

## Effect of Cashless Policy on Deposit Money Banks Profitability in Nigeria

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### Authors' contributions

This work was carried out in collaboration among all authors. Author CN designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author KOC managed the analyses of the study. Author EOO managed the literature searches. All authors read and approved the final manuscript.

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### ABSTRACT

The effect of cashless policy on deposit money banks is expected to increase the profitability of banks; it lowers the operational costs and curbs corruption. As such this study tends to ascertain the effect of cashless policy on deposit money banks profitability in Nigeria from 2009 to 2019. Secondary data from the Statistical bulletin of Central Bank of Nigeria was used in the study and the ARDL Auto-regressive Distributed lag model was used as a method of data analysis. The explanatory variables are Point of Sale (POS) Terminal, Automated Teller Machine, Mobile Banking, and Web Payment while the dependent variable is Profit before Tax. The result from the research indicates that cashless policy has a negative and insignificant effect on profit before tax of deposit money banks in Nigeria within the study period. The study, therefore, makes the following recommendations; banks should educate their customers more on the importance of cashless policy and some of the innovative products they are bringing in the market. They should also improve their financial infrastructure. Power generation and distribution should be improved upon as no electronic banking can take place without adequate power supply. Banks should set up appropriate security processes and use up to date programs to limit the effects of fraud on their products.

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## 1. INTRODUCTION

The advent of the novel coronavirus COVID-19 which saw the whole world in lockdown and limited physical appearance at various banking halls has increased various online transactions. The virus has shown that the world has evolved into a global village and the banking sector is not left out. Information and digital technology (ICT) has increasingly stirred the expansion of the banking networks and range of the services offered in recent times. Most of banking transactions, such as electronic payments, loans, deposits, or securities have become highly dependable on information and telecommunication technology [1].

The Central Bank of Nigeria (CBN) has recently introduced a series of reforms intended at both strengthening Nigerian financial system and enhancing the general performance of the economy so as to place it in the right direction in tune with global standard. Cashless policy is one key reform introduced in Nigeria financial system. The policy is a new policy on cash-based payments which specifies a 'cash handling charge' on daily cash withdrawals or cash deposits that surpass N500, 000 for Individuals and N3, 000,000 for Corporate bodies. The scheme plans at lowering not eradicating the quantity of physical cash flowing in the country, and encouraging further electronic-payment systems in Nigeria [2]. The cashless policy has birthed numerous electronic payment channels the commonly used e-payment machinery in the country are Automatic Teller Machine (ATM), Point of Sale Terminals (POS), Mobile Money Transfer (MMT), and Online Money Payment (WEB) [3].

The essence of the electronic banking reform was to promote a broad process of significantly enhancing the administrative and surveillance framework, promoting sound competition in banking services, assuring an organized structure for monetary management, increase in savings mobilization, reinforcement of capital adequacy, encouragement of investment and development through market-based interest rates, expanding elegance of the world financial products, and even the recent global financial crisis, all make the need for banking sector reforms a sine qua non, but the challenges of insecurity and inadequate infrastructure are still persistent.

Many researches have been conducted on cashless policy and its effect on the bank's performance with varying results and conclusions. Some think that the cashless policy is yet to be fully embraced and many others pointed out problems associated with the advent of the cashless policy via the various e- payment channels such as overcharge, debiting a customer without appropriate credit to the right persons, delays in a reversal of wrong transactions, etc. Therefore, this study is aimed at finding out the effect of cashless policy on deposit money banks profitability and whether the bank is making profits or losses through the cashless policy of the Federal government. The study use profit before tax as the major gap the study tends to fill. The following sections of this work include conceptual framework; theoretical framework and empirical review of related works. Others are methodology and data presentation; discussions, conclusions, and recommendations.

## 2. LITERATURE REVIEW

A cashless economy is a society where no one uses cash, all payment being made are by cheques, credit cards, charge cards, or movement of money from one bank account to another through mobile banking. The cashless policy was intended at limiting a number of negative effects connected with the utilisation of physical currency in the economy, including the huge cost of cash, increase risk of using cash, high subsidy, theft, incompetence as well as fraud [4]. A cashless economy is a financial system where business can be done without necessarily using physical cash as a means of exchange of transaction but rather with the use of credit or debit card for payment of goods and services. The cashless economy policy programme of the Central Bank of Nigeria (CBN) is a move to develop the financial terrain but in the long-term sustainability of the policy will be a function of adoption and compliance by end-users [5].

The cashless society anticipated here points to the comprehensive use of computer technology in the financial system. The cashless policy introduced by The CBN in 2012 kicked off with the commencement of the mobile payment, Nigeria is only keying into a swift-developing global payment system. The mobile money structure is a technology-driven payment system that will open up several other business

opportunities in the economy. The mobile money payment system permits clients to make payments with their GSM phones. It is a transfer and savings system that changes GSM phones into a savings account platform, permitting the owner to accumulate money in it and from which withdrawals or transfers could be made. Under the payment system, users could do their normal basic financial transactions daily by making payments for goods and services or by engaging in person-to-person transfer directly on their GSM phones.

There are various components of cashless policy in Nigeria. Woleola [6], observed that the most used cashless payment in the banking system is automated teller machine (ATM), point of sale (POS), internet banking, mobile banking, and implants, etc.

### **2.1 Automated Teller Machine (ATM)**

Is a machine that gives out cash and can perform other functions a teller in banking hall does like transfers, minimum balance investigation, payments of bills, deposits, and recharge of various kinds. Tan and Teo [7] states that an automated teller machine (ATM) helps clients have effortless access to funds in their accounts without delay. For one to make use of an ATM he or she needs as a debit card and a personal identification number (PIN). CBN allows N55 as profit to banks for any 4<sup>th</sup> transaction carried out by the cardholder in another bank's ATM terminals.

### **2.2 Point of Sale (POS) Terminal**

Point of Sales (POS) machine is an electronic gadget used to purchase commodities especially in hotels, filling stations, shops, and supermarkets. Adurayemi [8] observed that the POS machine allows for printing of receipt upon payment of the goods and the customer will be charged a fee called merchant service charge (MSC) for the use of the machine. The maximum total fee as set out by the Central Bank of Nigeria is normally 1.25 percent of the transaction value subject to a maximum of N2000.

### **2.3 Internet Banking**

Can be referred to as online banking or web banking. Online banking allows a bank customer to carry out financial transaction through the internet by using such devices as computers, mobile phones, and ipads in the comfort of their homes. It provides customers almost every service conventionally obtainable through a local

branch including deposits, transfers, and online bill payments. Siyanbola, [9] observed that internet banking makes use of a computerized card framework to carry out payment orders and a final payment of commodities over the internet between the seller and the buyer. It goes to show that customers can buy goods from the internet by placing orders through the net to their banks to pay the merchant the bill amount involved and the commodities conveyed to the place of its destination where the buyer wants.

### **2.4 NIBSS Instant Payment (NIP)**

NIP is the Nigerian financial industry preferred money transfer platform that assures immediate benefit to the beneficiary. It is also an account number based online real-time interbank payment solution set up in the year 2011 by Nigeria interbank settlement system. The NIP services started with only two (2) deposit money banks participating in it at the initial stage. However today the number of organisations involved in the programme has increased to include all deposit money banks, microfinance banks (MFBS), and mobile money operations (MMOs). NIP has been valuable to all parties since it allows customers to benefit from increased convenience, while corporate enjoy payment processing efficiency, increased liquidity, and reduced payment risks. Deposit money banks and other financial establishments can build services around it to meet their ever-dynamic customer needs especially digital banking products. Apart from using the internet to perform the operations of NIP and NEFT one can visit his or her banks and use funds transfer forms in the bank to perform these operations by signifying NEFT or NIP as the chosen transfer type [10].

### **2.5 NIBSS Electronic Funds Transfer (NEFT)**

NEFT was introduced in Nigeria in 2004 to reduce high dependency on cash and make available a range of payment systems to bank customers. The modes of this payment can be through (i) NEFT credit transfer (single items) (b) Bulk clearing-Automated direct credits (c) Bulk clearing -Automated direct debits. NEFT credit transfer is irreversible fund transfer order since the payer's bank basically will not agree to the instruction if there are inadequate funds to cover the payment instruction and this helps to reduce the trouble of returned cheques in the transaction. Bulk clearing- allows corporations or organizations to present numerous direct credit

or direct debit instruments, through clearing banks to the automated clearing period. Payments that can be made through Bulk clearing- Automated direct credits are payment of staff salaries, payment of pensions, payments of sundry benefits to several individuals' e.g shareholders dividends, payment of inter-bank standing orders by banks, and contractor payments. While payments that can be done through Bulk clearing- Automated direct debits are payment of insurance premiums, payment of utility bills (water electricity, telephone bills), and subscription collections.

## 2.6 Mobile Banking

It involves the use of mobile phones to access your account and connect to financial institutions database which allows you to settle financial transactions. Financial services one can perform using a mobile phone includes funds transfer, balance inquiry, recharging of phones, and payment of bills. Tayo [11] states that some of these services are integrated with an interactive system of a voice message that directs a customer through automated provision of relevant account details.

## 2.7 E-Bills Pay

It is Electronic Bills Payment and is a collection platform that is supervised and controlled by Nigeria Inter-Bank Settlement System Plc (NIBSS). The platform allows payments from clients through internet banking, USSD channels, and bank branch.

## 2.8 mCash

It is a novel solution set up to help small value retail payments grow by providing easy access to electronic medium to a wide range of users. It is anticipated that mCash will strengthen financial inclusion and increase e-payment benefits to both buyers and sellers.

## 2.9 Remita

It is an electronic-payment system licensed by CBN to attend to the needs of individuals and organizations as regards payment. It was developed by Financial Technology giant Systemspecs and commenced operation in Nigeria in 2017 intending to help the people make and receive payments easily. Remita is the payment gateway that helps in the transfer of funds (taxes, levies, tariffs) into the single treasury accounts.

According to CBN [4], the cashless policy was initiated in Nigeria for the following reasons:

- a) To steer the evolution and improvement in the method of payment in Nigeria in agreement with Vision 2020 objective of being among the top 20 economy by 2010.
- b) To limit the price of banking services (as well as the cost of credit) and help financial inclusion by providing more capable transaction options and greater reach.
- c) To strengthen the effectiveness of monetary policy in controlling inflation and driving economic development.
- d) Besides, the policy objectives was to reduce some of the adverse consequences of high usage of cash, including the high cost of handling (estimated to be about N192 billion per annum), high risk of usage, and high subsidy.

The cashless Nigerian society has many benefits. Some of these benefits include.

## 2.10 Consumers

Increased convenience; more service options; reduced risk of cash-related crimes; cheaper access to (out-of-branch) banking services, creation of more employment opportunities in the financial sector, access to credit, and financial inclusion. Corporations: Faster access to capital; reduced revenue leakage; and reduced cash handling costs. Government: Increased tax collections; greater financial inclusion; increased economic development, reduction in money laundering, check on terrorist financing, and helps in monetary policy implementation.

## 2.11 Profitability (Profit before Tax)

Profitability is the predicted variable in this study and it is represented by profit before tax. Profit before tax can also be referred to as earnings before tax. European central bank [12] states that profitability is a bank's primary source of defence against unanticipated losses, as it enhances its capital position and improves future profitability through the investment of retained earnings. It is worthy of note that an institution that constantly makes a loss will eventually drain its capital base, which in turn puts equity and debt holders at risk. Profit before tax is a measure of a company's profitability that examines the profits made before any tax is paid. It tries to compare all the company's expenses which include operating and interest expenses

against its earnings but excludes the payment of income tax. Profit before tax helps to show how much a tax a company owes and helps to compare among companies that pay a varying amount of taxes. Profit before tax is listed on the income statement and can be calculated by subtracting expenses from revenue.

## 2.12 Theoretical Review

The study considers two theories namely: Transaction cost innovation theory and Technology acceptance model while the study will be anchored on Transaction cost innovation theory

## 2.13 Transactions Cost Innovative Theory

The transaction cost innovation theory initiated by Niehans [13] stated that the paramount factor of financial innovation is the decrease of transaction cost, and in fact, financial innovation is the answer to technological advancement which caused the transaction cost to decrease. The decrease of transaction costs can stimulate financial innovation and improvement of financial service. It states that financial innovation reduces transaction costs. Transaction costs innovation theory is also important in this context: for instance, the use of Internet-connected Information Technology (IT) can substantially reduce a firm's transaction costs as it facilitates effective coordination, management, and use of information. Mobile, Internet-connected IT might additionally decrease transaction costs because it offers off-site access to the firm's internal database and other significant sources of information. Consequently, reduction of operation costs through agency banking, internet banking, and mobile banking may influence growth in profitability for the bank.

## 2.14 Technology Acceptance Model (TAM)

This theory was developed by Davis in 1986 [14]. The model was formally developed from the research conducted by Davis on technological issues. The result of this research led to the development of the Technology Acceptance Model (TAM). This model seeks to establish the relationship between individuals' behavior and the use of Information and Communication Technology (ICT). It is argued that the behavior of individual influences his attitude towards adopting new technology. However, attitude and perceived usefulness are both determined by ease of use. [15] maintains that adopting the

TAM model is based on knowing end-users' requirements concerning how easy and friendly the technology is presented.

The banking industry in Nigeria evaluated its options and discovered that only 10 percent of its client's base accounted for 90 percent of its expenses. The focus thus became how to eliminate costs by attending to those 10 percent. Competitiveness, high growth levels, and increased sophistication in world systems and sub-systems thus forced the banking sector to reevaluate techniques and innovations to improve its efficiency, profitability, and overall performance. In recent years, advances in banking-related technology have reduced the need for a physical location, and banking transactions are now being conducted from a remote location using personal computers and ATMs.

## 2.15 Empirical Review

Agu and Agu [16] explored the effect of cashless policy on economic growth in Nigeria, throughout Q12010 to Q42018. It employed quarterly time series data using the ordinary least squares regression (OLS) technique. The data was sourced from the World Bank Development indicator and Central Bank of Nigeria (CBN) Statistical Bulletin, Annual Report, and Statement of Account for the year 2019. The researchers subjected the data to unit root, cointegration, and granger causality tests. Findings from the research showed that cashless policy has been a veritable tool in influencing economic performance, especially as it relates to Automated Teller Machine (ATM) transactions and Point of Sale (POS) payment patterns.

Okafor [17] did a study on the effect of cashless policy for business performance and purposes of deposit money banks in Nigeria (2009-2019). The explanatory variables were internet banking, automated teller machine, mobile banking and point of sale while the response variable was return on assets. We employed econometric techniques involving descriptive statistics, augmented dickey fuller tests for unit roots, and the regression analysis. The finding from the analysis shows that Internet Banking, Point of Sale (POS), Mobile Banking (MB), and Automated Teller Machine (ATM) have a significant but positive effect on return on asset (ROA). The research thus states that cashless policy has a positive effect on deposit money banks performance in Nigeria.

Osazevbaru, Sakpaide and Ijubune [18] explored cashless policy and profitability of banks' in Nigeria. The mutation of the financial industry of the economy of Nigerian has constantly been the fundamental position in the economic policies of all political government in Nigeria. Employing computerised banking as the podium, the cashless policy was initiated to additional expand the financial market micropattern. This study investigated the effect of cashless policy on Nigerian banks profitability, in view of the fact that these banks in a cash-based economy are recognized for their enormous profits even in the face of soaring production cost. Essentially, will financial institutions in the cashless economy be able to make lots of profits as they use to make? To tackle this, data from secondary source were used and evaluated using content analysis comparing profits under the cash-based policy with a cashless regime. The research shows that cashless economy policy has positive impacts on banks' profit through the reduction in the production cost and banking the unbanked populace.

Muotolu and Nwadiolor [19] explored the effect of cashless policy on deposit money banks financial performance in Nigeria. The study used a panel data collected from a sample of 14 banks covering 6 years for the period 2012 when the policy was initiated in country to 2017. Return on Asset was used in study as a proxy for deposit money banks performance while the transactions in value are done through the Internet Banking, POS, ATM, NIP and NEFT platforms (Computerized Products) were used to proxy cashless policy. Specifically to guarantee the soundness and the dependability of our data, we, therefore, carry out adiagnostic test using descriptive statistic analysis, multicollinearity test, correlation testing, and heteroskedasticity testing. Findings from the study showed that (ATM) value has a significant but positive effect on deposit money banks return on assets (ROA) in Nigeria while, POSV, WEBV, NIPV, and NEFV were establish to have insignificant and positive effect on quoted banks ROA in Nigeria.

Werigbelegha and Avery [20] studied the effect of cashless policy on deposit money banks performance Nigeria; for the period 2000-2018. Data from Statistical Bulletin of Central Bank of Nigeria were collected and analysed. This study used automated teller machine (ATM), point-of-sale (POS), and mobile banking (MB) as the explanatory variables to measure cashless policy; whereas, return on assets of deposit money banks as a surrogate for deposit money

banks performance and used as the dependent variable. Hypotheses were developed and examined using Ordinary Least Square regression (OLS). There is a significant effect of automated teller machine transactions on deposit money banks return on assets in Nigeria. The point on sales terminal transactions has a significant effect on deposit money banks return on assets in Nigeria. Electronic mobile payment has a significant effect on banks return on assets in Nigeria. The coefficient of determination indicates that about 47% of the variations in the bank's profitability can be explained by changes in cashless policy variables (ATM, POS, MB) in Nigeria. The research resolves that there is significant effect of cashless policy on deposit money bank's performance in Nigeria.

Ignoroje and Okoroyibo [21] analyzed the effect of cashless policy on deposit money banks performance in Nigeria spanning from 2009-2018. The main aims of the study are to: ascertain the effect of automated teller machine, point of sale, mobile banking and internet banking respectively on deposit money banks performance in Nigeria. We employed econometric techniques involving descriptive statistics, augmented dicker fuller, and Philip perron tests for unit roots and the autoregressive distributed lags (ARDL) for cointegration and coefficient analysis. The findings from the research revealed that Internet Banking and automated teller machine (ATM) have a significant and positive effect on deposit money banks return on equity (ROE). Point of Sale (POS) has insignificant but positive effect on return on equity, while Mobile Banking (MB) has a significant but negative effect on ROE. The work therefore concludes that the performance of money deposit banks in Nigeria is positively affected by Central bank of Nigeria cashless policy.

Ugwueze and Nwezeaku [22] investigated Electronic-banking and the performance of commercial banks in Nigeria. A cointegration using the Engle-Granger cointegration model and causality approach from 2013-2016. The dependent variable includes the Customer's deposit (time deposit, savings deposit, and demand deposit) and POS as an independent variable. They find that POS has no long run relationship with both the savings and time deposits but there is long run relationship with demand deposits.

Mustapha [23] examined the effect of E-payment technology on bank performance in emerging

economies-evidence from Nigeria (2012-2017) using time dimensional and panel least square models was to analyze the data. Two dependent variables, namely the performance index and the risk exposure variable were used and the experimental variables include values of ATM transactions and POS technology transactions, the total value of mobile money transfers, and the value of online payment transactions. It was the finding of the study that bank performance disagrees with autoregressive and random walk processes and consequently entails that investors should not be bothered about prior bank performances but concerned about present bank resources.

Suberu, Afonja, Akande, and Adeyinka [24] studied the effect of cashless policy, saving, and bank credit on the Nigerian deregulated economy. They employed the regression econometric technique to analyze the data. GDP and growth of aggregate domestic credit to the economy (GADCE) were used as the variables. The result showed that the coefficient of marginal productivity of bank credit to the domestic economy is insignificant but positive.

Ali and Emenike [25] explored the effect of automated teller machine on banking services delivery in Nigeria: a stakeholder analysis (2009-2013) using Simple linear regression model ATM (the independent variable) on banking services proxy by the customer deposits (the dependent variables). The study revealed that there is positive and significant impact between ATM transactions and private sector demand deposits in Nigeria although private sector savings deposits and private sector time deposits have insignificant impact.

Okon and Amaegberri [26] studied mobile banking transaction and profitability of bank in Nigeria from 2007-2016, SURE model estimation was used to analyze the data. ROA=return on assets, measuring deposit money banks performance, ATM= value of Automated Teller Machines transactions, POS= value of Point of Sales transactions, MOB= mobile banking transactions, SIZE= bank size, represented by banks total assets, PIV= private investment in Nigeria, INFL= inflation rate, measuring macroeconomic instability. The result shows a significant and positive relationship between ATM, mobile banking, and POS on the performance of DMB of old and new generation banks.

Too, Ayuma and Ambrose [27] also did a study on the effects of mobile banking on commercial banks financial performance in Kapsabet

(Kenya): A case of selected banks in Kapsabet Town (2016) they used SPSS to analyze the primary data and multiple regression model was used to analyze the secondary data. Dependent variable= Financial performance while independent variables include mobile banking withdrawal and deposits, Mobile banking loans, Mobile banking funds transfer, Mobile banking payment of bills. The findings of the research showed that there was a significant effect between mobile banking and financial performance ( $p < 0.005$ ).

Abaenewe, Ogbulu, and Ndugbu [28] studied electronic banking and bank performance in Nigeria. Data from four Nigerian banks was adopted and judgmental sampling technique was used in selecting the data. Returns on equity (ROE) and returns on assets (ROA) were used profitability performance indicators in the study. With the data collected, they analysed the pre- and post-adoption of e-banking performance differences between means using a standard statistical technique for the independent sample at a 5 percent level of significance for performance indicators such as ROE and ROA. The findings from the research showed that the introduction of electronic banking has significantly and positively enhanced the returns on equity (ROE) of Nigerian banks. Contrary, it also indicates that digital-banking has insignificantly not enhanced the returns on assets (ROA) of Nigerian banks.

Harelimana [29] investigated the effect of mobile banking on Microfinance Bank financial performance in Unguka, Rwanda (2012-2016). Equally Quantitative and Qualitative research methods such as questionnaires and interviews were used towards answering the research questions to generate primary data. The quantitative data are analyzed using SPSS. The study used (ROA) and (ROE) as a measure of the profitability of financial performance. The finding from the study indicates that there is a positive correlation among financial performance variables pre and post the introduction of the mobile banking system and shown the positive effect between mobile banking transaction volume and products and financial performance of Unguka Bank Ltd.

Oyomo [30] analysed the control of mobile banking on organizational operations. A questionnaire was used to gather the primary data while a study design was used in selecting the population for the study. The design population was 20 banks and a sample size of 70

was used. Statistical Package of Social Sciences (SPSS) software was used in analyzing the data. The finding from the analysis indicates that mobile banking had positively significant effect on the performance of banking organization. The result also indicates that mobile banking is an anchor of stability of competitive edge to the banking industry.

Omotunde, Sunday, and John-Dewole [31] studied cashless policy and economy of Nigeria. Questionnaire was used to collect the data for the analysing while using Survey research to aid data collection. Feedback from the respondents indicates that a cashless policy will help reduce unemployment; decrease cash associated robbery thence minimizing the risk of holding cash; the cashless policy will also abate cash associated corruption and stimulate more investment abroad into the country. The findings, consequently, indicates that the commencement of a cashless policy in Nigeria can be seen as a move in the right direction.

### 3. METHODOLOGY

The research was carried out using secondary data sourced from Central Bank of Nigeria Statistical Bulletin and annual report of Nigeria Deposit Insurance Corporation from 2009 to 2019. The research used descriptive statistics to depict the variables while the unit root test was carried out to check the stationarity of the variables by using Philips-Perron (PP) and Augmented Dickey-Fuller (ADF). The unit root test shows that the variables were integrated at order (0) and (1) which makes the use of Auto-regressive Distributed lag models(ARDL) necessary to be used as a method of data analysis. The model used for the research involves the adaptation and modification of the research carried out by Okafor [14]. He examined cashless policy for business purposes and the performance of Deposit Money Banks in Nigeria (2009-2019). His original model was stated thus:

$$ROE = f(ATM, POS, MB, ITB)$$

$$ROE = \beta_0 + \beta_1ATM + \beta_2POS + \beta_3MB + \beta_4ITB + \mu - - - - - 1$$

Where: ROE = Return on Equity  
 ATM = Automated Teller Machine  
 POS= Point of sale  
 MB= Mobile Banking  
 ITB= Internet Banking (ITB)

$\beta_0$  and  $\mu$  are the constant and error term respectively while  $\beta_1$ ,  $\beta_2$ ,  $\beta_3$ , and  $\beta_4$  are the coefficient of cashless economy on deposit money banks performance in Nigeria.

The model was adapted and modified by bringing in profit before tax as the explained variable while removing return on equity since this study deals with cashless policy and Deposit Money Banks profitability in Nigeria. The model for this study is stated thus:

$$PBT = f(ATM, POS, MOBILE, WEB)$$

$$PFT = a_0 + a_1ATMs_{it} + a_2POSs_{it} + a_3MOBILES_{it} + a_4WEBS_{it}$$

Where: PBT= Profit before Tax  
 ATM= Automated Teller Machine  
 POS= Point of Sale (POS) Terminal  
 MOBILE= Mobile Banking  
 WEB= Web Pay or Internet Banking  
 $a_0$  = Intercept of the model  
 $a_1 - a_6$  = Parameters of the regression coefficients  
 $e_{it}$  = Stochastic error term

### 4. DATA PRESENTATION AND ANALYSIS

The description of the data series used in the analysis is presented in Table 1. The table shows a summary of the descriptive statistics used in the analysis. The mean value was shown to be 80244477 for PBT, 3581.108 for ATM, 822.8345 for MOBILE, 798.2782 for POS, and 146.6373 for WEB. The median value was shown to be 539970.0 for PBT, 3679.880 for ATM, 346.4700 for MOBILE, 312.0700 for POS, and 84.15000 for WEB. The maximum and minimum of the series are 4.21E+08 and -40350.00 for PBT, 6512.600, and 399.7100 for ATM, 4371.550, and 1.270000 for MOBILE, 3204.760 and 11.03000 for POS, 478.1300 and 25.05000 for WEB. The series standard deviations are 1.50E+08 for PBT, 2319.650 for ATM, 1309.164 for MOBILE, 1087.734 for POS, 153.5399 for WEB. The variables of standard deviations were found to be positively skewed towards normality as evidenced by the positive values of the skewness statistic.

The variables for the study were tested for stationarity by using Phillips-Perron (PP) and Augmented Dickey-Fuller (ADF) unit root test to determine the stationarity of the data. Phillips-Perron (PP) was used to confirm the stationarity of the data which shows that the variables are integrated at order (0) and (1) that is at the level



and first difference. Tables 2 to 5 shows the unit root test for the study.

Table 2 revealed that POS, MOBILE, and PBT are stationary at level but ATM and WEB are not stationary at level. Based on this we difference the variables to see their outcome.

Table 3 shows that ATM and WEB which were not stationary at the level is stationary at 1<sup>st</sup> difference which shows that the variables are stationary at a level and 1<sup>st</sup> difference. Table 4 and 5 confirms the stationarity by using the Phillips-Perron (PP) unit root test which allows the use of ARDL Auto-regressive Distributed lag models as a method of data analysis.

#### 4.1 ARDL Co-Integration Relationship

The confirmation of the stationarity of the data through the unit root test of ADF and PP allows for the determination of the co-integration relationship between the dependent and explanatory variables in the models. The ARDL was chosen as against the traditional Johansen co-integration because it is structured in such a way that it considers the different order of integration of financial time series data.

#### 4.2 Co-integration Test For Long-run Effect

Pesaran et al. [32] showed that cointegrating systems can be estimated as ARDL models; it has the advantage to estimate cointegrating relationships on variables that are both I(0) or I(1). According to Pesaran et al. [32], the asymptotical allotment of the F-statistic is non-standard regardless of either the regressors are I(0) or I(1), and give two adjusted critical values that establish lower and upper bounds of significance. The bound test follows the critical criterion at the lower bound and upper bound value for decision at the three levels of significance in 1%, 5%, and 10%.

Given a computed F statistics Value of 5.119304 which is greater than the lower and upper critical bound values at 1%, 2.5%, 5% and 10% respectively, thus indicating the existence of a steady-state long-run relationship among the variables. This suggests that the various selected variables have a long-run relationship with deposit money banks profitability in Nigeria.

##### 4.2.1 Decision rule

We reject the null hypothesis of the co-integration relationship to accept the alternative that there is Co-integration. We thus conclude

that a cashless policy instrument as represented by a quantitative monetary policy instrument as represented by Mobile Banking, Point of Sale (POS) Terminal, Automated Teller Machine, and Web Pay has a long-run effect on deposit money banks profitability in Nigeria.

#### 4.3 Nature of Long-Run Relationship/ARDL Error Correction Model

The ARDL result has proven that Profit before Tax, Mobile Banking, Point of Sale (POS) Terminal, Automated Teller Machine, and Web Payment are co-integrated/related in the long run. Consequently, the determination of the nature of the long-run relationship becomes necessary as well as the speed of the adjustment to equilibrium.

The result in Table 7 shows that ATM, MOBILE, and WEB have a negative insignificant relationship with PBT while POS has an insignificant positive relationship with profit before tax. In terms of the speed of adjustment, Table 7 reveals that the model moves toward equilibrium following disequilibrium in the explanatory variables. The ECM is negatively signed with a coefficient of -0.014674, a suggestion that -1.4674% of error generated in the previous period is corrected in the current period.

#### 4.4 Diagnostic Test

##### 4.4.1 Normality test

The normality test was done using the Jarque-Bera Normality test, which requires that for a series to be normally distributed; the histogram should be bell-shaped and the Jarque-Bera statistics would not be significant. This implies that the p-value given at the base of the normality test table should be greater than the selected level of significance to accept the Null hypothesis, that the series is normally distributed [33].

##### 4.4.2 CUSUM tests of stability

The stability test results are revealed in Fig. 2. The CUSUM test is the test used to check stability within the model. The findings from the stability test confirm the evidence that the model is stable. This is indicated by a movement of blue lines located within the critical lines (two-red dotted lines) in the figures. Therefore, at significant level of 5%, the CUSUM stability tests confirm the good performance of the model.

**Table 1. Descriptive statistics**

	<b>Mean</b>	<b>Median</b>	<b>Maximum</b>	<b>Minimum</b>	<b>Std.Dev</b>	<b>Skewness</b>	<b>Kurtosis</b>	<b>Jarque-Bera</b>	<b>P-value</b>	<b>Obs</b>
PBT	80244477	539970.0	4.21E+08	-40350.00	1.50E+08	1.489447	3.611120	4.238335	0.120132	11
ATM	3581.108	3679.880	6512.600	399.7100	2319.650	0.024303	1.616418	0.878470	0.644529	11
MOB	822.8345	346.4700	4371.550	1.270000	1309.164	2.016704	6.052426	11.72677	0.002842	11
POS	798.2782	312.0700	3204.760	11.03000	1087.734	1.294326	3.272787	3.105453	0.211670	11
WEB	146.6373	84.15000	478.1300	25.05000	153.5399	1.387683	3.385816	3.598607	0.165414	11

*Computer Result using E-views 9.0*

**Table 2. ADF result at level**

<b>Variables</b>	<b>ADF test statistic</b>	<b>1%</b>	<b>5%</b>	<b>10%</b>	<b>Order of integration</b>
ATM	-0.437533	-4.297073	-3.212696	-2.747676	Non-stationary
POS	5.508920	-4.297073	-3.212696	-2.747676	Stationary
WEB	1.408216	-4.297073	-3.212696	-2.747676	Non-stationary
MOBILE	6.815791	-4.297073	-3.212696	-2.747676	Stationary
PBT	3.346400	-4.297073	-3.212696	-2.747676	Stationary

*Source: Analyst E-view result*

**Table 3. ADF result at 1<sup>st</sup> difference**

<b>Variables</b>	<b>ADF test statistic</b>	<b>1%</b>	<b>5%</b>	<b>10%</b>	<b>Order of integration</b>
ATM	-3.608058	-4.420595	-3.259808	-2.771129	Stationary
POS	-0.126424	-4.420595	-3.259808	-2.771129	Non-stationary
WEB	-3.316231	-4.420595	-3.259808	-2.771129	Stationary
MOBILE	4.518750	-4.420595	-3.259808	-2.771129	Stationary
PBT	-0.968095	-4.420595	-3.259808	-2.771129	Non-stationary

*Source: Analyst E-view result*

**Table 4. PP result at level**

Variables	PP test statistic	1%	5%	10%	Order of integration
ATM	-0.295378	-4.297073	-3.212696	-2.747676	Non-stationary
POS	6.261164	-4.297073	-3.212696	-2.747676	Stationary
WEB	1.408216	-4.297073	-3.212696	-2.747676	Non-stationary
MOBILE	6.445619	-4.297073	-3.212696	-2.747676	Stationary
PBT	3.715689	-4.297073	-3.212696	-2.747676	Stationary

Source: Researcher's E-view result

**Table 5. PP result at 1<sup>st</sup> difference**

Variables	PP test statistic	1%	5%	10%	Order of integration
ATM	-4.737975	-4.420595	-3.259808	-2.771129	Stationary
POS	-0.124572	-4.420595	-3.259808	-2.771129	Non-stationary
WEB	-3.316234	-4.420595	-3.259808	-2.771129	Stationary
MOBILE	5.633241	-4.420595	-3.259808	-2.771129	Stationary
PBT	-0.966724	-4.420595	-3.259808	-2.771129	Non-stationary

Source: Researcher's E-view result

**Table 6. ARDL bounds tests for cointegration**

Test statistic	Value	k
F-statistic	5.119304	4
Critical Value Bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.45	3.52
5%	2.86	4.01
2.5%	3.25	4.49
1%	3.74	5.06

Source: Author's Calculation employing E-Views 9 Software

**4.4.3 Test for heteroskedasticity and serial correlation LM test**

In line with the classical linear regression assumption, the model was subjected to diagnostic analysis of serial correlation LM test and heteroskedasticity test. The p-values of 0.0786 and 0.0610 for f-statistics of serial correlation LM test and heteroskedasticity test are insignificant at a 5% level of significance. This implies that the model has no serial correlation LM test and heteroskedasticity test problem.

**4.5 Short Run OLS Relationship**

In analyzing the short-run nexus between cashless policy and Profit before Tax of deposit money banks, the OLS regression was applied and the result shown in Tables 9. The outputs were interpreted using the coefficients of the individual variables, Adjusted R-square, f-statistic, and Durbin Watson.

Table 9 shows that ATM, MOBILE, and WEB have a negative and insignificant effect on profit before tax of deposit money banks in Nigeria while POS has a positive and significant effect on PBT. The constant parameter for the model is insignificant but positively related to profit before tax. It has a positive coefficient of 41717146 implies that if all explanatory variables are held constant in the short-run, profit before tax will increase by 41717146.

Meanwhile, the coefficient of multiple determinants ( $R^2$ ) showed a coefficient of 0.990777  $\approx$  0.99 which implies a 99% explanation of the behavior of Profit before Tax by the totality of the explanatory variables: Automated Teller Machine, Point of Sale (POS) Terminal, Mobile Banking, and Web Pay) on the short-run. The Adjusted  $R^2$  further proves this with the adjusted value of 0.979248  $\approx$  0.97 which implies that 97 percent explanation of the behaviour of profit before tax by the totality of the explanatory variables with the remaining 3 percent behaviour attributed to other variables

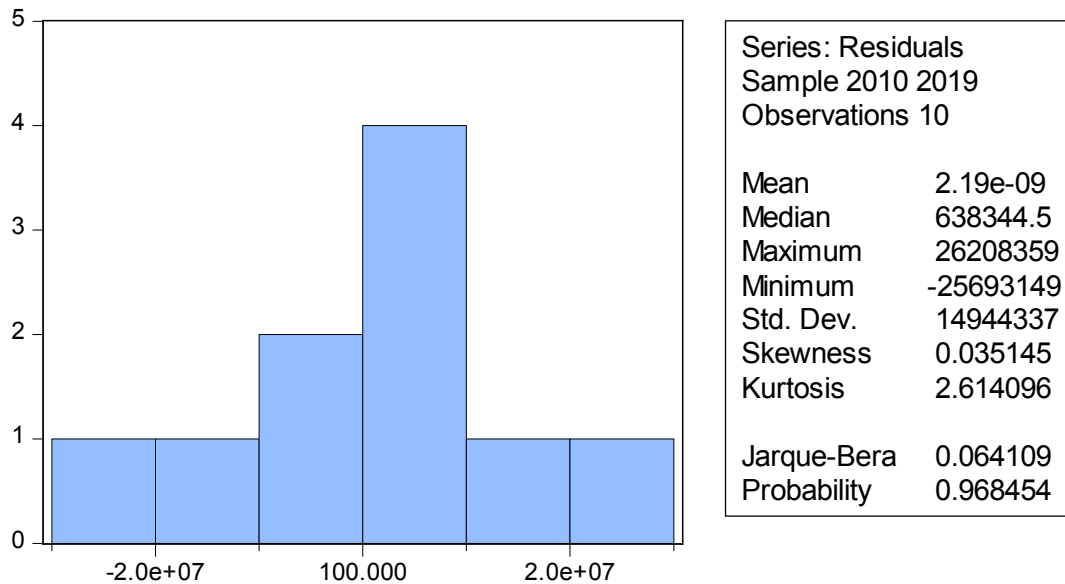
outside the model otherwise referred to as the stochastic variables. The F-statistic indicates that the model is well fit for the estimation because F-stat for the model is 85.93745 is greater than the F-critical value of 4.53 at a 95 percent significance level. However, the Durbin Watson

Statistic value of 2.642781 is symptomatic of autocorrelation. As a result, the serial correlation test in Table 8 shows that there is no autocorrelation problem in the model and could be used for statistical inference like hypothesis testing and forecasting.

**Table 7. ARDL co-integrating and long run form forPBT→ATM+POS+MOBILE+WEB**

<b>Cointegrating Form</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
D(ATM)	-12349.919599	13856.161890	-0.891294	0.4231
D(POS)	322637.781600	100287.089185	3.217142	0.0324
D(MOBILE)	-97518.540179	55448.104898	-1.758735	0.1534
D(WEB)	-952794.309869	695290.393281	-1.370354	0.2424
CointEq(-1)	-0.014674	0.751520	-0.019526	0.9854
<b>Long Run Coefficients</b>				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.</b>
ATM	-841625.640460	42349364.847520	-0.019873	0.9851
POS	21987206.264605	1129918157.660824	0.019459	0.9854
MOBILE	-6645719.688852	343804209.000963	-0.019330	0.9855
WEB	-64931282.737406	3363872097.332409	-0.019303	0.9855
C	2842951302.491051	145914310032.50956	0.019484	0.9854

Source: Author's Calculation employing E-Views 9 Software



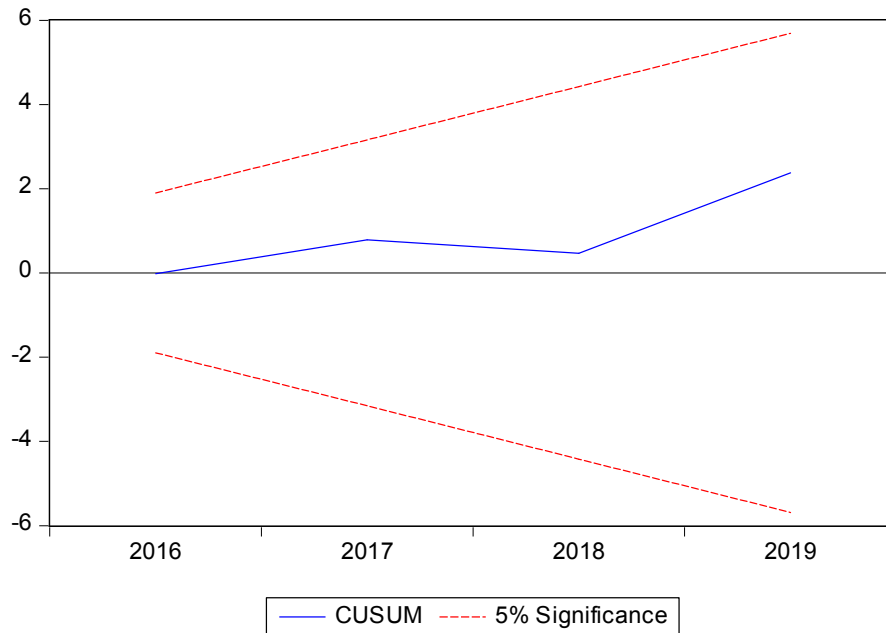
**Fig. 1. Normality test**

Source: E-views 9.0 version data output

**Table 8. Diagnostic test**

	<b>F-statistic</b>	<b>Prob.</b>
Serial Correlation LM Test	11.72407	0.0786
Heteroskedasticity Test	5.543738	0.0610

Source: Author's Calculation employing E-Views 9 Software



**Fig. 2. CUSUM text**

Source: E-views 9.0 version data output

**Table 9. OLS regression: Profit before tax and cashless policy**

<b>Dependent Variable: PBT</b>				
Dynamic regressors (0 lag, automatic): ATM POS MOBILE WEB				
Fixed regressors: C				
<b>Variable</b>	<b>Coefficient</b>	<b>Std. Error</b>	<b>t-Statistic</b>	<b>Prob.*</b>
PBT(-1)	0.985326	0.751520	1.311110	0.2600
ATM	-12349.92	13856.16	-0.891294	0.4231
POS	322637.8	100287.1	3.217142	0.0324
MOBILE	-97518.54	55448.10	-1.758735	0.1534
WEB	-952794.3	695290.4	-1.370354	0.2424
C	41717146	28007733	1.489487	0.2106
R-squared	0.990777	Mean dependent var		88269063
Adjusted R-squared	0.979248	S.D. dependent var		1.56E+08
S.E. of regression	22416506	Akaike info criterion		36.97220
Sum squared resid	2.01E+15	Schwarz criterion		37.15375
Log-likelihood	-178.8610	Hannan-Quinn criter.		36.77304
F-statistic	85.93745	Durbin-Watson stat		2.642781
Prob(F-statistic)	0.000369			

Source: Author's Calculation employing E-Views 9 Software

**4.6 Granger Causality Test**

Table 10 which is a Granger Causality test disclosed that there is a unidirectional/one-way causal relationship between profit before tax and Cashless policy at a 5% level of significance. Causality runs from profit before tax to point of

sale (POS) terminal, mobile banking, and web pay this shows that profitability can be the motivating factor for banks to adopt the cashless policy of the government. The result also indicates that there is no causality between the automated teller machine and profit before tax.

**Table 10. Granger causality output for cashless policy and profitability of DMBs**

<b>Null hypothesis:</b>	<b>Obs</b>	<b>F-statistic</b>	<b>Prob.</b>	<b>Implication</b>
ATM does not Granger Cause PBT	9	1.30001	0.3673	No Causality
PBT does not Granger Cause ATM		2.79058	0.1743	No Causality
POS does not Granger Cause PBT	9	4.37358	0.0985	No Causality
PBT does not Granger Cause POS		15.9818	0.0124	Causality
WEB does not Granger Cause PBT	9	4.71346	0.0887	No Causality
PBT does not Granger Cause WEB		26.3682	0.0050	Causality
MOBILE does not Granger Cause PBT	9	3.81152	0.1184	No Causality
PBT does not Granger Cause MOBILE		50.6861	0.0014	Causality

*Source: Author's Calculation employing E-Views 9 Software*

**5. SUMMARY, CONCLUSION, AND POLICY IMPLICATION**

**5.1 Summary and Conclusion**

The research work shows that there is a long-run relationship between the cashless policy and the profitability of deposit money banks in Nigeria. This indicates that in the long run cashless policy will help improve the profitability of deposit money banks by providing efficiency and lower cost of doing business in the country. The result of the short-run relationship revealed that cashless policy has an insignificant and negative effect on the profitability deposit money banks in Nigeria. The result is inconsistent with the findings of Agu and Agu [16], Okafor [17], Osazevaru, Sakpaide, and Ibubune [18], Werigbelegha and Avery [20], Ignoroje. and Okoroyibo [21] but in agreement with the study of Muotolu and Nwadiolor [19], Suberu, Afonja, Akande, and Adeyinka [24]. The insignificant effect shows many factors limit the operation of a cashless economy in the country. The cashless policy is all about the electronic payment system, Nigeria as of today has the problem of epileptic power supply which means that banks have to spend more money on power to keep their various branches and ATM in particular running. Equally, most of the banks in Nigeria are concentrated in the urban areas while the rural areas that have more illiterate and unbanked Nigerians have no access to electricity and good telecommunication network. Illiteracy and poverty level in the country is high and that's why some Nigerians still prefer cash economy, unlike the cashless economy. Again is the issue of fraud in the country due to the high unemployment rate in the country many youths in the country has entered into what we call yahoo yahoo or advance free fraud. Where they hack customers' bank accounts even banks this tends to discourage people from going cashless in the economy. The issue of Hushpuppi is an ideal example. It is estimated that 61% of Nigerians

are unbanked due to limited financial literacy and lack of financial infrastructure all these make Nigeria economy more of a cash economy and tends to limit deposit money banks profitability.

**5.2 Policy Implication**

The commencement of cashless policy by the government was to reduce the use of cash in the country, increased tax collections, and ensures greater financial inclusion, on the part of deposit money banks it is expected to lower the operational cost and increase banks profitability. Nevertheless, the much-anticipated benefits to the economy and deposit money banks have not been realized as such the study makes the following recommendations. There is a need for banks to provide banking services to all Nigerians especially those in the rural areas. Efforts should be made by banks to capture the unbanked as the number of people excluded in the financial system is still high in Nigeria. Banks should improve its financial infrastructure in the country. Modern and effective infrastructure like ATMs, POS, and the internet should be provided and get up to 40% of the Nigerian population. Power generation and distribution should be improved upon as no electronic banking can take place without adequate power supply. Telecommunications companies should improve their services by providing affordable, available, and fast internet services to all Nigerians. Banks should embark on massive education to their customers on the importance of the cashless policy and need to accept innovative products being offered to them. Banks should set up appropriate security processes and use up to date programs to limit the effects of fraud on their products.

**COMPETING INTERESTS**

Authors have declared that no competing interests exist.

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