Innovations

Financial Innovation (FIs) and Performance of Deposit Money Banks (PMDBs) in Nigeria

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Abstract
The study examined the effect of financial innovations (FIs) on performance of deposit money banks in Nigeria for the duration of 2000-2022 (22years). This was done respect of measures of FIs, namely; Points of Sales (POS), Mobile Banking (MB), Automated Teller Machines (ATM) and Internet Banking (INTB) and how the effects financial performance of DMBs in Nigeria {proxy with Return on Equity (ROE)}. 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. The data set was described using descriptive statistics and the unit root test was conducted to ascertain if the data are stationary in order to have accurate regression result. The correlation analysis will be use to ascertain the co-movement of the independent variables in relation to the dependent variable while the Multiple Regression analysis were employed with the aid of E-VIEW version 9.0 for the purpose of testing the research hypotheses raised. The finding revealed that ATM and POS has positive significant effect on ROE of deposit money banks in Nigeria while INTB and MB has negative insignificant effect on ROE of deposit money banks in Nigeria. Hence, the study concluded that FIs and financial performance of deposit money banks in Nigeria is significant, and it's affected the banking industry positively. It is therefore recommended that, Investment in financial disruptive innovations has been proven to enhance the finance of Nigerian deposit money banks. The banks should therefore give emphasis to efficient utilization of FIs enabled services such POS, MB, ATM and INTB.

***Key Words**: 1.Financial Innovation, 2.Financial Performance, 3.Deposit Money Banks, 4.financial disruptive innovations, 5.Nigeria Deposit Insurance Corporation*

Introduction

Online transactions have surged as a result of the new Corona Virus (COVID-19) advertisement, which depicted the entire planet as being under lockdown and limiting physical presence at different banking halls. In recent years, FIs has increasingly sparked the expansion of banking networks and the variety of services offered. Information and telecommunications technology has become crucial to the majority of FIs, including electronic payments, loans, deposits, and securities (Nwako, Chukwu and Okoh, 2020). The Nigerian financial industry is without a doubt one of the most technologically advanced in the nation. Due to constantly evolving FIs, the sector has seen significant changes over time (Abdulmalik & Lamino, 2021). In general, Nigerian banks are implementing fresh approaches to enhance and streamline business processes, encouraging a shift away from traditional delivery methods and toward

digital and mobile ones (PWC Nigeria, 2017). In a similar vein, according to Onuoha (2019), these FIs can raise total income and therefore enhance the efficiency of banks. Deposit money banks make a variety of products available to both individuals and businesses in order to improve performance. Improved financial inclusion brought about by e-banking channels later improved performance in terms of efficiency (Motsatsi, 2019).

Deposit money banks (DMBs) in Nigeria have adopted FIs over time to ensure an improvement in performance in terms of efficiency, such as Unstructured Supplementary Service Data (USSD) (Onuoha 2019). The last two decades have seen significant innovation in the secondary markets for the global financial system, giving rise to new financial products that financial intermediaries could use to manage a particular risk (Kero, 2018). FIs have historically been seen as a cornerstone of our financial system and the lifeblood of effective and responsive capital markets (Davis, 2019). Noyer (2019) pointed out that the processes used to introduce new products to the market are FIs. All of these definitions point to the same conclusion: a new output of processes is required for financial innovation to emerge. FIs are tools for ensuring that the bank operates effectively and efficiently in achieving customer satisfaction (Akani, 2020).

Concept of FIs

The launch of a novel financial system service or method is typically what defines financial innovation (Nwako, Chukwu and Okoh, 2020). The modification of an old concept into a new product or method is another example of FI. As a result of these financial advancements, platforms for financial products and services have been distributed, and different banking services are now provided through platforms and channels with less of a human interface (Davis, 2019). In order to ensure that the bank operates successfully and efficiently in generating customer happiness and providing value to all stakeholders, FI is a tool. Service providers are highly appreciated and esteemed if they consistently exceed client expectations. Electronic commerce includes the revolutionary ICT-based solutions known as e-banking as a sub-component (e-commerce). E-banking play critical role in improving the quality of financial services provided to bank customers around the world, widening financial inclusion, advancing the cashless economy, and increasing the effectiveness of banks globally (Nkem and Akujinma, 2020). The idea of "branchless banking," which is increasingly popular with Deposit Money Banks (DMB) in Nigeria, was created by the use of alternative distribution platforms like mobile and internet banking (Gichungu & Oloko, 2019).

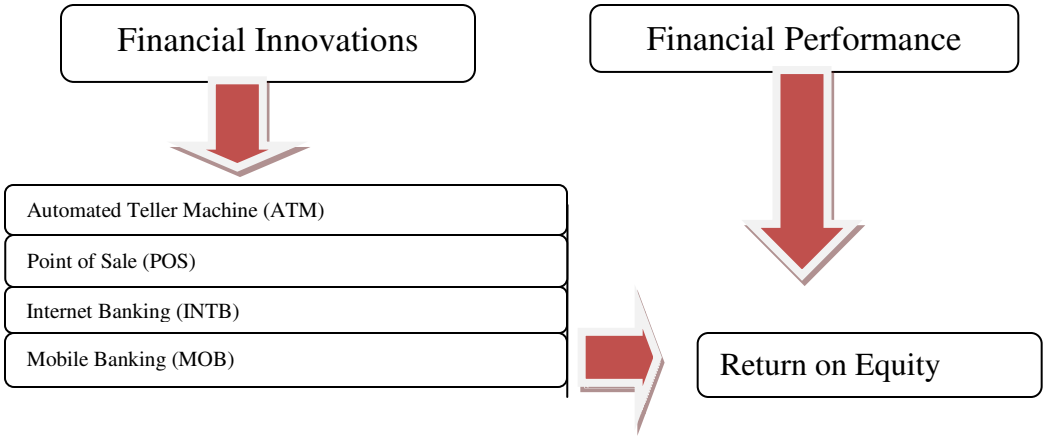


Figure 2.1: Source: Authors Conceptual Model, 2022

a) Automated teller machine (ATMs)

These are tools that let a bank customer withdraw money from his or her deposit using a cash dispenser, immediately deducting the same amount from the user's account (Ojukwu and Sujuyigbe, 2020). This activity occurs on the grounds of the bank or other locations that the bank has specified. Customers are spared time during service delivery and can use that time for other useful activities. (Ojukwu, et al., 2020) claimed that ATMs are cost-effective in producing increased productivity and can be found in shopping malls, supermarkets, gas stations, fast food restaurants, hotels, etc.

According to Steve (2021), ATMs are located not only close to or inside the walls of banks, but also in places like malls, grocery stores, gas stations, airports, and places where a lot of people might congregate. These are examples of on- and off-premise ATM installations. On-site ATMs are often more expensive, multi-functional, and technologically advanced machines that supplement the capabilities of a real bank branch. In some nations, particularly those that benefit from a fully integrated cross-bank ATM network, ATMs perform a variety of tasks that are not directly related to managing one's own bank account. These tasks include paying regular bills, fees, and taxes, as well as paying for services like utilities, phone bills, social security, and legal fees. An account holder is issued a unique identifier and identity as part of the electronic system that allows ATMs to operate, ensuring that they have access to the funds they wish to withdraw. One benefit of an ATM is that it can be installed anywhere other than the bank office, especially in grocery stores, fast-food joints, reputable hotels, and other public places. This allows for the withdrawal of money whenever it is needed for immediate use and allows for recourse to the bank that holds the account (Ugwu, 2020).

b) Electronic Point Of Sales (EPOS)

Electronic point of sales (EPOS) electronic payment system is user friendly simple multi-functional equipment with many possibilities of use. It enables the operators to administer payments by the customer in a simple way and subsequently to record the payments for clear accounting purposes. Evidences from the literature show that 28 billion transactions are made using dial-up POS systems in North America. Also in the United States, there are 10 million payment terminals; over 60% currently dial-up terminals (Sumanjeet, 2019).

c) Internet Banking

The internet is an innovative form of information technology, yet most commercial web sites function as well-defined information systems. Internet banking as a key component of e-finance has gained research attention. Even the most traditional old generation banks that resisted the introduction of automated teller machines (ATM), web banking, mobile telephony, standard computer networks and internet in the past have now introduced all these technologies (Popoola, 2019).

d) **Mobile Banking**

Here, financial transactions are settled via a cell phone. This is essentially a mechanism for transferring money between consumers, with the beneficiary getting their money right away. With the low infrastructure requirements and the nation's fast rising mobile phone penetration, it is extremely well-liked and thrilling to the people. Even while the product is exciting, most customers in Nigeria have not yet fully embraced it. As a result, both the apex bank and other banks still have a lot of work to do to raise the product's awareness among the nation's savers (Siyanbola, 2018).

Deposits money banks' Performance

The term "deposit money bank performance" refers to how well a deposit money bank has performed in its trading activities over an extended period of time (often a year) to achieve its goals. The published financial statements of such banks are among the most significant papers that provide explanations for this. Commercial banks in Nigeria have reported a sustained increase in profit over the decade, though in some years the profit have been increasing in a decreasing rate, positioning the Nigeria banks as the second most profitable banking system in Africa, (Omotunde, Sunday & John-Dewole, 2018).

Joseph (2019) asserts that determining whether a bank has been successful in achieving the goals established by management and stockholders is the best place to start when assessing its performance. Undoubtedly, each bank has a different set of goals. Some companies want to expand more quickly and meet long-term growth goals, while others seem to prefer a quieter existence, reducing risk, and projecting the image of a reliable bank while offering modest benefits to their shareholders (Abaenewe, Ogbulu, & Ndugbu, 2021). Typically, stock prices and their behaviour are thought to reflect a company's performance. This is a market indicator, thus it might not always be accurate. However, more trustworthy performance metrics might be considered to include the bank's size, deposit volume, and profitability. For the purposes of this study, bank performance is evaluated using profitability metrics, namely returns on assets (ROA) (Abaenewe, Ogbulu, & Ndugbu, 2021 and Joseph, 2019).

Financial performance, which measures whether a firm's financial objectives have been met, has long been a topic of interest in managerial study. The multiple arbitrary measures of how well a company can utilise its available resources from its principal method of business to generate profits are referred to as the firm's financial performance. According to Oluyi and Abioye (2020), a company's value is the current price of the projected future cash flows after accounting for chance at the optimal rate of return. According to Eyenubo (2017), referenced in Abaenewe, Ogbulu, & Ndugbu, (2021), the satisfaction comes from achieving pre-established milestones, objectives, and purposes within a precise time frame. Qureshi (2019) proposed four distinct techniques in which the cost of a firm has been identified in company finance literature, as mentioned in Joseph (2019).

The invention diffusion hypothesis, which was applied in this study, was developed by Roger in 1983. This theory explains why people seek to employ technology in a novel way to carry out a conventional task. The key considerations that have an impact on an innovation's acceptability on a general level are its relative advantage, compatibility, complexity, and observability. It is concerned with the process of taking a new technological concept, method, or inventive use of an existing one from conception to application (Kim, 2018). According to the notion of innovation diffusion, technological innovation spreads over time through certain channels among members of a social system. The stages that a technological innovation goes through are knowledge (awareness of its existence and comprehension of its functions), persuasion (the development of a favourable attitude toward it), decision (commitment to adopting it), implementation (putting it to use), and confirmation (reinforcement based on positive outcomes) (Kim, 2018).

The theory is pertinent to the study because it emphasises how technological disruptions that are transmitted through certain channels (POS, ATM, internet, and mobile) have improved the performance of Nigerian banks by ensuring that services are delivered efficiently and effectively throughout time.

Theorem of Disruptive Innovation

A significant innovation theories of the past ten years is undoubtedly the disruptive innovation. The fundamental ideas behind it spread so quickly that by 1998, one year after the theory was published, people were referring to it without mentioning Harvard professor Clayton Christensen or his book The

Innovator's Dilemma (Harvard Business School Press). More precisely, he did a thorough analysis of the disc drive industry, which was the most complicated, technologically discontinuous, and dynamic sector of our economy. Just keep in mind that from 50 kilobytes in 1967 to 1, 7 megabytes in 1973, 12 megabytes in 1981, and 1100 megabytes in 1995, the amount of memory that can be stored on a square inch of disc rose by 35% annually, (Joseph, 2019)

Advances in Technology Acceptance Model (ATAM)

This model relates the individuals' behavioural intentions and his/her ICT use. It is suggested that, the actual behaviour of a person is determined by his behavioural intention to use, which is in turn influenced by user's attitude toward and perceived usefulness of the technology. Adopting the TAM model requires the understanding of end-user's requirements regarding usefulness and user friendliness (Pedersen, Leif, Methlie and Thorbjornsen, 2019). From this model, usefulness and user friendliness affect users' attitudes towards any service. In practice, constraints such as limited ability, time, environmental or organizational limits and unconscious habit will limit the freedom to act.

Branchless Banking Theories

The branchless banking theories originated from Back in 1995, the senior vice president of First Union National Bank (now Wells Fargo) claimed that the banking industry will suffer the same fate as the dinosaur. He thought that firms like IBM, Microsoft, and AT&T would enter the banking industry with their branchless alternatives and outperform the competition (Aburime, 2018). The theories mainly seek to explain how branchless banking has given rise to financial innovation and financial inclusion, explaining how branchless banking is conducted, the branchless banking risks and opportunities, and hence contribute to the study.

This model is believed to be risky as there might not be much room for (or importance given to) customers' due diligence which may lead to significant Anti-Money Laundering and Counter-Terrorism Financing (AML/CFT) risks. This in itself raises significant regulatory challenges (some of which are now being addressed by the Apex Bank through the introduction of the eNaira, and the licensing of PSBs) (Abdulmalik and Lamino, 2021).

The use of Unstructured Supplementary Services Data (USSD), mobile/internet banking, and ATMs may be seen as a modest extension of the conventional branch-based banking under the bank-focused theory. This theory is very significant and relevant to this study as it underscores the importance of banks using technological disruptive innovative channels for efficient performance.

Empirical Reviews

Abdulmalik and Lamino (2021) looked into how Nigeria's deposit money banks (DMBs) performed in relation to financial innovation. An ex-post facto research design was employed in the study. 13 DMBs in Nigeria that are reported on the study's population list are used as the sample size because the study's population is quite small. Data was gathered from company financial statements and the 2019 statistical bulletin from the Central Bank of Nigeria (CBN) (6-12months). The analysis employed descriptive statistics, correlation tests, unit root tests, and regression. Data envelopment analysis (DEA), a non-parametric method, is frequently used to calculate the effectiveness of DMB. After calculating the efficiency ratio, the study employed multiple regressions to examine the data, and the results demonstrated that the performance of DMB in Nigeria in terms of efficiency is positively and significantly impacted by financial innovation (Unstructured Supplementary Service Data-USSD). It is also discovered that the effectiveness of DMB in Nigeria is negatively and negligibly impacted by board size.

The quality, standardisation, and maintenance of equipment must be improved by the banks, switching firms, card companies, etc. In cases of lost or stolen cards, fraud, and other customer complaints regarding e-payments, the banks must enhance service quality and customer responsiveness. The study recommends that government should provide uninterrupted power supply and adequate communication link while shortfall should be covered by banks through back-up arrangement to power standby generator in case of power outage; Government should also support banks in the aspect of financing the payment system which requires a lot of capital to maintain; Government and the CBN should create awareness on the benefits derivable from cashless policy for the improvement of businesses and economic development.

The study recommends that the policy makers should ensure that effective deployment of information technology due to its sophistication since the technology with relative perceived advantage. Policy makers and regulatory authorities should be able to provide security by physically and electronically to check the incidence of hacking by fraudsters .The management deposit money banks should from time to time train customers with regard to electronic banking benefits, its risk exposure, physical and electronic security to avoid financial loss in the hands of fraud stars .The operators should create an enlightenment to their customers on the convenience and importance of adopting mobile banking channel in completing their transactions.
In the specified model for this study, four variables, namely, 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 study revealed that two independent variables namely ATMTV and POSTV individually have positive relationship ROA, while both MBTV and IBTV defied apriori expectations as they individually have negative relationship with ROA. However, a combined test for all the four variables revealed a no significant relationship with ROA. The study therefore, concludes that digital banking channels have no significant effect on the performance of banks in Nigeria in the short run for the period covered by the study. Therefore, the study recommended that monetary authorities and commercial banks should enlighten their customer on the benefits and importance of using mobile and internet banking just as they seem to have embraced the use of point of sale POS and automatic teller machines ATM for their transactions.

For a ten-year period, from 2006 to 2015, Ikpefan, Akpan, Osuma, Evbuomwan, and Ndigwe (2018) assessed the effect that electronic banking tools have on Nigeria's policy towards cashless transactions. The data in this research project were analysed using the ordinary least squares approach. Data for this study was gathered from the Nigerian Interbank Settlement System (NIBSS) website and the Central Bank of Nigeria (CBN) annual report. The main conclusions of this study indicated that there is no discernible effect of electronic banking tools on the amount of money in circulation.

Oyinkola (2018) on the effects of information technology on banking activities at the First Bank of Nigeria PLC using primary data and questionnaires and in-person interviews with bank employees and clients. The statistical method used was a simple frequency %, and Chi-square was used to analyse the hypothesis. The outcome showed that IT had significantly enhanced the development and effectiveness of Nigerian commercial banks and had raised customer satisfaction. The report advises the government to strengthen local IT enterprises to encourage imports, cut tariffs on the importation of IT-related equipment, and equipment upgrades for their agencies and regulatory authorities.

Joseph (2019) looked at how information and communication technologies affected deposit money banks' performance in Nigeria between 2006 and 2015. The log-linear regression model was employed to examine the effects of various ICTs on banks' return on equity (ROE). The computation of the results was carried out using the e-view version 8.0 econometric software programme. The outcome demonstrates how the implementation of various information and communication technologies has significantly impacted the performance and, more specifically, enhanced banks' return on equity.

Model Specifications

The model for this study was adopted from the work of Joseph (2019), titled; Cashless Policy and PDMBs in Nigeria and was modified to suit needed variables. The model which specifies that deposit money bank performance [proxy by Return on Equity (ROE)] is significantly influenced by the technological disruptive innovations channels (Automated Teller Machine (ATM) transactions, Point of Sale (POS) transactions, Internet Banking (INTB) transactions and Mobile Banking (MOB) transactions. is formulated as follows,

ROE = f(ATM, POS, INTB, MOB)

$ROE = \beta_0 + \beta_1 ATM + \beta_2 POS + \beta_3 INTB + \beta_4 MOB + U$

Where:

ROA = Return on Equity; β_0 = Constant Term; β_1 = Coefficient of Automatic Teller Machine Transactions; ATM = Automatic Teller Machine Transactions; β_2 = Coefficient of Point of Sale Transactions; POS = Point of Sale Transactions; β_3 = Coefficient of Internet Banking Transactions; INTB = Internet Banking Transactions; β_4 = Coefficient of Mobile Banking Transactions; MOB = Mobile Banking Transactions; U = Disturbance Term (other variable not mentions in the model); The a priori expectation is β1, β2, β3, β4, > 0

Decision Rule:

Accept the null hypotheses if the p-value is greater than the significance level, Significance level is 5%.

Data Presentation

Table 1: Independent and Dependent Variables

Year	ATM N'Billion	POS N'Billion	INTB N'Billion	MB N'Billion	ROE (%)
2000	5.42	2.1	9.87	1.01	35.2
2001	8.02	5.2	15.3	1.07	55.81
2002	10.25	6.4	16.52	1.09	36.6
2003	22.13	7.33	17.24	1.11	25.52
2004	56.4	7.4	18.04	1.12	27.35
2005	89.32	8.05	19.33	1.18	12.97
2006	90.45	9.15	23.23	1.2	10.6
2007	101.23	9.13	44.3	1.13	23.84
2008	212.1	10.19	34.3	1.25	22.01
2009	548.6	11.03	84.15	1.27	60.07
2010	399.71	12.72	25.05	6.65	57.65
2011	1,561.74	31.02	59.61	18.98	0.27
2012	1,984.66	48.01	31.57	31.51	21.58

2013	2,828.94	161.02	47.32	142.8	18.97
2014	3,679.88	312.07	74.04	346.47	20.03
2015	3,970.25	448.51	91.58	442.35	19.78
2016	4,988.13	759	132.36	756.9	12.56
2017	6,437.59	1,409.81	184.6	1,102.00	17.80
2018	6,480.09	2,383.11	675.92	1,974.25	22.30
2019	6,512.61	3,204.75	478.14	5,080.96	25.80
2020	1,628.15	801.19	119.54	1,270.24	8.12

Source: CBN Publications and NDIC) Annual Reports, 2000-2020

Due the fact that the independent variables are in billions and the dependent variable is in percentage, the data were subjected to natural logarithm in Table 2. below:

Table 2: Log Independent and Dependent Variables

LogATM	LogPOS	LogINTB	LogMB	LogROE
0.733999	0.322219	0.994317	0.004321	1.546543
0.904174	0.716003	1.184691	0.029384	1.746712
1.010724	0.80618	1.21801	0.037426	1.563481
1.344981	0.865104	1.236537	0.045323	1.406881
1.751279	0.869232	1.256237	0.049218	1.436957
1.950949	0.905796	1.286232	0.071882	1.11294
1.956409	0.961421	1.366049	0.079181	1.025306
2.005309	0.960471	1.646404	0.053078	1.377306
2.326541	1.008174	1.535294	0.09691	1.34262
2.739256	1.042576	1.925054	0.103804	1.778658
2.601745	1.104487	1.398808	0.822822	1.760799
3.193609	1.491642	1.775319	1.278296	-0.56864
3.297686	1.681332	1.499275	1.498448	1.334051
3.451624	2.20688	1.675045	2.154728	1.278067
3.565834	2.494252	1.869466	2.539666	1.301681
3.598818	2.651772	1.961801	2.645766	1.296226
3.697938	2.880242	2.121757	2.879039	1.09899
3.808723	3.149161	2.266232	3.042182	1.25042
3.811581	3.377144	2.829895	3.295402	1.348305
3.193609	1.491642	1.775319	1.278296	-0.56864
3.813755	3.505794	2.679555	3.705946	1.41162
3.211694	2.903736	2.077513	3.103886	0.909556

Source: Researcher Excel Computations, 2022.

Table 3: Descriptive Statistics

	LOGROE	LOGATM	LOGPOS	LOGINTB	LOGMB
Mean	1.274213	2.608411	1.709696	1.704928	1.391272
Median	1.342620	2.739256	1.104487	1.646404	0.822822
Maximum	1.778658	3.813755	3.505794	2.829895	3.705946
Minimum	0.568636	0.733999	0.322219	0.994317	0.004321
Std. Dev.	0.480064	1.047317	1.022068	0.494075	1.384808
Skewness	2.744853	0.416975	0.496278	0.730627	0.410958
Kurtosis	2.960592	1.804989	1.710175	2.809193	1.492760
Jarque-Bera	91.17394	1.858082	2.317714	1.900214	2.578904
Probability	0.000000	0.034932	0.013845	0.036700	0.025422
Sum	26.75848	54.77663	35.90362	35.80349	27.53671
Sum Sq. Dev.	4.609225	21.93746	20.89244	4.882203	38.35388
Observations	22	22	22	22	22

Source: EVIEW, 9.0 Outputs, 2022.

Table 3.above is the presentation of the descriptive statistics. The mean value for ROE recorded a mean value of 1.2742 with a standard deviation of 0.4801. Also, Automated Teller Machine (ATM), recorded a mean of 2.6084 and standard deviation of 1.0473, Point of Sale (POS), recorded that a mean of 1.7097 with a standard deviation of 1.0221, Internet Banking (INTB), recorded that a mean of 1.7049 with a standard deviation of 0.4941 and Mobile Banking (MB) recorded an average value of 1.3913 with a standard deviation of 1.3848. Since the standard deviations for all the variables are lesser than respectively means, it shows that the data are 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 are lesser than 3, this shows that ROE, ATM, PO, INTB and MOB have thin tails when compared to the normal distribution.

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.below;

Table 4: Variance Inflation Factors Multicollinearity Test

Variance Inflation Factors

Date: 11/22/22 Time: 14:09

Sample: 2000 2022

Included observations: 22

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	0.389769	33.94287	NA
LOGATM	0.054263	37.08771	4.936432
LOGPOS	0.864456	294.9456	7.895244
LOGINTB	0.440359	120.3861	8.915479
LOGMB	0.314960	97.25499	5.094101

Source: EVIEW, 9.0 Outputs, 2022.

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 are valid, the variance inflation factor (VIF) computed in Table 4. Furthermore, the Centered Variance Inflation Factor (CVIF) statistics for all the explainatory variables consistently lies between 4.9364, 7.8952, 8.9155 and 5.0941 for ATM, PO, INTB and MOB 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.

Data Validity Test

Since the data are time series data, spanning for 2000-2020(21years), 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 4.5.1 below;

Table 5: Data Validity Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	1.528691	Prob. F(2,14)	0.2509
Obs*R-squared	3.764061	Prob. Chi-Square(2)	0.1523

Source: E-VIEW, 9.0 Outputs, 2022.

Prior to estimating the models, residuals of the variables were ascertained to check for the presence of serial correlation. This was done using the serial correlation LM test. The serial correlation LM test in Table 5 details that there is no element of serial correlation in the models owing to the fact that the p-values of the f-statistics are insignificant at 5% level of significance.

Table 6 Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	33.36858	Prob. F(4,16)	0.7373
Obs*R-squared	29.53950	Prob. Chi-Square(4)	0.8497
Scaled explained SS	28.54540	Prob. Chi-Square(4)	0.6310

Source: E-VIEW, 9.0 Outputs, 2022.

To ensure that there is homoscedasticity in the model estimation, the heteroskedasticity test via the Breusch-Pagan-Godfrey was performed. With the result there is no problem of heteroskedasticity in the models as the p-values of the f-statistics are insignificant at 5% significance level.

Table 7: Ramsey RESET Test

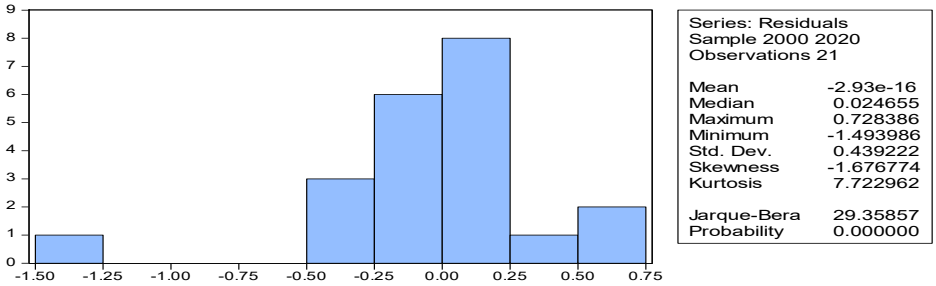
Equation: UNTITLED
Specification: LOGROE C LOGATM LOGPOS LOGINTB LOGMB
Omitted Variables: Squares of fitted values

	Value	df	Probability
t-statistic	1.399614	15	0.1820
F-statistic	1.958918	(1, 15)	0.1820
Likelihood ratio	2.577616	1	0.1084

Source: E-VIEW, 9.0 Outputs, 2022

From the Table 7 above, it confirms that the Durbin Watson stat that our data has no traits of autocorrelation.

Table 8: Normality Histogram Test



Source: E-VIEW 9.0 Output, 2022.

The test of residuals for normality was conducted to assess the distribution normality of the model residuals. When residuals are not normally distributed, it denotes the presence of significant outliers in the data which affects the standard errors and then the significance levels of the coefficients. From the test result, it indicates that the residuals are normally distributed as the histogram assumes a bell-shape and the probability value (0.0000000) of the J-B statistic tends towards zero (0) or having a small probability value, this form the premise to reject the null hypotheses that the residuals are not normally distributed.

Augmented Dickey-Fuller (ADF) Unit Root Test

Testing for the existence of unit roots is a principal concern in the study of time series models and co-integration. The rationale behind this test is to avoid the problem of spurious regression which is commonly associated with time series data. The unit root test was conducted using the ADF Unit root test as presented in table 9 below:

Table 9: Augmented Dickey-Fuller Unit root Test

Test Variables	ADF Test Statistic Value	Mackinnon Critical Value @ 5%	Order of Integration	P-Value	Decision
ROE	-5.078997	-3.040391	1(1)	0.0008	**Stationary**
ATM	-3.839179	-3.029970	1(1)	0.0416	**Stationary**
POS	-3.598352	-3.029970	1(1)	0.0440	**Stationary**
INTB	-5.503870	-3.029970	1(1)	0.0003	**Stationary**
MB	-3.509324	-3.029970	1(1)	0.0289	**Stationary**

Source: E-VIEW, 9.0 Outputs, 2022.

The summary of the ADF unit root test output in table 9, above revealed that all the variables under investigation i.e. ROE, ATM, PO, INTB and MOB contain unit root test at their first difference 1(1). Evidence of this could be seen from the value of their respective ADF statistics which is more than the critical value at 5%. Moreover, additional evidence of stationary series could also be seen from the p-value for all variables which is less than 5% level of significance greater than 95% confidence level. They

all attained stationarity at first difference i.e. at order one. Since the variables are all integrated at order one, we may proceed with Johansen cointegration test.

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 10: Summary of Johansen Cointegration Test Output

Date: 11/22/22 Time: 14:30
Sample (adjusted): 2002 2020
Included observations: 19 after adjustments
Trend assumption: Linear deterministic trend
Series: LOGROE LOGATM LOGPOS LOGINTB LOGMB

Hypothesized No. of CE(s)	Eigenvalue	**Trace** Statistic	**0.05 Critical Value**	Prob.**	**Max-Eigen** Statistic	**0.05 Critical Value**	**Prob.****
None *	0.956060	123.5776	69.81889	0.0000	59.37385	33.87687	0.0000
At most 1 *	0.832813	64.20372	47.85613	0.0007	33.98417	27.58434	0.0066
At most 2 *	0.519489	30.21955	29.79707	0.0447	23.92519	21.13162	0.0112
At most 3	0.413783	16.29437	15.49471	0.0378	16.14723	14.26460	0.0024
At most 4	0.276412	6.147136	3.841466	0.0132	6.147136	3.841466	0.0132

Researcher's Computation Based E-views 9.0 Output, 2022.

Trace test indicates 4 cointegratingeqn(s) at the 0.05 level
* denotes rejection of the hypothesis at the 0.05 level

Table 10 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 performance of deposit money banks.

Table 11: Correlation Matrix

	LOGROE	LOGATM	LOGPOS	LOGINTB	LOGMB
LOGROE	1.000000				
LOGATM	0.298927	1.000000			
LOGPOS	0.168955	0.885573	1.000000		
LOGINTB	-0.159362	0.845507	0.912993	1.000000	
LOGMB	-0.196423	0.874797	0.985641	0.863255	1.000000

Source: EVIEW, 9.0 Outputs, 2022.

The correlation test in Table 11 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; ATM and POS has positive strong correlation with ROE of DMBs while INTB and MB has negative strong correlation with ROE of DMBs.

Table 12: Multiple Regression Analysis

Dependent Variable: LOGROE
Method: Least Squares
Date: 11/22/22 Time: 14:07
Sample: 2000 2022
Included observations: 22

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.461835	0.624315	2.341503	0.0325
LOGATM	0.300682	0.132945	2.261702	0.0441
LOGPOS	0.809235	0.329761	2.454005	0.0370
LOGINTB	-0.143346	0.663596	-0.216015	0.8317
LOGMB	-0.413697	0.561213	-0.737148	0.4717
R-squared	0.862914	Mean dependent var		1.274213
Adjusted R-squared	0.746358	S.D. dependent var		0.480064
S.E. of regression	0.491065	Akaike info criterion		1.619777
Sum squared resid	3.858318	Schwarz criterion		1.868472
Log likelihood	12.00765	Hannan-Quinn criter.		1.673750
F-statistic	20.78481	Durbin-Watson stat		2.429205
Prob(F-statistic)	0.005282			

Source: EVIEW, 9.0 Outputs, 2022.

The multiple regression results in Table 12 above, the coefficient of Automated Teller Machine (ATM) is 0.3007 with a t-value of 2.2617 and an associated p-value (sig. value) is 0.0441. This suggests that ATM have an affirmative and considerable effect on ROE. This relationship is significant as the p-value of 0.0441 is lesser than 0.05 (5%) level significance. The coefficient of ATM is 0.3007, meaning ATM has an affirmative trend with ROE. One percent (1%) movement in ATM would lead to 30.07% increase in ROE of DMBs. This finding is in tandem with the findings of Muotolu and Nwadialor (2019). Also, the multiple regression results in Table 12 above, the coefficient of Point of Sale (POS) are 0.8092 with a t-value of 2.4540 and an associated p-value (sig. value) is 0.0370. This suggests that POS has an affirmative and considerable effect on ROE. This relationship is significant as p-value of 0.0370 is lesser than 0.05 (5%) level significance. The coefficient of POS is 0.8092 meanig POS has a positive trend with ROE. One percent (1%) movement in Point of Sale (POS) would lead to 80.92% increases in ROE of DMBs. The finding is in agreement with the findings of Obiekwe and Anyanwaokoro (2017).

More also, the multiple regression results in Table 12 above, the coefficient of INTB is -0.1433 with a t-value of -0.2160 and an associated p-value (sig. value) is 0.8317. This suggests that INTB have a negative insignificant effect on ROE. This relationship is not significant as p-value of 0.8317 is greater than 0.05 (5%) level significance. The coefficient of INTB is -0.1433, meaning that INTB has a negative trend with ROE. One percent (1%) movement in INTB would lead to 14.33% decrease in ROE of DMBs in Nigeria. The finding is in agreement to the findings of Muotolu and Nwadialor (2019) contrary to the findings of Morufu (2017).

Finally, the multiple regression result of the coefficient of MB is -0.4137 with a t-value of -0.7372 and an associated p-value (sig. value) is 0.4717. This suggests that MB have a negative insignificant effect on ROE. This relationship is not significant given the fact that the p-value of 0.4717 is greater than 0.05

(5%) level significance. The coefficient of MB is -0.4137 which imply that MB has a negative trend with ROE. One percent (1%) movement in MB would lead to 41.37% decrease in ROE of DMBs in Nigeria. This finding is in tandem with the findings of Muotolu and Nwadialor (2019).

Conclusion

The study examined FIs on PDMBs of FIs, namely; ATM, POS, INTB and MOB and how they effects PDMBs {proxy with Return on Equity (ROE)}. The data set was described using descriptive statistics and the unit root test was conducted to ascertain if the data are stationary in order to have accurate regression result. The finding revealed that Automated Teller Machine (ATM) and Point of Sale (POS) has positive significant effect on ROE of DMBs while Internet Banking (INTB) and Mobile Banking (MB) has negative insignificant effect on ROE of DMBs.

Recommendations

(a) Therefore, it is advised to invest in disruptive financial innovations, which have been shown to improve the finances of Nigerian deposit money institutions. In order to effectively use financial disruptive innovations, banks should focus on services like Points of Sales (POS), Mobile Banking (MB), Automated Teller Machines (ATM), and Internet Banking (INTB).

(b) The banks should launch an active marketing and client reorientation to educate the public about the benefits of using the facilities, particularly in the areas of POS, mobile banking, and other services.

(c) The report also suggested that the government emphasise the need for further regulations that will increase the usage of ATMs, POS terminals, mobile banking applications, and INTBs, resulting in a long-term equilibrium relationship with deposit money bank performance.

References

1. *Abaenewe, Z. C., Ogbulu, O.M. & Ndugbu, M.O. (2021). Electronic banking and bank performance in Nigeria. West African Journal of Industrial & Academic Research, 6(1), 76-89.*
2. *Abdulmalik, M. & Lamino, A. H. (2021). Effect of financial innovation on performance of deposit money banks in Nigeria. Nile Journal of Business and Economics, 19, 71-87.*
3. *Aburime, C.O. (2018) An empirical investigation of the level of users' acceptance of e-banking in Nigeria. Journal of Internet Banking and Commerce, 15(1), 75-82.*
4. *Akani E.H. (2020) Determinants of mobile banking adoption in the Ghanaian banking industry. A case study of Access Bank Ltd. J. Comp. Comm. 3, 1-19.*
5. *Davis F. D. (2019). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly. 13, 319-340.*
6. *Eyenubo E. A. (2017). Banking consolidation, credit crisis and asset quality in a fragile banking system: Some evidence from Nigerian data, Journal of Financial Regulation and Compliance, 19(1), 33–44.*
7. *Gichungu Z. N. & Oloko M. A. (2019). Relationship between bank innovations and financial performance of commercial banks in Kenya. International Journal of Education and Research, 3(5), 443-456.*
8. *Ikpefan, O. A., Akpan, E., Osuma, O. G., Evbuomwan, G. & Ndigwe, C. (2018). Electronic Banking and Cashless Policy in Nigeria, International Journal of Civil Engineering and Technology (IJCIET), 9(10), 718–731.*
9. *Joseph G.B. (2019). Effect of Financial Innovations on Financial Sustainability of Microfinance Institutions in Eldoret Town, Kenya. Journal of Economics and Finance, 10(5), 80-89.*

10. *Kero, O.T. (2018). Impacts of Financial Innovations on Financial Performance Evidence of Electronic Banking in Africa. International Journal of Scientific Engineering and Science, 3(7), 56-60.*
11. *Kim P.G. (2018) Relationship between financial innovation and commercial banks performance in Kenya. International Journal of Social Sciences and Information Technology, 2(4), 34-47.*
12. *Motsatsi Z.I. (2019) Banks' risk taking, financial innovation and macroeconomic risk. The Quarterly Review of Economics and Finance, 5(3), 112-124.*
13. *Muotolu, P. C. & Nwadialor, E. O. (2019). Cashless Policy and Financial Performance of Deposit Money Banks in Nigeria. International Journal of Trend in Scientific Research and Development, 3(4), 465-476.*
14. *Nkem P.O. and Akujinwa D.Y. (2020). Impact of Information and Communication Technology on the Performance of Deposit Money Banks in Nigeria. International Journal of Management and Sustainability, 7(4), 225-239*
15. *Nwako, C.,Chukwu, O.K. & Okoh, E. O. (2020). Effect of Cashless Policy on Deposit Money Banks Profitability in Nigeria. Asian Journal of Economics, Business and Accounting, 19(4), 48-63.*
16. *Noyer, C. (2019). Financial Innovation, Monetary Policy and Financial Stability. Spring Conference, Banque de France, 18(2), 105-126.*
17. *Ojukwu R. M. & Sujuyigbe A. S. (2020). The impact of electronic banking on human resources performance in the Nigerian banking industry. International Journal of Eecomomic Research, 3(2):61-69.*
18. *Oluyi, A. I. & Abioye, A. L. (2020). A comparative study of electronic banking service delivery in First Bank of Nigeria Plc and Guaranty Trust Bank Plc. International Journal of Media, Journalism and Mass Communications (IJMJMC), 6(3), 21-39.*
19. *Omotunde, M., Sunday, T. & John-Dewole, A. T. (2018). Impact of cashless economy in Nigeria. Greener Journal of Internet, Information and Communication Systems, 1(2), 40-43.*
20. *Oyinkola, S. (2018). The impact of information technology on banking operations in First Bank of Nigeria PLC. Available from www.researchclue.com.*
21. *Pedersen, T., Leif G.G., Methlie R.N and Thorbjornsen S.D. (2019). Dealing with mobility: Understanding access anytime, anywhere. ACM Transactions on Computer-Human Interaction, 8(4), 323-347.*
22. *Popoola, S. O. (2019). Management Perceptions of Internet - based Banking Services in Nigerian Commercial Banks; African Research & Documentation*
23. *Qureshi I.J. (2019). The impact of electronic banking on the profitability of banks: A case study of banks in Ghana. Texila International Journal of Management, 4(2), 75-87.*
24. *Steve R.N. (2021). The Fintech opportunity. Wharton School of the University of Pennsylvania Pension Research Council WP 2018-21.*
25. *Sivanbola F.O. (2018). Exploring the digitalization impact on consumer decision making in retail banking. Electronic Markets, 28(3), 265–286.*
26. *Ugwu T.Y. (2020) Appraisal of cashless policy on the Nigerian financial system. West African Journal of Industrial & Academic Research, 16(1), 78-92.*