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Impact of Electronic Banking on Deposit Money Banks Performance in Nigeria: Evidence from Dynamic Ordinary Least Squares Technique

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The importance of electronic banking and its performance can never be overemphasized and technology industries made it effective and efficient in carrying out transactions on a daily basis. On this note, the paper investigated the empirical effect of electronic banking on bank performance in Nigeria from 2009Q1 to 2023Q1. The paper adopted Dynamic Ordinary Least Squares (DOLS) technique and the variables include the dependent variable, return on assets (ROA) while the independent variables include point of sales (POS) and cheque (CHQS). The coefficient of the total number of point of sales transactions (POS) coefficient is directly related to electronic banking on bank performance long-run in Nigeria. The result reveals that there is a statistical and positive effect of electronic banking on bank performance on the return of assets (ROA) in Nigeria. On the other hand, the coefficient of total transactions carried out on the cheques (CHQS) is positively

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related to electronic banking on bank performance captured by return on assets (ROA). It means a rise in total transactions carried out on the cheques exerts a positive impact on e-banking on bank performance in Nigeria. The paper recommended that government or financial institutions should deploy the right technology that would model the digital global market and banking sector and that banks should encourage the consumers‟ of electronic ways of banking. On the aspect of cheques, therefore, there is a need to develop effective strategies for customers to shift from traditional to electronic banking and discourage the use of cheques.

Keywords: Electronic banking; bank performance; return on assets; DOLS.

JEL Classification: C20, E58, G12, G21.

1. INTRODUCTION

Globally, electronic banking has witnessed tremendous expansion and development in recent years, due to information and communication technology engagement. This has transformed the banking sector in terms of e-business, e-commerce industries, and financial institutions has taken the world in the competitive business strategy and rapid economic growth and development (Salehi and Alipour, 2014) [1].

The revolutionary banking recapitalization in Nigeria since its inception is reported to have exponentially embraced the use of information and communication technologies in the provision of banking services which has enhanced the application of e-payments. The application of information and communication technology concepts, techniques, policies, and implementation strategies to banking services has become a subject of fundamental importance and concern to all banks and indeed a prerequisite for local and global competitiveness banking. The advancement in technology has played an important role in improving service delivery standards in the banking industry. In its simplest form, point of sales (POSs), cheques, automated teller machines (ATMs), and deposit machines now allow customers to carry out banking transactions beyond banking hours. Thus, Nigerian banks today are seriously into new electronic delivery channels for banking products and services with a view to delivering better services and satisfying customers the more. Banks that cannot offer these services are increasingly losing their customers.

This financial revolution comes with different challenges in regard to risk. The volume of transactions in the banking sector has increased tremendously as also the level of fraudulent practices experienced by the financial institutions in Nigeria. The products and services that have been rendered by these 29 commercial banks in Nigeria, is as a result of information technology adoption in the economy. The customers depositing, withdrawing, transferring, or cheques clearing of cash is easier and faster [1].

This paper reviewed some recent literature on the subject matter such as [1-9], among others. The methodologies, scope, countries, variables, and findings of their papers differ and also mix. Then, Gbanador, [2] and Madugba, et al., [7] found that e-banking influences the performance of deposit money banks in Nigeria. However, Frank, and Binaebi [10], also concluded that the implementation of electronic payment system in banks have had a mixed effect on the performance of banks. On this note, this paper investigates the impact of electronic banking on bank performance in Nigeria. To the best of our knowledge, none of the studies used Dynamic Ordinary Least Squares (DOLS) and the specific objectives of this paper are: Analyse the effect of point-of-sale (POS) usage on the value of deposit money banks in Nigeria and assess the effect of cheque on the performance of deposit money banks in Nigeria.

2. LITERATURE REVIEW

2.1 Conceptual Review

2.1.1 Concept of electronic banking

The revolution of information technology has influenced almost every sphere of life; notable is the banking sector. The introduction of electronic banking has changed and redefined the ways banks were operating. Similarly, with the emergence of the global economy, e-business has increasingly become a necessary component of business strategy and a strong catalyst for economic growth and development, as technology is now considered the major contributor to organizations' success and their

core competencies [6]. Subsequently, the electronic banking system has become an important practice among commercial banks in Nigeria, owing to the fact that the introduction of this banking system has improved banking efficiency in rendering services to customers. Thus, banks (domestic or foreign) are investing more in providing customers with new technologies through e-banking. Electronic banking can be described as using the internet as a delivery mode for the provision of services like opening a deposit account, electronic bill payment, online transfers, online withdrawals, and in fact, any other online banking transaction. Electronic banking has also been defined as the medium of using electronic devices, like wireless connections, internet, point of sale (POS), networks, automated teller machines (ATM), phones, and cell phones in banking services [11]. Electronic banking is the conduct of banking business electronically which involves the use of information communication technology to drive banking business for immediate and future goals.

2.1.2 Cheques clearing (CHQ)

CBN [12] a cheque is an instrument payable on demand and drawn on or payable through or at an office of a bank, whether or not negotiable, that is handled for forward collection or return. Hence there are two types of cheques that exist in terms of size: the small cheque which comprises personal cheques and the large cheque which comprises managers' cheques, bank drafts, corporate cheques, interest warrants, dividend warrants, debit notes, and direct debit. More so, cheques are part of electronic banking instruments in Nigeria.

According to Allen et al. [46], that the number of cheques cleared would be used as a variable; especially since Nigeria is classified as a developing nation, therefore, paper-based cheque clearing is still widely used. The paper-based clearing is expected to increase transaction costs; hence a negative sign is expected.

The clearing is a system whereby bankers exchange the financial instruments drawn on each other through the use of a clearing house [13]. It is also the process of establishing the amount each person/each bank owes in the clearing house. Nnanna and Ajayi [14] stated that clearing is the exchange of payment-related information between system participants and any regulations under which payments are settled on a bilateral or multilateral basis. In addition, clearing is the process by which banks meet on banking days at specified hours to exchange payment instruments, particularly bank drafts, and cheques. Apart from the aforementioned financial instruments, other instruments that are approved for clearing are the manager's cheque, corporate cheque, dividend warrant, and interest warrant, among others. These instruments are also called negotiable instruments because they are used to secure the payment of money through endorsement and delivery which guarantees complete ownership and transfer of legal title from one party to another.

2.1.3 Point-of-Sales (POS)

The Point of Sales (POS) system is usually a computer device that is linked to a barcode scanner and printer device, where on the computer has been installed special software for POS. Examples such as transaction cashiers or payment points in mini markets, supermarkets, hotels, restaurants, and much more [15]. POS systems can be made to stand alone (not connected to other POS systems) and can be designed to connect to other POS systems as required, over the Internet as well as on local networks. The traditional POS (TPOS) is not easy to be moved, which means more difficult to apply for movable merchants [16]. A point-of-sale (POS) terminal is a computerized replacement for a cash register. Much more complex than the cash registers of even just a few years ago, the POS system can include the ability to record and track customer orders, process credit, and debit cards, connect to other systems in a network, and manage inventory. Generally, a POS terminal has at its core a personal computer, which is provided with application-specific programs and I/O devices for the environment in which it will serve. A POS system for a restaurant, for example, is likely to have all menu items stored in a database that can be queried for information in a number of ways. POS terminals are used in most industries that have a point of sale such as a service desk, including restaurants, lodging, entertainment, and museums.wikipidia.org (2017). Okuma, Nwoko, and Obialor, [17] in their paper on the causal relationship between technologies of cashless policy and agricultural sector output in Nigeria found that POS as a variable of cashless policy impacted significantly on agricultural sector output.

2.1.4 Concept of performance of deposit money banks

On the performance of deposit money banks, Rose and Hudgins [18] described the performance as 'how adequate a financial firm meets the needs of its stockholders (owners), employees, depositors, and other creditors and borrowing customers'. Succinctly, deposit money banks should endeavour to adhere strictly to the postulations of regulatory authorities, at least to be at peace with their operating policies, loans, and investment. These will in the long run earn the trust and confidence of the public they serve. Performance of Deposit Banking Traditionally, performance in deposit money banking has been measured through costs, time, and quality, which highlight production orientation in banking [19]. The bank's performance is represented in three alternative variables such as return on asset (ROA), return on equity (ROE) and return on investment (ROI). This paper used the dependent variable return on asset (ROA).

2.1.5 Return on Asset (ROA)

Return on asset (ROA) is the profitability ratio that shows the ability of bank assets to produce a profit. This paper, consequently, measures banks' performance using return on assets (ROA) which is consistent with that of Abaenewe et al., [11]. Emekekwue [20] sees the return on assets (ROA) as a ratio that seeks to measure the amount of profit made from the entire assets of the firm. It is expressed as Profit before tax /Total Assets. Ekwe and Duru [21] opine that return on assets (ROA) was used as a dependent variable because it is an indicator of managerial efficacy. Return on assets (ROA) is a and dependent variable. It is the quotient of dividing profit after tax by total assets (Lazaridis & Trynidis, 2006; Falope Ajilore, [22], Singh & Pandy, [23]; & Karaduman et al., 2011; agree that the formula for return on Assets (ROA) is express as Profit before tax /Total Assets.

2.2 Theoretical Review

This section of the paper provides an overview of the theoretical underpinning of financial and information system adoption, factors determining customers' acceptance of e-banking, and presents the theory of customer loyalty. They are the Financial Intermediation theory, Technology Acceptance Theory, and Theory of Planned Behaviour (TPB) and among others.

2.2.1 The financial intermediation theory

According to Matthews and Thompson [24], financial intermediation is a process where the surplus units in the economy, deposit their excess funds with the financial institutions, which in turn lend to the deficit units of the economy. The financial intermediation theory is, thus, based on information asymmetry, agency theory, and cost of transaction. Financial intermediation affects the economy as a whole and brings to the fore the effect of government policies on the economy. However, the presence of information asymmetry between the lender and the borrower makes the bank intermediate even when the bank has to face the issue of moral hazard and adverse selection.

A financial intermediary is a step towards financial inclusion because the vulnerable groups are the deficit units that take advantage of financial services. The theory states five roles of financial intermediation, which are the acquisition of information on borrowers, provision of risk reduction agreement, improved corporate governance, accumulating capital, and ease of the transaction process [25]. Scholars such as Demirguc-Kurt & Klapper [26]; Beck et al. [27]; and Kendall et al. (2010) have all advocated for more financial intermediation activities, especially in the rural areas where the poor lives. Financial intermediation can be done through the opening of bank branches, which paves the way for varieties of financial services to be offered to households and firms in accordance with their needs and status [28]. This is in line with the positions of Chandan and Mishra (2010). However, financial intermediation faces the problem of information asymmetry during the intermediation process [29].

A major drawback of this theory is that it ignores the moderating role of the financial system, which guides contract enforcement and information sharing, which can reduce transaction costs in the intermediation process [30]. They also found a significant positive relationship between financial inclusion and financial intermediation; though in some developing countries, the unbanked poor population is hardly reached by financial institutions due to a lack of collaterals thereby discouraging financial inclusion. Financial intermediation thrives because of market imperfections as the deficit and surplus units lack the basic information (information asymmetry) to deal with intermediation. The financial institution

acts in the interest of both parties by screening investors on behalf of savers and providing funds for prospective investors due to the fact that these institutions have a comparative information advantage on the deficit and surplus units which justifies the transaction cost usually imposed.

2.2.2 Technology acceptance theory

In 1989, Davis, Bagozzi, and Warshaw propounded this Technology Acceptance theory (TAT), to explain the conceptual model that users' intention or acceptance degree towards information systems or new technology. TAT is constructed on the foundations of perceived usefulness and perceived ease of use. It was referring to individual belief to improve the degree of job performance through using particular new technology and information system. Perceived ease of use indicates how easily an individual learns how to operate or use new technology or information system. The model places more emphasis on how perceived ease of use would positively affect perceived usefulness. Exogenous variables such as environment are also the antecedent that induces perceived usefulness and perceived ease of use. Thus, TAT is based on both important perceptive factors as perceived usefulness and perceived ease of use. TAT is widely applied in the research of information technology. Liu and Arnett [31] studied the significant variables to build a successful website based on the TAT theory. The result revealed that TAT does not only apply to observe new information technology accept intention or behaviour, but also ensures that TAT is suitable for the explanation of online user behaviour issues [32].

2.2.3 The planned behaviour theory

In 1988, Ajzen also advocated this principle. It was subjected to a debate that individual behaviour is anchored by the behaviour intention. This can be linked to 3 factors such as individual's attitude towards behaviour, subjective norms, and perceived behavioural control. Therefore, behavioural intention is influenced by perceived behavioural control, attitude, and subjective norms. Actual behaviour is in turn, determined by behavioural intention. Among all, perceived behavioural control refers to individual's perceived ease or difficulty in performing the particular behaviours [33]. Globally, the use of the internet has been widespread and has been more diversified. Studies on planned behaviour theory (PBT) applying to electronic commerce have increased both in advanced and developing economies.

2.3 Empirical Review

Gbanador [2] ascertained the influence of electronic-banking systems on the performance of deposit money banks in Nigeria between 2019 and 2021. Error Correction Model and the Fully Modified Least Squares Model were employed, and the variables are automated teller machine, point of sale, deposit money bank, total assets, and mobile banking. The result revealed that, in the short run, e-banking systems had no significant impact on the performance of DMBs in Nigeria while the long run indicated that POS and ATM positively and insignificantly influence the performance of DMBs in Nigeria. Hence, mobile banking has a positive and significant impact on DMBs' performance. Thus, the paper concluded that e-banking influences the performance of DMBs in Nigeria. The paper recommended that customers of Deposit money banks should be informed about the benefits that come with using point of sale, automated teller machines and other electronic-payment channels.

Using the Multivariate Panel Estimation and Dynamic Panel Data Regression Model, between 2009 and 2018, Omoruyi, and Benecdita [3] assessed the effect of electronic banking on the financial performance of deposit money banks in Nigeria. Return on equity, mobile payment, point of sale, and automated teller machine were employed as the variables. The results obtained from the generalized method of moments (GMM) estimate reveal that the total value of automated teller machine (ATM) transaction positively and significantly impact the financial performance of deposit money banks (DMBs) while the total value of point of sale (POS) transactions exert a negative influence on deposit money banks (DMBs) financial performance. Similarly, the relationship between total value of mobile payment transactions and financial performance was also negative but fail the significant test. It was concluded that the total value of ATM transactions has a significant and positive impact on deposit money banks financial performance and the total value of POS transactions has a negative impact on the financial performance of deposit money banks in Nigeria. The paper recommended that the number of automated teller machines should be increased so as reduce the queue at ATM stands and encourage constant usage.

Okonkwo and Ekwueme [4] studied the effect of electronic payment on the financial performance of deposit money banks in Nigeria between 2009 and 2019. Firm size, automated teller machine, point of sale, and return on assets was used to measure electronic payment and deposit money banks. The paper employed the use of Ordinary Least Squares Technique. The result revealed that automated teller machine (ATM) payment has a positive effect on return on assets of quoted deposit money banks in Nigeria, while point of sale (POS) payment has a negative effect on return on assets of quoted deposit money banks in Nigeria. It was recommended that banks should educate the public through seminars and media campaigns about the use of automated teller machines.

Kimere [5] examined the effect of electronic-banking on the financial performance of microfinance institutions in Kenya between 2017 and 2021. The paper employed Descriptive Correlation Method and Regression Analysis Model. Return on assets, automated teller machine, internet banking, mobile banking, capital adequacy, credit risk, micro-finance institution size, and liquidity risk were used as the variables. The result indicated that mobile banking has a positive and significant effect on return on assets of MFIs. Then ATMs and internet banking exhibited a positive but not significant influence ROA. However, liquidity and credits risks has a negative on return on assets of MFIs. The paper recommended that a comfortable environment should be created for micro-finance institutions by policy makers so as to tackle mobile banking as it improves their financial performance.

Between 2013 and 2017, Nwankwo and Agbo [6] investigated the effect of electronic banking on the performance of commercial banks in Nigeria between 2013 and 2017, using Ordinary Least Squares (OLS) method. The variables adopted were mobile banking, automated Teller Machine, inflation rate, point of sale, profit after tax, and exchange rate. The empirical result showed that automated teller machine transactions have a positive and significant effect on the performance of commercial banks in Nigeria while both point-of-sale terminal and mobile banking transactions respectively has negative and weak effects on the performance of the commercial banks in Nigeria. The paper concludes that through electronic banking, banking transactions has been made easier by bring the services closer to its customers thereby improving the performance of the banking industry. Then, recommended that banks management should embrace innovations in their transactions that would shore up their profitability.

Madugba, Egbide, Jossy, Agburuga, and Chibunna [7] evaluated the impact of electronic banking on the financial performance of Nigerian deposit banks between 2005 and 2019. The paper employed the Ordinary Least Squares (OLS) method and the variables used are return on assets, earnings per share, point of sale, web banking, automated teller machine, and national electronic fund transfer. The result revealed the automated teller machine (ATM) has a positive and significant association with return on assets (ROA) and earnings per share (EPS); point of sale (POS) and National electronic fund transfer (NEFT) significantly affect the return on assets (ROA) only, while web banking (WEB) has an insignificant impact on both earnings per share and return on assets. It was concluded that electronic banking has a significant impact on financial performance of deposit money banks in Nigeria. Therefore, it recommended that customers should be more informed about web banking (WEB), point of sale, and national electronic fund transfer. Also, the amount of Automated teller machine withdrawals should be increased so as to enhance bank performance.

Nwakoby, Okoye, Ezejiofor, Anukwu, and Ihediwa [8] explored the link between electronic banking and the profitability of Nigerian deposit money banks in Nigeria between 2009 and 2018. Regression Analysis Model of OLS was employed while automated teller machine, firm size, point of sale, return on equity, and mobile banking Payment (MPAY) was used as the variables in this paper. The empirical result showed that automated teller machine (ATM) payment has negative effect on return on equity of deposit money banks in Nigeria and point of sales (POS) payment method effect on return on equity of deposit money banks. Then, mobile banking Payment has positive effect on return on equity of deposit money banks in Nigeria. It was concluded that electronic banking service provides satisfaction to customers, save cost, and cause banks through the use of internet banking to develop interest in increasing their market. The paper recommended that Nigerian Banks should create more awareness about automated teller machine usage and point of sale usage as this would help in boosting banks profitability impact in Nigeria and also reduced criminal activities.

Prabodhi and Buddhika [9] looked into the impact of electronic banks on operational performance of commercial banks in Sri Lanka between 2014 and 2019. Cost to income ratio, return on assets, return on equity, branch network, internet banking, and automated teller machine were adopted as the variables. Pearson Correlation Method was employed, and the result indicated that the fixed effect model has a significant positive relationship among internet banking on return on assets, negative significant with return on asset and branch Network, automated teller machine. Likewise, the insignificant relationship between return on equity and internet banking, Internet banking and CIT (cost to income ration) has negative significant, and other variables are a significant relationship with CIT. It was concluded that electronic banking has a significant impact on banks operational performance in Sri Lanka. The paper recommended that commercial banks should invest heavily in technology.

Oniore and Okoli [1] investigated the impact of electronic banking on the performance of money deposit banks in Nigeria between 2006 and 2017. The Ordinary Least Squares technique were employed, and the variables used returned on assets, point of sale, inter-bank transfer, and automated teller machine. The findings showed that electronic banking has moderate positive impacts on banks performance in Nigeria. It was concluded that e-banking has gradual positive impacts on performance of banks in Nigeria and hence could contribute to the process of output growth. The paper recommended that banks should use the right technology so that they can reach their goals and objectives and not adopt internet banking technology because other banks adopted it.

Using the Ordinary Least Squares Regression Technique, between 2009 and 2019, Frank and Binaebi [10] investigated the effect of electronic payment systems on the performance of commercial banks in Nigeria. Internet banking, point of sale, mobile banking, and automated teller machine was used as the variables. The results indicated that mobile banking, automated teller machine and internet banking has a positive impact on banks performance and point-of-sale machines has a negative impact on the performance of banks. It is concluded that implementation of electronic payment system in banks have had a mixed effect on the performance of banks. Therefore, while internet banking, ATM, and mobile banking leads to improvements in the performance of banks, same cannot be said for point of sales machines which has a negative effect on bank performance. It recommended that government should intervene in the aspect of internet infrastructure in order to capture remote areas and promote financial inclusion through e-banking.

Muotolu and Nwadialor [34] examined the effect of Central Bank of Nigeria cashless policy and financial performance of deposit money banks between 2012 and 2017. The study used the Linear Regression Model and the variables used are return on assets, national electronic funds transfer, point of sale, automated teller machine, Internet Banking, and NIBSS instant payment. The empirical study indicated that automated teller machine has a positive and significant effect on return on assets of banks in Nigeria while, point of sale, NIP, WEBV, and NEFV were found to have a positive but insignificant effect on ROA of quoted banks in Nigeria. The study concluded that electronic banking has a positive impact on Deposit money banks financial performance in Nigeria, and then recommended that the management of banks should focus more on activities that will improve automated teller machine services.

Odhiambo and Ngaba [35] evaluated the effect of electronic-banking strategy on the financial performance of commercial banks in Kenya. The paper used Descriptive and Inferential Statistics with the aid of SPSS both primary and secondary data. The population of the study was the 43 deposit money banks (DMBs) in Kenya. The variables of the paper are agency banking, automated teller machine, mobile banking, and internet banking. The results showed that automated teller machine, internet banking, mobile banking and agency banking has significantly and positive effect on commercial banks financial performance in Kenya. The study concluded that mobile banking, agency banking, internet banking and use of ATMs had a positive and significant effect on the financial performance of commercial banks in Kenya. The paper recommended that there should be more investment in new technology which is electronic-banking services and also, banks should inform their customers on the value and usage of electronic-banking services.

Muoghalu, Okonkwo, and Ananwude [36] examined the effect of electronic banking-related fraud on deposit money banks financial performance in Nigeria between 2013 and 2016. The study employed the Ordinary Least Squares

method and the variables used are interest income and non-interest income, return on equity, return on assets, web banking, point of sale, automated teller machine, and mobile banking. It was found that fraud on point-of-sale terminals has a significant negative effect on interest income, while fraud on mobile banking, automated teller machines, and web had no effect on return on equity, assets, and non-interest income of banks. The concluded that electronic banking through the various platforms: automated teller machine, mobile banking, point of sale terminals and web have negative relationship with deposit money banks financial performance in Nigeria. The study recommended that authentication of transactions should be made by deposit money banks (DMBs) on point of sale (POS) terminal by sending verification code to the mobile numbers that are connected to the account to assert that the transaction was initiated by the actual cardholder.

Mapharing and Basuhi [37] used the relationship between electronic banking and commercial bank performance in Botswana between 2007 and 2016. The study employed, used Multiple Regression of the OLS model while return on assets, return on equity, cards and electronic payment at point of sale, automated teller machine, electronic funds transfer, and cheques cleared was used as the variables. The result revealed that the cheque is the only variable that has a positive and significant impact on commercial banks in Botswana. The paper recommended that customers should switch from traditional banking to electronic banking and also, the use of cheques should be discouraged.

Taiwo [38] looked into the role of electronic banking on the operational efficiency of commercial banks in Nigeria. The paper used primary data sources using 100 questionnaires to selected 4 banks (UBA, Ecobank, first bank, and GTB) to measure electronic banking and commercial banks operational efficiency. The study used Pearson Correlation Method, and the results revealed that electronic-banking plays a positive role in banks operational efficiency in Nigeria. The paper concluded that the operations of electronic-banking increased bank performances also recommended that the government should organize trainings that would help improve e-channels forms.

Between 2009 and 2015, Sachdeva, and Kumar [39] assessed the impact of electronic banking on performance of Indian commercial banks. Panel Data Technique was employed. Return on assets, return on equity, and automated teller machine. More so, capital adequacy ratio, size, liquidity, asset quality, and market share were adopted as the variables. The result indicated that the impact of e-banking has a statistically significant with bank performance variables in case of public sector banks. However, performance of private banks and foreign banks exhibits an insignificant relationship with e-banking variables. The study concluded that size, liquidity, market share, asset quality, and total amount of online transactions are significant on the performance of commercial banks in India.

3. METHODOLOGY

The ex post facto research design was adopted for the purpose of this paper. The design was adopted considering the nature of the study which requires the collection of data on events that had already taken place. Data for the paper was collected mainly from the Central Bank of Nigeria (CBN) statistics. Data collected were those on commercial banks transactions via electronic channels including cheques and Point of Sales (POS) machines and return on asset (ROA) the performance banks. The statistical model chosen for the analysis is Dynamic Ordinary Least Square (DOLS) analysis of the inbuilt approach. The method improves OLS by coping with small samples and dynamic sources of bias. In addition, it has the same asymptotic optimality properties as the Johansen distribution. More so, there is no theoretical basis for choosing the number of leads and lags, with the aid of E-view 12.0 software. Two sets of hypotheses were advanced for confirmation in this paper.

3.1 Model Specification

This paper adopted Oniore and Okoli [1] specified with slide modification of the model for the relationship between electronic banking and bank performance in Nigeria. More so, the theoretical framework of the Technology Acceptance Model (TAT) was adopted.

$$ROA = f(ATM, IBT, POS) \quad (1)$$

The slide modification of the model

$$ROA = f(POS,\ CHQS) \quad (2)$$

Where:

ROA = Return on Assets as a measure of deposit money banks performance as the dependent variable

POS = Point – of – Sale as a measure of electronic banking as the independent variable
CHQS = Cheques as a measure of electronic banking as the independent variable.

Assuming a linear relationship among the above variables exists model 2 can specified in the estimable form below

$$\mathrm{ROA}_t = \beta_0 + \beta_1 \log(POS)_{t-1} + \beta_2 \log(CHQS)_{t-1} + e_t \quad (3)$$

3.2 Data Sources

The paper used quarterly data between 2009q1 and 2023q1 mainly from secondary sources, these sources include the statistical bulletin of the Central Bank of Nigeria (CBN) for various editions and to achieve the objectives of the paper.

4. DATA ANALYSIS AND RESULTS

The result of the descriptive statistics which is presented in Table 2 shows results for statistics such as mean, standard deviation, maximum and minimum values of the variables, measures of dispersion in the variables, and measures of normality for fifty-seven (57) observations. From Table 2, it can be observed that within the study period Return on Assets on average was 1.857039 while its associating standard deviation was 1.730793 and the minimum and the maximum values are -8.845985 and 4.278903 respectively. With regards to point of sales (POS), it can be observed that it is 172808.6 with a standard deviation which is 229751.6. Furthermore, the minimum and the maximum values were respectively observed to be 38.57195 and 807161.0. With respect to cheques (CHQS), it was observed from Table 2 that the cheques average the mean value of 761819.6 with its associating standard deviation of 708029.0. The minimum and the Maximum value for cheques in the paper are seen to be 103003 and 3236854 respectively.

Skewness which measures the shape of the distribution shows that one of the variables has the value to be negative, which suggests that their distribution tail is left of the mean while two variables have Skewness to be positive which suggests the distribution tails to the right of their means. Variables with a value of kurtosis less than three are called platykurtic (fat or short-tailed), ROA, POS, and CHQS are variables qualified for this during the paper period.

The Jarque-Bera probability values of ROA, POS, and CHQS are 0.000000, 0.000138, and 0.000000 respectively. The value is less than 0.05, which indicates that it is not normally distributed. However, the normality of the data does not affect the regression result.

Table 1. Description of variables

S/N	Variables	Acronyms	Measurement	Sources
1	Return on Asset	ROA	Measured in Percentage	CBN Statistical bulletin, 2022
2	Point of Sale	POS	Measured in Million Naira	CBN Statistical bulletin, 2022
3	Cheques	CHQS	Measured in Million Naira	CBN Statistical bulletin, 2022

Source: Author's Computation 2023

Table 2. Descriptive statistics

	ROA	POS	CHQS
Mean	1.857039	172808.6	761819.6
Median	2.249063	46652.94	472464.9
Maximum	4.278903	807161.0	3236854.
Minimum	-8.845985	38.57195	103003.0
Std. Dev.	1.730793	229751.6	708029.0
Skewness	-4.392530	1.337009	1.862893
Kurtosis	27.23425	3.578019	5.707937
Jarque-Bera	1578.131	17.77564	50.38421
Probability	0.000000	0.000138	0.000000
Sum	105.8512	9850091.	43423716
Sum Sq. Dev.	167.7560	2.96E+12	2.81E+13
Observations	57	57	57

Source: Authors Computation, E-Views-12, 2023

Table 3. Correlation analysis

Covariance Correlation	ROA	POS	CHQS
ROA	2.943088 1.000000		
POS	-3261.270 -0.008348	5.19E+10 1.000000	
CHQS	-312256.6 -0.259360	-7.95E+10 -0.497473	4.93E+11 1.000000

Source: Authors Computation, 2023 (E-Views-12.0)

The evidence in Table 3 revealed a negative correlation between the variables are expected. However, the correlation matrix is used to determine the relationship between the dependent and independent variables also used to examine the relationship among the independent variables of the study. Point of sale has a significant negative correlation with ROA. Also, cheques has an insignificant (negative) correlation with ROA.

4.1 Stationarity Test of Variables

The stationarity of the series employed are checked first using the ADF test proposed by Dickey & Fuller (1979). The result is shown in Table 4

The unit root /stationary test is shown in Table 4. Unit root analysis is a test conducted to ascertain if the variables under consideration are stationary. The was carried out using Augmented Dickey-Fuller (ADF) test and shows that the variables are mixed in order of integration of I (0) and I (1) respectively. Since all the variables were found to be stationary at different orders, it was safe for the study to employ DOLS to validate or test for the presence of Co-integration.

Table 4. Unit root test results (constant, and with constant and trend)

At Level				
		logROA	**LogPOS**	**logCHQS**
With Constant	t-Statistic	-5.5663	4.8442	-3.9993
	Prob.	0.0000	1.0000	0.0028
		***	n0	***
With Constant & Trend	t-Statistic	-5.7707	1.1529	-3.9824
	Prob.	0.0001	0.9999	0.0149
		***	n0	**
Without Constant & Trend	t-Statistic	-1.5779	6.8069	-4.2603
	Prob.	0.1070	1.0000	0.0001
		n0	n0	***
At First Difference				
		d(ROA)	**d(POS)**	**d(CHQS)**
With Constant	t-Statistic	-10.8395	0.5367	-2.0089
	Prob.	0.0000	0.9864	0.2821
		***	n0	n0
With Constant & Trend	t-Statistic	-11.3153	-8.8902	-6.6235
	Prob.	0.0000	0.0000	0.0000
		***	***	***
Without Constant & Trend	t-Statistic	-10.8008	1.6132	-2.2528
	Prob.	0.0000	0.9724	0.0249
		***	n0	**

Notes: (*)Significant at the 10%; (**)Significant at the 5%; (***) Significant at the 1%. and (no) Not Significant
Source: Authors Computation, 2023 (E-Views-12.0)

Table 5. Dynamic Least Squares (DOLS) regression result: Return on Asset (ROA)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LPOS	1.931010	0.635364	3.039218	0.0055
LCHQS	0.438897	1.005786	0.436372	0.6663
C	-15.72199	14.62946	-1.074680	0.2928
R-squared	0.715595	Mean dependent var		2.091064
Adjusted R-squared	0.504925	S.D. dependent var		0.807869
F. Stat.	2.131201	0.0638		
DW. Stat	2.10000			

Source: Authors Computation, 2023 (E-Views-12.0)

Table 6. Post-estimation diagnosis test result on impact of electronic banking on deposit money banks performance in Nigeria

S/No	Tests		Outcomes		Null hypothesis
			Co-efficient	Probability	
1	Breusch-Godfrey Serial Correlation LM Test:	F-Stat.	1.001585	0.5264	No Serial Correlation
		Obs*R-Squared	32.58800	0.2268	
2	Normality Test	Jarque-Bera		0.2206	Normal Distribution
3	Heteroskedasticity Test: Breusch-Pagan-Godfrey	F-Stat.	2.131201	0.0638	No Conditional Heteroskedasticity
		Obs*R-Squared	29.38574	0.0804	

Source: Authors Computation, 2023 (E-Views-12.0)

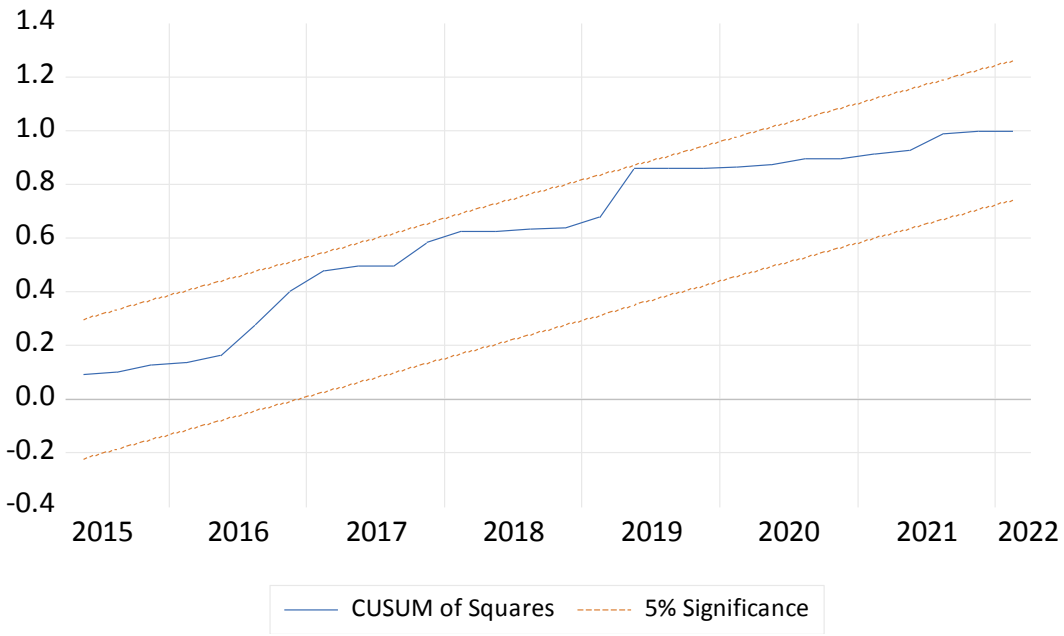

Fig. 1. Graphical presentation showing CUSUM of squares

5. DISCUSSION OF FINDINGS AND RESULTS

The estimated dynamic least squares regression results are in line with economic theory. All the variables of interest are correctly signed. The coefficient of the total number of point of sales transactions (POS) coefficient is directly related to electronic banking on bank performance long-run in Nigeria. The contribution of the total number of POS transactions is about 1.9% (percent). This finding conforms with the studies of Oniore and Okoli, [1] and theoretical intuition. The result reveals that there is a statistical and positive effect of electronic banking on bank performance on the return of assets (ROA) in

Nigeria. The coefficient of total transactions carried out on the cheques (CHQS) is positively related to electronic banking on bank performance captured by return on assets (ROA) during the study period. By implication, a rise in total transactions carried out on the cheques exerts a positive impact on e-banking on bank performance in Nigeria. Accordingly, a 1% (percent) increase in total transactions carried out on the cheques is associated with a 0.44% (percent) rise in e-banking on bank performance. This implied that the result is statistical and has no significant effect on e-banking on bank performance on the return on assets in Nigeria. This positive sign is consistent with the notion that in many developed countries electronic payment systems are widely used by consumers while in less developed countries, paper-based check clearing method is still widely used.

The overall significance of the study was measured by F-statistics which was observed to be 2.131201 (0.0638) variation in e-banking on bank performance is due to the variation in the regressors; DW statistics was found to be 2.1. This suggests that there is no serial correlation in the study. However, the overall performance implied that there is a positive impact on the electronic banking on banks performance in Nigeria and thus can contribute to the economic performance and acceleration process [40-42].

All the robustness tests carried out are in line with the fundamental laydown procedure of this study as indicated in the economic theory. Such normality test (Jarque-bera), Breusch-Godfrey Serial Correlation LM Test: Heteroskedasticity Test: and Breusch-Pagan-Godfrey [43-45].

6. CONCLUSION AND RECOMMENDA-TIONS

The paper investigated the empirical effect of electronic banking on deposit money banks performance in Nigeria from 2009Q1and 2023Q1. The paper adopted Dynamic Ordinary Least Square (DOLS) techniques and the variables include the dependent variable, return on assets (ROA) while the independent variables include point of sales (POS) and cheque (CHQS). The coefficient of the total number of point of sales transactions (POS) coefficient is directly related to electronic banking on bank performance long-run in Nigeria. The contribution of the total number of POS transactions is about 1.9% (percent). This finding conforms with the studies of Oniore and Okoli, [1] and theoretical intuition. The result reveals that there is a statistical and positive effect of electronic banking on bank performance on the return of assets (ROA) in Nigeria. The coefficient of total transactions carried out on the cheques (CHQS) is positively related to electronic banking on bank performance captured by return on assets (ROA) during the study period. By implication, a rise in total transactions carried out on the cheques exerts a positive impact on e-banking on bank performance in Nigeria. Accordingly, a 1% (percent) increase in total transactions carried out on the cheques is associated with a 0.44% (percent) rise in e-banking on bank performance. This implied that the result is not statistically significant on the effect of e-banking on deposit money banks performance on the return on assets in Nigeria. This positive sign is consistent with the notion that in many developed countries electronic payment systems are widely used by consumers while in less developed countries paper-based check clearing method is still widely used.

The overall significance of the paper was measured by F-statistics which was observed to be 2.131201 (0.0638) variation in e-banking on bank performance due to the variation in the regressors; DW statistics was found to be 2.1. This suggests that there is no serial correlation in the study. However, the overall performance implied that there is a positive impact of electronic banking on banks' performance in Nigeria and thus can contribute to the economic performance and acceleration process.

The paper, therefore, has the following recommendations:

i. The point of sales (POS) comes to stay in Nigeria; however, government or financial institutions should deploy the right technology that would modern digital global market and banking sector, it is recommended that banks should encourage the consumers‟ use of electronic ways of banking.
ii. On the aspect of cheques, in developed countries, the adoption of digital routes such as Internet banking reduces operating expenses, increases noninterest income, and consequently increases banks‟ profitability. Therefore, there is a need to develop effective strategies for customers to shift from traditional to electronic banking and discourage the use of cheques which increases a lot of paperwork.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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