial Analysis*, 66, 101370, <https://doi.org/10.1016/j.irfa.2019.06.009>.