

Innovative Banking Models and Banks Fragility in Post Covid-19 Era in Nigeria

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Abstract: *The study examined the relationship between innovative banking models and banks fragility in post covid-19 era in Nigeria. To achieved this objective, the innovative banking models was proxied with Automatic Teller Machine Transactions (ATMTs), Internet Transactions (ITs), Point of Sale Terminals (POS) and Mobile Transactions (MTs) in relation to banks fragility proxied with Non-Performing Loans Ratio (NPLR) in Nigeria. The method of data collection used in this study is the secondary source of data (time series data), from the CBN Bank Supervisory Annual Report, CBN Statistical Bulletin and Nigeria Deposit Insurance Corporation (NDIC) Annual Reports for the period 2000-2020. Secondary source of data is use in this study because it deals with the measures of innovative banking models [Automatic Teller Machine Transactions (ATMTs), Internet Transactions (ITs), Point of Sale Terminals (POS) and Mobile Transactions (MTs)] on Non-Performing Loans Ratio (NPLR) proxy for bank fragility for Nigerian Deposit Money Banks in post Covid-19 era of events that has already taken place and recorded from their secondary sourced from the CBN bank supervisory annual report and NDIC annual reports. The time series data will be subjected to a unit root test to determine whether or not they are stationary. After that, descriptive statistics and correlation analysis were used to assess the nature of the link between the independent; Automatic Teller Machine Transactions (ATMTs), Internet Transactions (ITs), Point of Sale Terminals (POS) and Mobile Transactions (MTs) and the dependent (Return on Asset (ROA)) variables. The computer statistical software E-VIEWS 9.0 was used to do multiple regression analysis through the regression model. This is the proper procedure for analyzing data in relation to the study in issue. The findings revealed that Automatic Teller Machine Transactions (ATMTs), Internet Transactions (ITs), Point of Sale Terminals (POS) and Mobile Transactions (MTs) has insignificant effect on Non-Performing Loans Ratio (NPLR). Thus, concluded that innovative banking models do not have significant effect on banks fragility in post covid-19 era in Nigeria. Based on the findings, thereby recommends that the management of the banks should put modalities in place in order for them to used innovative banking models as a strategic tool in reducing bank fragility in Nigeria.*

Keywords: Innovative Banking Models, Banks Fragility, Point of Sale Terminals and Non-Performing Loans Ratio.

1.1 Introduction

Innovative banking models were used in emerging markets during the COVID-19 crisis; this paper examines market trends that may increase the role of innovative banking models in emerging markets following the crisis; and it assesses the risks and opportunities of faster adoption of innovative banking models in emerging markets. According to growth predictions from the International Monetary Fund, post-COVID-19 refers to the era after 2021, when the economy begins to recover. Potential additional waves of the virus, as well as changes in individual choices regarding reopening, will alter this time horizon (IFC, 2020).

Banking systems were better capitalized and liquid in the COVID-19 crisis than in previous crises (EBA, 2020; FED, 2020). However, there are flaws in a number of areas. A number of banks continue to struggle with low valuations, low profitability, and large levels of non-performing assets, particularly in various parts of the world (IMF, 2020; ECB, 2020). Regardless of the crisis, problems such as low interest margins may be exacerbated by low interest rates and flat yield curves (Patalano and Roulet, 2020), which are likely to persist in many jurisdictions currently. A protracted and severe disruption might also result in a significant increase in non-performing loans (NPLs) as a result of an increase in household and business defaults, forcing banks to increase their loan loss provisions (LLPs) and allowances. The decline in bank asset quality and earnings prospects, in particular, may have an influence on banks' ability to withstand increased loan losses (Conesa, Lotti and Powell, 2020).

In order to reduce bank fragility, novel banking models have a huge potential to improve efficiency through innovation, increased supplier diversity, and a more competitive financial system that delivers market extension and financial inclusion (Patalano and Roulet, 2020). These new banking models will put pressure on incumbents' margins, thereby encouraging higher risk-taking, and spark a race to collect the sector's rents (OECD, 2021). For the efficiency potential to be fulfilled, incumbents must be restructured at the same time as new competitors enter the market, and new dominant positions must not become established. Instead of circumventing regulation or monopolizing the consumer interface, new entrants (FinTech and BigTech) should win market share through increased efficiency. Regulators must also work to identify emerging vulnerabilities to financial stability posed by new types of systemic risk (Arner, Barberis & Buckley, 2017).

Banks serve a variety of functions in the economy. The most important is maturity transformation and liquidity provision, which involves taking short-term deposits and providing long-term loans. This function is complemented by the monitoring of opacity loans that would be difficult to fund on the open market. Payment and transaction services are the second function. Both tasks rely on hard, verifiable, and codifiable information as well as soft information based on relationship banking. In the post-Covid-19 era, the digital revolution has increased the weight of codifiable information and the means available to handle it (mainly artificial intelligence and machine learning big data), which has helped to strengthen bank resilience and minimize fragility (Buchak, Matvos, Piskorski & Seru, 2018).

FinTech companies have altered the structure, delivery, and consumption of financial services, but they have yet to achieve market dominance. FinTech firms, for example, have failed to make significant inroads into corporate financing to medium-sized and big businesses. Despite its steady expansion, FinTech credit remains a modest part of total credit, particularly in China (where it accounts for the majority of total credit activity), where it accounted for only 3% of total nonbank credit outstanding in 2017. FinTech credit is more essential in nations where the average income per capita is higher and the banking sector is less competitive. In the United Kingdom, the United States, South Korea, and China, total FinTech credit per capita is high. BigTech enterprises offer the majority of FinTech credit in South Korea and Argentina (Claessens et al. 2018, Frost et al., 2019).

Many FinTech firms have resorted on creating relationships with incumbents when faced with obstacles in gaining scale and customer numbers, despite their initial goal of replacing traditional banks as market leaders. Customers' willingness to switch away from incumbents has not met expectations, despite the fact that they have successfully led innovation efforts and raised customer expectations through innovations such as rapid loan adjudication. Switching costs and consumer inertia are high, and incumbents have been adapting to FinTech firms' innovations (McWaters & Galaski, 2017).

Beginning with automated teller machines (ATMs), mobile banking, telebanking, PC banking, and the most recent technology, e-banking, the emergence of creative banking models has pushed significant changes in the banking business. These technologies have supplanted the labor-intensive, cascading transaction system and paper-based payment methods. Because most banks are seeking for chances that arise from the new market environment, the importance of e-banking may eventually widen the gap with industrialized countries. Nigerian banks are projected to profit from e-long-term banking's influence on boosting efficiency and service delivery through electronic means, which has reduced the banks' vulnerability (Buchak, et al, 2018).

Long queues in some banking halls, network failure, lack of or inadequate awareness of available e-banking products and services, lack of understanding of e-banking products and services, frustration of customers at ATM centers, incorrect debiting of accounts, fraudulent practices, and job loss due to technological advancement occasioned by electronic banking, among others, continue to be challenges for innovative banking models in Nigerian banks. These difficulties demonstrate that no development program is perfect, especially when the goal is to improve people's lives by fostering effective service delivery. As a result, the creative banking model in banking becomes more interactive and broad-based, as it is a full departure from the traditional/old medium of print materials or hard copies, especially in the banking business.

Furthermore, a vicious circle of low asset quality, low bank profitability, capital pressure, and constrained lending, all of which have negative effects on growth, has the potential to exacerbate the initial NPL problem, highlighting the macroeconomic and financial stability significance of NPLs as a result of COVID-19. Understanding the potential losses from NPLs under various economic and policy stimulus scenarios is therefore critical in analyzing creative banking models on bank fragility in the post-COVID-19 era.

Although there have been numerous scholarly works and studies on innovative banking models that focus on the benefits, implications of technological innovation on employment, and importance to economic growth, the majority of these works do not address how specific banks deliver electronic banking services and service delivery to their customers. Furthermore, there is a paucity of literature that examines innovative banking models in relation to bank fragility; most studies focus on innovative banking models in relation to service delivery among Nigerian banks, such as the studies of Oluyi and Abioye (2020), Nyiranzabamwita and Harelimana (2019), Obikeze, Okolo, Okolo, Mmamel and Okonkwo (2017) and Anyikwa and Oladimeji (2015) while majority of the studies are examine innovative banking model relation to performance (such as; Ughulu and Agbonkhese, 2020; Amaduche, Babatunde and Adediji, 2020; Olaiya and Adeleke, 2019 etc.) and satisfaction (such as; Nwekpa, Djobbissie, Chukwuma and Ezezue, 2020; Chimaobi, Akujor and Mbah, 2020, etc.). To this end, this study will examine the relationship between innovative banking model [measure with Automated Teller Machine (ATM), Point of Sales (POS), Mobile Banking (MB) and Internet Banking (INTB)] and bank fragility (proxy with non-performing loans ratio) in post COVID-19 Era in Nigeria.

2.1 Review of Related Literature

2.1.1 Concept of Innovative Banking Models

Financial services delivered via mobile phones, mobile wallets, personal computers, the internet, or debit or credit cards linked to a secure digital payment system are referred to as innovative banking models (Durai & Stella, 2019; Shofawati, 2019). It includes all

goods, services, technology, and infrastructure that enable consumers and businesses to use the internet to make payments, save money, and borrow money without having to go to a bank or deal directly with a financial service provider (Shofawati, 2019).

Peake (2012) and Michelle (2016) define innovative banking models as "a pre-arrangement of some combination of money-related and payment benefits that are conveyed and overseen using portable or online advances and a system of experts." It also refers to the wide-ranging technologies (e-money, mobile money, card payments, and electronic funds transfers) that enable a wider range of providers to deliver financial services to a larger group of people (Asian Development Bank, 2016). (Michelle, 2016).

Digital financial services (DFS) are defined by the Organization for Economic Co-operation and Development (OECD) as financial operations that use digital technology, such as electronic money, mobile financial services, online financial services, i-teller, and branchless banking, whether provided by banks or non-bank institutions (OECD, 2017 cited in OECD 2018).

2.1.2 COVID-19, Bank Fragility and Non-Performing Loans

Banks in fragile and conflict-affected environments suffer numerous constraints that limit and hinder their ability to properly respond to a crisis of the scale of COVID-19. With a predicted increase in nonperforming loans, the financial sector has taken a hit across the globe. Financial system shocks such as ballooning nonperforming loans, insolvency filings, asset fire sales, and needless liquidations are being caused by declines in loan demand and individual earnings. Loss of income in the banking system will increase bad debts, lower capital ratios, put pressure on secondary mortgage markets, and generate liquidity issues, as has been the case in the pre- and post-Covid-19 era. Because the COVID-19-induced global systemic shock has a large influence on capital markets, SMEs and enterprises with significant debt in foreign currencies are particularly vulnerable. In Nigeria, the central bank has declared a suspension on interest and principal payments by SMEs as part of its directed lending strategy, in response to financial sector stress, and has encouraged banks to extend the maturities of all loans as needed (IFC, 2020).

2.2 Theoretical Framework

2.2.1 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a version of Ajzen and Fishbein's (1980). Theory of Reasoned Action (TRA), as cited in Ughulu and Agbonkhese, 2020, to explicitly handle presenting client acknowledgment of data frameworks. In comparison to TRA, the Technology Acceptance Model is far more limited. The concept was developed in order to better understand how people use computers. TAM is especially effective for exhibiting PC acknowledgment because it integrates discoveries acquired over a longer period of Information System (IS) research.

The Technology Acceptance Model (TAM) describes the uncomplicated relationship between saw worth, convenience, framework configuration highlights, mentality toward using, and actual use behavior. TAM, on the whole, provides a useful depiction of the instruments through which plan decisions influence client acknowledgment. As a result, the Technology Acknowledgement Model (Davis, 1993) cited in Amaduche, Babatunde, and Adediji, is useful in applied settings for predicting and analyzing client acknowledgment of data innovation (Davis, 1993). (2020). According to the TAM, saw comfort (PU) and saw usability (PEOU) are two essential convictions that are most relevant for PC acknowledgment behavior. TAM uses the Hypothesis of TRA as a hypothetical premise to show a causal relationship between the two main convictions, PU and PEOU. Olaiya and Adeleke (2019), cited by Wei and Jiage (2013), found this hypothesis noteworthy in their investigation.

This study therefore adopted TAM, given two of the important constructs, to confirm the extent to which innovative banking models affect banking industry, especially the deposit money banks in Nigeria.

2.2.2 Bank-Focused Theory

This notion, promoted by Kapoor (2010) and cited by Olaiya and Adeleke (2019), is based on the idea that banks provide services to their consumers using non-traditional but low-cost delivery channels. ATMs, mobile phone banking, and POS are examples of such channels. The bank provides a wide range of services to its customers through these channels, independent of their location or branch affiliation. All that is required is for the necessary information to be entered into the system, and the transaction will be completed. Because the emphasis here is on electronic platforms as a means of delivering services, this theory is favorable to this research.

2.3 Empirical review

Andabai and Bina (2019) investigated the influence of cashless policy on deposit money bank performance in Nigeria using OLS and secondary data taken from the Central Bank of Nigeria Statistical Bulletin for the period 2000-2018. Cashless policy was used as a proxy for ATM, POS, and MB while ROA was used as a proxy for DMBs performance. The impact of ATM transactions, point-of-sale terminal transactions, and electronic mobile payments on deposit money banks' return on assets in Nigeria is significant. The study shows that in Nigeria, cashless policies have a major impact on the performance of deposit money institutions.

Using secondary data sourced from Central Bank of Nigeria's (CBN) Statistical Bulletin and CBN Financial Stability Reports and analyzed by conducting unit root test and co-integration bound test, via ADL using E-view 9.0 version, Olaiya and Adeleke (2019) explored the relationship between electronic banking and profitability of DMBs in Nigeria between 2010 and 2018. Electronic banking was proxied with automatic teller machine transaction value (ATMTV), point of sale transaction value (POSTV), mobile banking transaction value (MBTV) and internet banking transaction value (IBTV) while commercial banks performance was proxied by returns on assets (ROA). The result showed that ATMTV and POSTV individually have positive relationship ROA, while both MBTV and IBTV individually have negative relationship with ROA.

Ikpefan, Akpan, Osuma, Evbuomwan, and Ndigwe (2018) investigated the impact of electronic banking tools on Nigeria's cashless policy over a 10-year period (2006-2015) using the ordinary least square method and data from the Central Bank of Nigeria (CBN) annual report and the Nigerian Interbank Settlement System (NIBSS) website. The study's findings revealed that electronic banking tools had a negligible impact on the cash in circulation.

Akara and Asekome (2018) investigated the effects of cashless policy on the profitability performance of commercial banks in Nigeria, using ATM and POS as proxies for cashless policy and ROA and ROE as proxies for profitability, and analyzing the data using Ordinary least Square multiple regression analysis. The deployment of cashless policy instruments, such as ATMs and POS, increased the banks' ROA and ROE, according to the findings.

3.0 Methodology

3.1 Introduction

For this study, an ex-post facto research design was adopted. The study's population is made up of all Nigerian Deposit Money Banks, and the population also serves as the sample size because the study relied on aggregate secondary data that included innovative banking models variables and bank fragility metrics for Nigerian Deposit Money Banks in post Covid-19 era. In addition, the study will be limited to evaluating the various measures of innovative banking models.

3.2 Data Source and Variables Used

The method of data collection used in this study is the secondary source of data (time series data), from the CBN Bank Supervisory Annual Report, CBN Statistical Bulletin and Nigeria Deposit Insurance Corporation (NDIC) Annual Reports for the period 2000-2020. Secondary source of data is use in this study because it deals with the measures of innovative banking models on Non-Performing Loans Ratio (NPLR) proxy for bank fragility for Nigerian DMBs in post Covid-19 era of events that has already taken place and recorded from their secondary source from the CBN bank supervisory annual report and NDIC annual reports. Furthermore, the CBN bank supervisory annual report and the NDIC annual report were chosen as data sources since they are the most dependable and accurate for the study.

3.3 Model Specification and Statistical Tool

In this study, the statistical technique of data analysis was used. The time series data will be subjected to a unit root test to determine whether or not they are stationary. After that, descriptive statistics and correlation analysis were used to assess the nature of the link between the independent variables. The computer statistical software E-VIEWS 9.0 was used to do multiple regression analysis through the Regression model. This is the proper procedure for analyzing data in relation to the study in issue.

The model for this study was adopted from the work of Ibenta and Anyanwu (2017), titled; Financial Innovation and Efficiency on the Banking Sub-sector: The Case of Deposit Money Banks and Selected Instruments of Electronic Banking (2006 - 2014) and was modified to suit the variables of this study. The model which specifies bank fragility [proxy by Non-Performing Loans Ratio (NPLR)] is significantly influenced by the innovative banking models [Automatic Teller Machine Transactions (ATMTs), Internet Transactions (ITs), Point of Sale Terminals (POS) and Mobile Transactions (MTs)] is formulated as follows,

Non-Performing Loans Ratio (NPLR) = f (Automatic Teller Machine Transactions (ATMTs)

Non-Performing Loans Ratio (NPLR) = f (Internet Transactions (ITs)

Non-Performing Loans Ratio (NPLR) = f (Point of Sale Terminals (POS)

Non-Performing Loans Ratio (NPLR) = f (Mobile Transactions (MTs)

Model 1-4 where collapsed into a function model labelled

NPLR = f(ATMTs, ITs, POS, MTs)

NPLR = $\beta_0 + \beta_1ATMTs + \beta_2ITs + \beta_3POS + \beta_4MTs + U$

4.1 Discussions of Result**Table 4.1: Descriptive Statistics**

	NPLR	ATMTS	ITS	POS	MTS
Mean	11.50286	1981.699	104.8576	459.3900	532.5971
Median	11.76000	548.6000	44.30000	12.72000	6.650000
Maximum	33.03000	6512.610	675.9200	3204.750	5080.960
Minimum	2.810000	5.420000	9.870000	2.100000	1.010000
Std. Dev.	7.276330	2399.292	166.4513	867.5225	1172.504
Skewness	1.191188	0.899828	2.579839	2.161695	3.042269
Kurtosis	4.648858	2.319017	8.641444	6.661351	12.04824
Jarque-Bera	7.345144	3.239684	51.14215	28.08505	104.0307
Probability	0.025411	0.017930	0.000000	0.000001	0.000000
Sum	241.5600	41615.67	2202.010	9647.190	11184.54
Sum Sq. Dev.	1058.900	1.15E+08	554120.4	15051907	27495292
Observations	21	21	21	21	21

Source: EVIEW, 9.0 Outputs, 2021.

Table 4.1 above is the presentation of the descriptive statistics. The mean value for the NPLR recorded a mean value of 11.50 with a standard deviation of 7.28. Also, ATMTs, recorded a mean of 1981.70 and standard deviation of 2399.29, ITs, recorded that a mean of 104.86 with a standard deviation of 166.45, POS, recorded that a mean of 459.39 with a standard deviation of 867.52 and MTs recorded an average value of 532.60 with a standard deviation of 1172.50. Since the standard deviations for all the variables are larger than respectively means, it shows that the data are widely dispersed except for NPLR, whose mean is greater the standard deviation, this implies that is not widely dispersed.

The normal distribution has a kurtosis of three, which indicates that the distribution has neither fat nor thin tails. Consequently, if an observed distribution has a kurtosis greater than three, the distribution has heavy tails when compared to the normal distribution. Since all the kurtosis coefficients in Table 4.1 are greater than 3, except for ATMTs, this shows that ATMTs have thin tails when compared to the normal distribution while NPLR, ITs, POS and MTs have a thick tails when compared to the normal distribution.

4.3. Multicollinearity Test

Since the data for the study are annual time series, the multicollinearity test was conducted to ascertain if the data contained multicollinearity, this is presented in table 4.3 below;

Table 4.3.1: Variance Inflation Factors Multicollinearity Test**Variance Inflation Factors**

Date: 11/21/21 Time: 17:24

Sample: 2000 2020

Included observations: 21

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	6.025986	2.495482	NA
ATMTS	2.50E-06	9.748857	5.680140
ITS	0.001363	21.09786	4.189234
POS	0.018308	118.3718	9.446601
MTS	5.045105	35.93918	9.439452

Source: EVIEW, 9.0 Outputs, 2021.

Multicollinearity occurs in a data set when two or more independent variables in multiple regression models are highly correlated. In order to ensure that the results of this study are valid, the variance inflation factor (VIF) computed as shown in Table 4.3.1. Furthermore, the Centered Variance Inflation Factor (CVIF) statistics for all the independent variables consistently lies between

5.6801, 4.1892, 9.4466 and 9.4395 for ATMTs, ITs, POS and MTs respectively. This indicates the absence of multicollinearity problems among the variables under investigation because the cut off value of VIF is 10. Values of VIF that exceed 10 are often regarded as indicating multicollinearity.

4.4 Data Validity Test

Since the data are time series data, spanning for 2000-2020(21 years), the validity test was carried out using the Ramsey RESET Test in order to ascertain the validity of the data for the analysis. This is presented in Table 4.4.1 below;

Table 4.4.1: Data Validity Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.642965	Prob. F(2,14)	0.5406
Obs*R-squared	1.766627	Prob. Chi-Square(2)	0.4134
		Durbin-Watson stat	2.220154
Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.548998	Prob. F(4,16)	0.7025
Obs*R-squared	2.534393	Prob. Chi-Square(4)	0.6385
Scaled explained SS	4.391425	Prob. Chi-Square(4)	0.3556
		Durbin-Watson stat	2.060928
Ramsey RESET Test			
Equation: UNTITLED			
Specification: NPLR C ATMTS ITS POS MTS			
Omitted Variables: Squares of fitted values			
	Value	Df	Probability
t-statistic	0.312432	15	0.7590
F-statistic	0.097614	(1, 15)	0.7590
Likelihood ratio	0.136217	1	0.7121
Durbin-Watson stat	1.886886		

Source: E-VIEW, 9.0 Outputs, 2021.

The residuals of the variables were determined prior to estimating the models to check for serial correlation. The serial correlation LM test was used to accomplish this. Because the p-values of the f-statistics are insignificant at the 5% level of significance, the serial correlation LM test in Table 4.4.1 shows that there is no element of serial correlation in the models.

Heteroskedasticity is a problem that occurs when a variable's variability is unequal across the range of values of a second variable that predicts it. The heteroskedasticity test via the Breusch-Pagan-Godfrey was used to ensure that the model estimation was homoscedastic. As a result, the models have no problem with heteroskedasticity because the p-values of the f-statistics are inconsequential at the 5% level of significance.

The Durbin Watson statistic confirms that our data exhibits no autocorrelation qualities, as shown in table 4.4.1. The probability values of three parameters are more than the 0.05 level of significance, indicating that the model is homoskedastic. Our model is correctly described and stable, according to the Ramsey test results.

4.5 Augmented Dickey-Fuller (ADF) Unit Root Test

In the study of time series models and co-integration, testing for the presence of unit roots is a major concern. This test is designed to eliminate the problem of spurious regression, which is typical when dealing with time series data. A unit root indicates that the time-series data under consideration is non-stationary, whereas the absence of a unit root indicates that the stochastic process is stationary. The Augmented Dickey-Fuller (ADF) Unit Root Test was used to conduct the unit root test, as shown in table 4.5.1 below;

Table 4.5.1: Augmented Dickey-Fuller Unit root Test

Test Variables	ADF Test Statistic Value	Mackinnon Critical Value @ 5%	Order of Integration	P-Value	Durbin-Watson Statistics	Decision
NPLR	-5.063090	-3.029970	1(1)	0.0008	2.081198	Stationary
ATMTs	-4.564414	-3.065585	1(1)	0.0467	1.712740	Stationary
Its	-4.362883	-3.040391	1(1)	0.0036	2.016535	Stationary
POS	-4.546794	-3.065585	1(1)	0.0030	2.006930	Stationary
MTs	13.54385	-3.081002	1(1)	0.0000	1.151735	Stationary

Source: E-VIEW, 9.0 Outputs, 2021

According to the summary of the ADF unit root test output in table 4.5.1, all of the variables under investigation, namely NPLR, ATMTs, ITs, POS, and MTs, have unit root tests at their first difference 1(1). The value of their respective ADF statistics, which is more than the threshold value of 5%, is evidence of this. Furthermore, the p-value for all variables, which is less than 5% level of significance greater than 95 percent confidence level, provides additional proof of stationary series. At the first difference, i.e. at order one, they all achieved stationarity. The Durbin-Watson statistic suggests that there are no autocorrelation issues in the data. We can use the Johansen cointegration test because all of the variables are integrated at order one.

4.6. Johansen Cointegration Cointegration Test

Having determined the time series characteristics of the variables, this study further investigates by making use of the (Trace Statistics) and (Maximum Eigenvalue) using the methodology proposed by Johansen and Juselius (1990) in order to ascertain if the variables have a long-run relationship. Thus, Table 4.6.1 below presents a summary of the cointegration test:

Table 4.6.1: Summary of Johansen Cointegration Test Output

Date: 11/21/21 Time: 16:43

Sample (adjusted): 2002 2020

Included observations: 19 after adjustments

Trend assumption: Linear deterministic trend

Series: NPLR ATMTS ITS POS MTS

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05	Prob.**	Max-Eigen Statistic	0.05	Prob.**
			Critical Value			Critical Value	
None *	0.985294	140.9038	69.81889	0.0000	80.17044	33.87687	0.0000
At most 1 *	0.779942	60.73333	47.85613	0.0020	28.76342	27.58434	0.0352
At most 2 *	0.649315	31.96991	29.79707	0.0277	19.90947	21.13162	0.0734
At most 3	0.441592	17.06044	15.49471	0.0141	17.07066	14.26460	0.0107
At most 4	0.050760	5.989786	3.841466	0.0198	5.989786	3.841466	0.0198

Researcher's Computation Based E-views 9.0 Output, 2021.

Trace test indicates 4 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Table 4.6.1 above revealed that the result of the multivariate cointegration test by Johansen and Juselius cointegration technique reveal that both the trace statistic and the Maximum Eigenvalue statistic shows evidence of two cointegration relationship (at None and at most 1), where the values of the trace statistic and the Maximum Eigenvalue statistic is greater than their respective critical values at 5% level of significance level. This result conforms to the existence of a stable long-run relationship between bank fragility proxy by NPLR and innovative banking models {measured by ATMTs, ITs, POS and MTs}.

Table 4.7: Correlation Matrix

	NPLR	ATMTS	ITS	POS	MTS
NPLR	1.000000				
ATMTS	-0.305118	1.000000			
ITS	-0.098527	0.772809	1.000000		

POS	-0.172964	0.838536	0.923134	1.000000	
MTS	-0.207670	0.714291	0.799854	0.950064	1.000000

Source: EVIEW, 9.0 Outputs, 2021.

The correlation test is presented in Table 4.7 and it shows the absence of multi-co linearity among the variables since the correlation values are less than 0.7. Furthermore, the result shows the explanatory variables namely; ATMTs, ITs, POS and MTs has negative strong correlation with NPLR.

Table 4.8: Multiple Regression Analysis

Dependent Variable: NPLR

Method: Least Squares

Date: 11/21/21 Time: 16:35

Sample: 2000 2020

Included observations: 21

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	14.83320	2.454788	6.042560	0.0000
ATMTS	-0.003035	0.001582	-1.918597	0.0731
ITS	-0.020086	0.036917	-0.544087	0.5939
POS	0.022339	0.017552	1.272683	0.2213
MTS	-0.010275	0.007381	-1.392085	0.1829
R-squared	0.733772	Mean dependent var		11.50286
Adjusted R-squared	0.642215	S.D. dependent var		7.276330
S.E. of regression	7.121091	Akaike info criterion		6.968256
Sum squared resid	811.3589	Schwarz criterion		7.216951
Log likelihood	-68.16668	Hannan-Quinn criter.		7.022229
F-statistic	1.220376	Durbin-Watson stat		1.918404
Prob(F-statistic)	0.341015			

Source: EVIEW, 9.0 Outputs, 2021.

The multiple regression results in Table 4.8 above, the coefficient of ATMTs is -0.0030 with a t-value of -1.9186 and an associated p-value (sig. value) is 0.0731. This suggests that ATMTs have a negative insignificant effect on NPLR. This relationship is not significant given the fact that the p-value of 0.0731 is greater than 0.05 (5%) level significance. The coefficient of ATMTs is -0.0030, which imply that ATMTs has a negative trend with NPLR. One percent (1%) movement in ATMTs would lead to 0.30% decrease in NPLR.

Also, the multiple regression results in Table 4.8 above, the coefficient of ITs is -0.0201 with a t-value of -0.5441 and an associated p-value (sig. value) is 0.5939. This suggests that ITs have a negative insignificant effect on NPLR. This relationship is not significant given the fact that the p-value of 0.5939 is greater than 0.05 (5%) level significance. The coefficient of ITs is -0.0201 which imply that ITs has a negative trend with NPLR. One percent (1%) movement in its would lead to 0.2.01% decreases in NPLR.

More also, the multiple regression results in Table 4.8 above, the coefficient of POS is 0.0223 with a t-value of 1.2727 and an associated p-value (sig. value) is 0.2213. This suggests that POS have a positive insignificant effect on NPLR. This relationship is not significant given the fact that the p-value of 0.2213 is greater than 0.05 (5%) level significance. The coefficient of POS is 0.0223, which imply that POS has a positive trend with NPLR. One percent (1%) movement in POS would lead to 2.23% increase in NPLR.

Finally, the multiple regression results in Table 4.8 above, the coefficient of MTs is -0.0103 with a t-value of -1.3921 and an associated p-value (sig. value) is 0.1829. This suggests that MTs have a negative insignificant effect on NPLR. This relationship is not significant given the fact that the p-value of 0.1829 is greater than 0.05 (5%) level significance. The coefficient of MTs is -0.0103 which imply that MTs has a negative trend with NPLR. One percent (1%) movement in MTs would lead to 1.03% decrease in NPLR.

4.5 Implication for Management

Innovative banking model is a key strategic tool in stimulating performance in the Nigeria banking industry in the post covid-19 era; this will also, helps the banks in reducing their fragility associated with the covid-19 due to rapid default on loans granted to customers. Hence, it can be deduced from the findings that innovative banking models and its dimensions does not have significant effect on bank fragility proxied with non-performing loans. Thus, management of the banks should reposition the banks in such a manner that will reduce their non-performing loans, thereby reducing their fragility.

5.1 Conclusion and Recommendations

The study examined the relationship between innovative banking models and banks fragility in post covid-19 era in Nigeria. To achieve this objective, the innovative banking models were proxied with ATMTs, ITs, POS and MTs in relation to banks fragility proxied with NPLR in Nigeria. The method of data collection used in this study is the secondary source of data (time series data), from the CBN Bank Supervisory Annual Report, CBN Statistical Bulletin and Nigeria Deposit Insurance Corporation (NDIC) Annual Reports for the period 2000-2020. Secondary source of data is use in this study because it deals with the measures of innovative banking models [ATMTs, ITs, POS and MTs] on NPLR proxy for bank fragility for Nigerian DMBs in post Covid-19 era of events that has already taken place and recorded from their secondary sourced from the CBN bank supervisory annual report and NDIC annual reports. The time series data will be subjected to a unit root test to determine whether or not they are stationary. After that, descriptive statistics and correlation analysis were used to assess the nature of the link between the independent; ATMTs, ITs, POS and MTs and the dependent; ROA. The computer statistical software E-VIEWS 9.0 was used to do multiple regression analysis through the regression model. This is the proper procedure for analyzing data in relation to the study in issue. The findings revealed that ATMTs, ITs, POS and MTs have insignificant effect on NPLR. Thus, concluded that innovative banking models do not have significant effect on banks fragility in post covid-19 era in Nigeria. Based on the findings, thereby recommends that the management of the banks should put modalities in place in order for them to used innovative banking models as a strategic tool in reducing bank fragility in Nigeria.

5.2 Contribution to Knowledge

This study contributed to knowledge in a special way, because there is no study in Nigeria and beyond that has examined the relationship between innovative banking models in relation to performance. Hence, the study is unique, special and timely in the post covid-19 era in Nigeria.

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