

**ELECTRONIC BANKING AND THE PERFORMANCE OF DEPOSIT MONEY BANKS
IN NIGERIA**

BY

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DEPARTMENT OF BANKING AND FINANCE

FACULTY OF MANAGEMENT SCIENCES

UNIVERSITY OF BENIN

APRIL, 2024

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**A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF BANKING AND
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AWARD OF BACHELOR OF SCIENCE (B.Sc.) DEGREE IN BANKING AND
FINANCE**

APRIL, 2024

DECLARATION

I declare that:

This project work is based on a study carried out by me in the Department of Banking and Finance, University of Benin under the supervision of Dr. J. Obayagbona. All ideas and views are product of my personal research, effort and all references to works of others have been duly acknowledged.

Anita AyomikoCHUKWUEMEKA

Project Researcher

CERTIFICATION

This is to certify that this research work titled “Electronic Banking and the Performance of Deposit Money Banks in Nigeria” was carried out and submitted by Anita AyomikoCHUKWUEMEKA with the Matriculation Number MGS1907918 for the award of Bachelor of Science (B.Sc) degree in the Banking and Finance, University of Benin, Benin City.

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Date

DEDICATION

I dedicate this project to God Almighty for his guidance and protection all through my years in the university.

I also dedicate this project to my parents (Mr. and Mrs. Charles Chukwuemeka), whose contributions and encouragements have made sure that I give it all it takes to finish that which I have started.

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ABSTRACT

The study empirically examined the impact of electronic banking on deposit money banks performance in Nigeria for the period 2009 to 2023. The specific objectives of the study were to examine the impact of mobile banking (MBANK), internet banking (IBANK), point of sales terminal (POS) and automated teller machine (ATM) on deposit money banks performance. The fully modified least square econometric technique was employed for analysis of data and the results obtained indicate that mobile banking (MBANK) and point of sales terminal (POS) has significant negative impact on deposit money banks performance; internet banking (IBANK) and has significant positive relationship with deposit money banks performance; while automated teller machine (ATM) has a weak negative impact on deposit money banks performance in Nigeria. The study therefore conclude that, in the determination of deposit money banks performance (DMBP), MBANK, IBANK and POS are major factors to be considered by management, policy makers and the government. These variables must not be ignored in policy decision making otherwise, it will spell doom for the Nigerian banking industry.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The world has grown and advanced incredibly in recent years, particularly in the area of information and communication technology (ICT). Deposit money banks have been obliged to take advantage of this growth by communicating data and information via contemporary technology and the Internet in order to bring their clients more benefits and support their goal of service excellence (Sulieman & Ahlam-Jebreen, 2017). Thus, electronic banking is the delivery of a variety of value-added products and services to bank clients via electronic and communication networks. The use of information and communication technologies in banking operations is referred to as "electronic banking." Certain authors contend that e-commerce in the banking and financial services sector led to the development of electronic banking. Furthermore, banks handle payments for their customers when they shop at different online retailers. It's a general term for the process via which a client can conduct electronic banking transactions without visiting a physical location (Ukoh, 2019)

The development of technology, raised awareness, and deposit money banks' increasing ambition to provide electronic client service have all contributed to the highly dynamic and ever-changing business climate of today. According to Mawutor (2018), deposit money banks have long been pioneers in leveraging technology to enhance their offerings. These changing conditions, coupled

with an extremely uncertain economic environment, make the banking industry of the twenty-first century work in a complex and competitive setting. The present worldwide transformation curve of Nigeria's electronic banking system is centered on ICT. Managers in Nigeria's banking industry cannot disregard information systems because they have a big impact on the present banking system. Given that most banks' whole financial flow is dependent on information systems (Okafor, 2020).

As businesses search for methods to provide clients with faster and more affordable service, e-payment systems are becoming an increasingly crucial part of online business process innovation. In light of this, Chhabra, Suri, and Verma (2021) advise utilizing electronic payment methods wherever there is a need to exchange money, including in the public sector, banking, retail, healthcare, and internet markets. This covers the acquisition of banking services, insurance, and plane tickets. There are numerous benefits to employing an electronic method of transfer rather than the traditional clearing house, as banks are relying more and more on technology to process their payments (Joseph & Vennis, 2013). These benefits over traditional methods include safe payments, financial savings, timely payments, and easier cash management. They have made a large financial investment to introduce self-banking services in an attempt to raise the bar for customer care. The likelihood of lengthy lineups in banking halls has decreased with the rise of e-banking services. Financial services based on information and communications technology have significantly lowered the cost of providing financial services.

Banks typically assess their financial performance by reviewing indicators like capital adequacy, liquidity, and profitability. The main focus of this essay is on examining the growth in profitability within deposit money banks. Profitability serves as a critical safeguard against potential losses and is measured using metrics such as return on equity (RoE) and return on assets (RoA). Nigeria's banking sector has experienced substantial growth due to the increasing demand for convenient and accessible banking services, leading to a significant rise in the use of electronic banking channels. As a result, Nigerian banks are heavily investing in these electronic delivery channels to enhance services and improve customer satisfaction, while those not providing these services are witnessing a loss in customers (Adelegan, 2018).

One of the CBN's permitted charges is 1.25%, or 12.50 for each thousand transactions. A bank's largest and fastest-growing expense, after salaries and benefits, is currently technology. Furthermore, there have been examples of system failure and inconsistent online connectivity services recorded (Sulieman & Ahlam-Jebreen, 2017; Mawutor, 2018). This has impacted banks' operational efficacy and efficiency, which has had a detrimental influence on their productivity and overall financial performance. The purpose of this study is to evaluate the statement's veracity.

1.2 Statement of the Research Problem

Electronic banking is a critical element in assessing deposit money bank institutions' financial performance, but understanding its impact on banks remains complex. Firstly, the driving forces

behind electronic banking innovation lack clarity, hindering a full grasp of what fuels its progress in the banking sector. Secondly, the overall influence of these innovations on banks is still under research and debate. Integrating electronic solutions into traditional banking models, particularly in a swiftly changing technological landscape, presents both challenges and unexplored opportunities. Past studies offer conflicting outcomes, demanding a more nuanced and context-specific examination, especially within the Nigerian banking context.

While electronic banking systems have expanded in Nigeria's financial sector, empirical research on their relationship with banks' actual financial performance is notably lacking. This dearth of scholarly investigation undermines a comprehensive understanding of the positive and negative effects of adopting electronic banking on the operations and finances of Nigerian banks.

This study aims to bridge this gap by investigating how electronic banking systems impact on the performance of deposit money banks in Nigeria.

1.3 Research Questions

They seek to provide answers to the following research questions:

- i. What impact does mobile banking have on the performance of deposit money banks in Nigeria?
- ii. What effect does internet banking have on the performance of deposit money banks in Nigeria?

- iii. To what extent does Point of Sale (POS) impact the performance of deposit money banks in Nigeria?
- iv. What is the relationship between Automated Teller Machine (ATM) and the performance of deposit money banks in Nigeria?

1.4 Objectives of the Study

The main objective of this study is to examine the impact of electronic banking on the financial performance of deposit money banks in Nigeria. The specific objectives are to:

- i. Examine the effect of mobile banking on the performance of deposit money banks in Nigeria
- ii. Determine the impact of internet banking on the performance of deposit money banks in Nigeria
- iii. Ascertain the influence of point of Sales (POS) on the performance of deposit money banks in Nigeria
- iv. Evaluate the relationship between Automated Teller Machine (ATM) transactions and the performance of deposit money banks in Nigeria.

1.5 Research Hypotheses

The following hypotheses stated in their null forms will be tested in this study:

- i. Mobile banking has no significant effect on the performance of deposit money banks in Nigeria.
- ii. Internet banking has no significant impact on the performance of deposit money
- iii. Point of Sales (POS) has no significant influence on the performance of deposit money banks in Nigeria.
- iv. Automated Teller Machine (ATM) transactions does not have significant influence on the performance of deposit money banks in Nigeria.

1.6 Significance of the Study

The study will shed information on how electronic banking systems impact the financial performance of deposit money banks' in Nigeria. Its ability to make significant contributions to scholarly literature as well as the real-world banking business is what makes it significant. In order to fill in important knowledge gaps and offer a thorough grasp of how technology affects the banking industry, this research will explore the complex relationship between electronic banking systems and the performance of Nigerian banks.

- **Banking sector:** The study aims to offer empirical insights into the manner in which Nigerian banks' operational and financial performance are impacted by electronic

banking technologies, such as point of sale (POS), mobile banking, online banking, and USSD transactions. The banking industry can use this empirical data to inform strategic decision-making, which helps banks maximize their operational and technical investments.

- **Policymakers and Regulatory bodies:** Policymakers, regulatory agencies, and industry stakeholders will find the research's findings to be a fundamental source of information that provides a more thorough grasp of the benefits of adopting electronic banking in Nigeria's financial system. Through a thorough examination of the implications of these technological breakthroughs, the research can contribute to the development of policy, regulatory frameworks, and industry practices that will support technological innovation and maintain the stability and effectiveness of the banking sector.
- **Developing economies:** The findings of this study will not only help the banking sector in Nigeria, but they will also add to the larger worldwide conversation on the relationship between technology and finance. Through a thorough examination of the Nigerian banking industry, the research will provide significant comparative insights and lessons for other developing and emerging economies. This will lead to a more sophisticated comprehension of the effects of electronic banking systems on financial institutions across the globe.

1.7 Scope of the Study

This study will look at how the financial performance of deposit money banks in Nigeria over a ten-year period, from 2013 to 2023, in order to determine how much of an impact electronic banking technologies have on their operations. The inquiry will include a thorough examination of the effects on the financial performance indicators of these particular Nigerian banks of several electronic banking components, such as USSD transactions, mobile, online, and point of sale (POS) systems. This study aims to provide valuable insights into the multifaceted impact of electronic banking technology within the Nigerian banking landscape by carefully examining the correlation between the adoption and utilization of these electronic banking systems and the financial and operational performance of the banks.

1.8 Limitations of the study

The main limitation in this research is the uncertainty around the data's dependability. There is doubt over the dependability of the variables under investigation when there is a heavy reliance on secondary data. Variable value inconsistencies that stem from the used data sources severely restrict the study's results. To counteract this restriction, though, data from the more reliable and well-known Central Bank of Nigeria Statistical Bulletin would be given priority.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This section reviews literatures on electronic payment systems and performance of Banks in Nigeria. The section shall be in three (3) sections namely; conceptual review, theoretical review and empirical review. The conceptual review will discuss concepts related to the subject matter, that is electronic payment systems and performance of Banks in Nigeria. The theoretical review will highlight and briefly discuss relevant theories on the relationship between electronic payment systems and performance of Banks in Nigeria while the empirical review will present previous studies, adopted statistical tools and their respective findings.

2.2 Conceptual Review

2.2.1 Electronic Banking

"Electronic banking" refers to the utilization of electronic technologies in the operations of financial institutions, encompassing the internet, wireless connections, networks, ATMs, phones, and cell phones. As elucidated by Abaenewe, Ogbulu, and Ndugbu (2013), it involves the

electronic execution of banking activities, utilizing information and communication technology to enhance both short-term and long-term financial goals.

These systems represent an advanced method of delivering financial services, offering functionalities like cash withdrawals, money transfers, cash deposits, payment of utility and credit card bills, check book requests, and other financial inquiries. Imiefoh (2012) similarly characterizes electronic banking as any process enabling customers to conduct financial transactions online without physically visiting a bank. This includes the automated direct distribution of both traditional and innovative banking products and services through interactive electronic communication channels.

The term "e-banking" specifically denotes a service allowing customers to access account-specific information and potentially conduct transactions remotely, such as from their homes or places of business. Elisha (2010) emphasizes the convenience and flexibility of e-banking, highlighting its popularity due to advantages such as efficiency, quickness, and ease of use. Described as a new generation of banking systems, e-banking, or online banking, enables individuals or corporations to access accounts, conduct business transactions, or obtain information about financial products and services through public or private networks like the Internet or mobile phones.

Kavitha (2017) further defines electronic banking as the process of opening deposit accounts, paying bills electronically, and transferring money online via the internet. This can be facilitated

by banks with physical locations, dedicated websites, or virtual banks. The internet is strategically employed to provide high-value financial services and complex products efficiently, breaking down physical boundaries.

While many associate electronic banking with the convenience of accessing cash from ATMs or receiving direct deposits, it involves various processes. Electronic fund transfers (EFTs), as detailed in this article, utilize computer and electronic technology to conduct transactions, replacing checks and other paper-based methods. The federal Electronic Fund Transfer Act (EFT Act) governs specific electronic consumer transactions (Fox & Beier, 2016).

Electronic terminals like ATMs enable banking operations at almost any time. These terminals require the insertion of an ATM card and the entry of a Personal Identification Number (PIN) to withdraw cash, make deposits, or transfer money between accounts. Certain banks and ATM operators may impose fees, particularly for non-account holders or those making remote transactions. Pre-authorized direct withdrawals enable regular deposits (e.g., paychecks, Social Security checks) and automatic payments of recurring bills (e.g., insurance premiums, mortgage payments, and energy bills for consumers).

2.2.2 Types and Delivery Channels of e-banking

E-banking can be classified into three basic types. These include Internet banking, Smart card banking and Mobile/telephone banking.

- **Internet banking:** This type of online banking service allows for the online receipt and processing of client requests. Thanks to internet banking, customers can benefit from financial services from the comfort of their homes or places of business. This implies that customers can place orders online, instruct their banks to pay the seller the invoice amount, and request delivery of the items to a preferred location (Kavitha, 2017).
- **Mobile/telephone banking:** This means using wireless phones, either fixed or mobile, to conduct banking operations. The following are the steps: Voice or short message service (SMS) commands are sent to the computer, which decodes them and uses a highly coded device to carry them out. The client then receives the answer electronically.
- **Point of Sales Banking:** The terms "Point of Sale (POS)" and "Point of Purchase (POP)" refer to the specific time and location where a retail transaction is concluded, as outlined by Okeke, Nwatu, and Ezeh (2017). A Point of Sale (POS) terminal, interchangeably known as a POP terminal, serves as a swift and user-friendly tool for processing payments for goods and services. This terminal allows users to instantly access their linked bank accounts through the use of debit or credit cards. According to Awoniyi (2022), POS terminals are considered a virtual alternative for financial transactions. These terminals meticulously record all customer purchases and deposits, enabling users to check their balances, make purchases, and transfer money without the use of physical currency. In essence, the point-of-sale terminal facilitates the seamless virtual transfer of

money, providing businesses with the capability to monitor and trace customer transactions.

A device installed in a storefront that enables customers to make electronic card payments instead of using cash is referred to as a point-of-sale (POS) terminal. The adoption of POS terminals has substantially reduced reliance on cash-based transactions, as this technology allows cardholders to make payments at various sales or purchase outlets without the necessity for physical currency, as noted by Osang (2017). Noteworthy advantages of the POS terminal include convenience, enhanced security, and simplicity in the payment process, as highlighted by Morufu (2016). Users of POS terminals are typically issued electronic purses, a type of pre-issued card, which can be inserted into electronic devices for payment processing (Okonkwo & Ekwueme, 2022).

POS terminals share similarities with ATMs, as noted by Anyanwu and Anumaka (2020). Upon the completion of a transaction logged into the POS terminal, the equivalent cash amount is automatically transferred from the payer's account to the payee's account. Clients can utilize the POS terminal, primarily employed by merchants, to make payments, check their balances, and execute electronic fund transfers by simply inserting their smart card into the device and entering their Personal Identification Number (PIN).

- **ATM Banking:** Automated Teller Machines (ATMs) have significantly transformed the banking landscape in Nigeria, revolutionizing the way customers access their funds and

conduct financial transactions. The introduction of ATMs has greatly enhanced the operational efficiency of deposit money banks in the country, leading to improved performance and customer satisfaction. According to Adewale, Adediran, and Babajide (2017), ATMs have expanded the reach of banking services, allowing customers to perform various transactions such as cash withdrawals, balance inquiries, fund transfers, and bill payments conveniently and efficiently. This accessibility has contributed to increased customer retention and loyalty, as individuals can access banking services beyond traditional banking hours and locations. Moreover, ATMs have reduced the operational costs for banks by automating routine transactions, leading to enhanced cost-effectiveness and profitability within the banking sector (CBN, 2020). This increased efficiency has translated into improved financial performance for deposit money banks in Nigeria.

Furthermore, the proliferation of ATMs across Nigeria has played a pivotal role in financial inclusion by bridging the gap between urban and rural areas. The accessibility of ATMs in remote regions has empowered previously underserved communities, providing them with access to formal financial services. This aligns with the Central Bank of Nigeria's (CBN) financial inclusion goals, as highlighted by Adewale et al. (2017). The widespread availability of ATMs has facilitated financial literacy and inclusion initiatives, enabling more Nigerians to participate in the formal economy. The resultant increase in the banked population has had a positive impact on the overall

stability and growth of the Nigerian banking sector, reinforcing the significance of ATMs in enhancing the performance and reach of deposit money banks in the country.

2.2.3 Banking Sector in Nigeria

The global banking system, as defined by Mohammed, Ibrahim, and Muritala (2022), constitutes the worldwide financial intermediation that facilitates the transfer of money. The collaboration between payment systems and banking technologies plays a crucial role in promoting trade and business. The rapid integration of POS system technology and the substantial surge in internet usage have led to significant transformations in global banking procedures. Bingilar and Bariweni (2019) elaborate that the banking system encompasses a network of organizations, structures, tools, rules, guidelines, protocols, and technical processes facilitating money transfers between different parties and ensuring the adherence to agreements. Effective banking systems play a pivotal role in reducing transaction costs and are vital for the smooth functioning of third-party, interbank, and security payment systems. Conversely, systemic instability can lead to inefficient use of financial resources, unequal risk distribution among agents, and a decline in public trust in the banking system (Ezejiofor, Nwakoby, & Okoye, 2015).

Historically, colonial banks in Nigeria were established to serve the commercial needs of the Colonial Government. The Nigerian Central Bank, operational since July 1, 1959, is responsible for enforcing banking regulations in the country. The African Banking Corporation and British West Africa, later known as First Bank of Nigeria, were established in 1892, and Nigeria's Barclays Bank was formed in 1925 by the Anglo-Egyptian Bank and the National Bank of South Africa. The United Bank for Africa, initially named the British and French Bank for Commerce and Industry, commenced operations in Nigeria in 1948. The Industrial and Commercial Bank, Nigeria's first domestic bank, was established in 1929 and succeeded by Mercantile Bank in 1931. The African Continental Bank, the only native organization to continue after the Industrial and Commercial Bank's closure in 1949, and the Nigerian Farmers and Commercial Bank, an agricultural bank founded in 1947, contributed to the diversity of the banking landscape (Kavitha, 2017). The Central Bank of Nigeria (CBN) was established by the CBN Act of 1958, becoming operational on July 1, 1959, as the nation's central bank and ultimate monetary authority (Abubakar & Isa, 2021).

The CBN, mandated by the CBN Act, holds the responsibility of maintaining the country's foreign exchange reserves, promoting monetary stability, ensuring a sound financial environment, and acting as the federal government's banker of last resort and financial advisor. Its dual responsibilities occasionally place the central bank in complex regulatory situations (Kavitha, 2017). The CBN played a crucial role in credit allocation to the real sector after the Nigerian

civil war, responding to the government's directives to advance the economy. Over time, the bank evolved from consumer lending through commercial banks to direct loans to individuals, influenced by the indigenization program. Olaiya and Adeleke (2019) note the government's proactive role in establishing money and equity centers, a securities regulatory board, and the introduction of treasury products to the capital market by the central bank.

The evaluation of the banking system's performance is contingent upon its ability to meet the objectives set by management and investors (Abaenewe, Ogbulu, & Ndugbu, 2013). According to Olaiya and Adeleke (2019), trading patterns and stock prices are commonly employed to gauge the overall health of the banking system. The contemporary banking system is dynamic and undergoing rapid changes due to the industry's embrace of technology to enhance goods and services. Okonkwo and Ekwueme (2022) assert that the banking system of the twenty-first century operates in a demanding and competitive environment, characterized by various factors and an unstable economic landscape. Responding to scientific advancements, increased information availability, and evolving customer expectations, the modern banking system offers computerized services to customers. Through active system integration and compliance with laws, rules, and principles, the modern banking system provides the necessary functionality for money exchange through bank deposits.

2.2.4 Bank Profitability

Because it is used to determine the stability and dependability of the banking and financial sectors, the profitability of the banking industry is important. Profitability is defined as the variation in expenses and income over a given period of time, usually one fiscal year. Banks need to generate enough revenue in order to develop and flourish. The extremely challenging economic climate makes managing and planning profits more challenging. Three distinct variables each point to a distinct profitability aspect. The first and most important profitability ratio is the return on asset (ROA) ratio. The ability of the bank asset to produce income is shown by this ratio. Another ratio that talks about the returns to shareholders on their equity is the return on equity (ROE) ratio. The return on capital invested, or ROI, is a key metric used to evaluate a bank's efficiency. A bank's profitability is also indicated by its earnings per share (EPS). Tobin Q and net profit margin (NPM), according to a different researcher, are important measures of a bank's profitability (Kavitha, 2017).

2.2.5 Impact of Electronic Banking on Bank Performance

Due to the increasing popularity of internet-based banking and shopping in recent decades, there has been a significant rise in the utilization of POS terminals and electronic payment systems. POS terminals offer a secure and efficient method for processing e-payments, leading to a reduction in the reliance on check and cash transactions (Nwankwo & Agbo, 2021). The implementation of POS services in the banking industry has been identified as a means to enhance customer satisfaction and loyalty, expand market share, and reduce operating and

administrative expenses (Adetayo, Mokuolu, &Fayomi, 2021). Customers use POS terminals for various transactions such as withdrawals, transfers, and utility payments, drawn to features like confidentiality, transaction speed, friendly operators, competitive pricing, and convenient locations.

The adoption of POS terminals in banking transactions not only boosts customer satisfaction but also alleviates crowding in banking areas and reduces queues at ATMs (Nnamani &Makwe, 2019). POS systems have brought numerous benefits to the banking industry globally, including shorter checkout lines, improved hygiene, decreased reliance on physical cash, increased sales volume, simplified cash collection, enhanced customer service, greater convenience, expanded service options, and more cost-effective banking services (Adeoti&Osotimehin, 2012). The introduction of POS machines has particularly positively impacted the Nigerian banking sector, providing benefits for both banks and customers. Consumers can now manage their financial affairs online from any location, eliminating the need to physically visit a branch office (Chedrawi, Harb& Saleh, 2019). This has liberated consumers from branch hour restrictions, allowing them to conduct financial transactions at their convenience (Awoniyi, 2022). In essence, the introduction of point-of-sale (POS) technology has significantly influenced the banking system in Nigeria, offering customers a self-service option that eliminates time and location constraints while enhancing comfort and accessibility (Kavitha, 2017). Despite concerns about

security risks, POS terminals remain favored in Nigeria due to their accessibility, efficiency, speed, adaptability, and convenience.

Examining the relationship between electronic banking and financial performance requires an analysis of the connection between electronic banking indicators and financial performance. Electronic funds transfer, which involves the availability and use of electronic checks alongside cash deposits and withdrawals, contributes to increased bank transaction volumes. This service allows customers to request information from the bank server, facilitating inquiry services such as checking balances and micro statements through mobile devices. The expansion of the bank, facilitated by the availability of liquidity from customer deposits, enhances revenue and ultimately profits.

In a recent application, a collaboration between Nigerian telecom and utility companies, including water and electricity providers, and satellite companies, has further advanced electronic payments. Consumers can now pay bills directly through a mobile application or initiate bank transfers to utility providers, encouraging the deposit of funds due to the simplified process. The utilization of mobile banking has significantly impacted various industries, enhancing service quality and attracting customers seeking improved service delivery. The advent of mobile banking has transformed traditional banking procedures, necessitating a shift in marketing strategies to enhance the industry's overall performance. Successful commercial banks recognize the importance of adopting the right information technology, and mobile banking

emerges as a valuable avenue for marketing goods and services. Mobile banking's role becomes increasingly essential, driving improvements in service quality and efficiency, leading to increased customer loyalty and retention rates and a subsequent rise in market share, revenues, and profits for banks.

Despite the transformative impact of electronic banking on traditional banking services, security concerns remain a challenge that requires resolution to further enhance service delivery (Adewoye, 2013). A study conducted in 2013 emphasized the positive influence of mobile banking on commercial banks in Nigeria, citing benefits such as transactional convenience, time savings, quick transaction alerts, and cost savings contributing to improved customer satisfaction and relationships. The effective operation of mobile banking services relies on the provision and maintenance of public network systems, such as telephones. Scholars argue that mobile banking has not only changed banking procedures but also influenced marketing strategies, highlighting the need for information and communication technology (ICT) implementation, particularly in the form of mobile banking, to navigate the complex and competitive business environment. The integration of ICT, including mobile banking, has proven to increase customer satisfaction and business efficiency, playing a crucial role in attracting and retaining customers within the banking industry.

2.3 Theoretical Review

This section introduces the concept of customer loyalty and provides an overview of the adoption process for information systems. It also covers the factors that affect clients' acceptance of online banking. The purpose of all adoption models, such as the Theory of Planned Behavior (TPB), Theory of Reasoned Action (TRA), and Technology Acceptance Model (TAM), is to examine how technology is adopted in developed countries. However, the adoption of technology in developed and developing countries may differ due to the distinct challenges that developed and developing countries face.

2.3.1 Technology Acceptance Theory (TAT)

Warshaw, Davis, and Bagozzi (1989) provide TAT as a conceptual model to explain users' intention or level of acceptability toward information systems or new technology. TAT is based on the fundamentals of perceived usefulness and perceived ease of use. Perceived usefulness is the idea that using a particular new technology or information system will improve an individual's performance at work. The perceived ease of use gauges how easy it is for someone to pick up new information systems or technology. The model focuses more on the potential benefits that perceived usability may have. Exogenous factors such as the environment also induce perceived usefulness and perceived ease of use, which are antecedents.

Thus, important perceptual factors like perceived utility and perceived usability form the basis of TAT. In information technology research, TAT is widely used. Liu and Arnett (2010) examined the crucial elements to take into account when creating a successful website based on the TAT theory. Researchers have concluded from the empirical study that TAT is appropriate for examining new information technology acceptance intention or conduct and for explaining issues with online user behavior (Pavlou, 2013).

2.3.2. Theory of Planned Behavior (TRA)

Early research focused on the theory of reason action (TRA), which was first described by Fishbein & Ajzen in 1975. The cornerstones of TRA are the basic elements of attitude and subjective norm. It has been demonstrated that both variables have a positive impact on people's behavioral intentions, which in turn has a positive impact on people's actual behavior.

An individual's attitude is their evaluation, whether positive or negative, of how they carry out a particular behavior. The idea is the degree to which the performance of the behavior is evaluated favorably or unfavorably. The impression that an individual has of a particular behavior that is influenced by the views of significant others is known as the subjective norm (such as parents,

spouses, friends, and teachers). Behavioral intention is considered to be the direct precursor to behavior, as it indicates an individual's readiness to perform a particular behavior. However, the basic tenet of TRA is that voluntary behavior control is achieved through the application of willpower (Fishbein and Ajzen, 1975). Thus, the primary cause of the behavior is one's willingness. Consequently, Ajzen (1985) incorporates the theory of planned behavior (TPB) and updates TRA. TPB is based on three elements: attitude, subjective norms, and perceived behavioral control. Consequently, behavioral intention is influenced by attitude, subjective norms, and perceived behavioral control. Conversely, actual conduct is determined by behavioral intention. Among other things, perceived behavioral control has to do with how simple or complex an individual thinks a particular behavior to be. The use of the internet has become more pervasive and diverse in recent years. There have been more studies on TPB's use in electronic commerce.

2.3.3 Theory of Reasoned Action

The 1975 Theory of Reasoned Action (TRA) by Fishbein and Ajzen has been heavily utilized in in-depth marketing research. Behavior that goes beyond accepting technology has been explained by the four general principles of technology adoption (TRA): behavioral attitudes, subjective norms, intention to use, and actual usage. It argues that people evaluate the consequences of a particular behavior and then make plans to act based on those evaluations.

More specifically, TRA asserts that intentions—which are inferred from attitudes and subjective norms—can be used to forecast people's behavior. Retracing the steps of the prediction process, attitudes can be inferred from an individual's beliefs about the consequences of their actions. One can predict subjective norms by knowing how important other people think the behavior is. From a technological perspective, it is especially useful to note that TRA asserts that other factors that influence behavior only do so indirectly through altering attitude and subjective norms. Some examples of such variables are the system design characteristics, task characteristics, and user characteristics (like cognitive styles and other personality traits) (Pavlou, 2013).

As a result, TRA is a good choice for anticipating how people will use multimedia technologies. TRA is a highly generic theory, thus it does not identify which individual ideas would be relevant in particular circumstances. However, the inclusion of subjective norm constitutes a significant variable that is even absent from more widely used models.

2.4 Empirical Review

In their study, Abaenewe, Ogbulu, and Ndugbu (2013) examined the profitability performance of Nigerian banks following their complete adoption of the electronic banking system. Utilizing information obtained from four banks in Nigeria, the judgmental sampling approach was applied. Only these four banks have continued to trade on the Nigerian Stock Exchange and consistently maintained their brand names since 1997. The profitability of these banks was evaluated using returns on assets (ROA) and returns on equity (ROE). At a 5% level of significance, the data

were tested for performance indicators such as ROE and ROA using a standard statistical method for independent samples. The study discovered that the adoption of this strategy has improved Nigerian banks' returns on equity (ROE) favorably and significantly. However, research also showed that the returns on assets (ROA) of Nigerian banks have not significantly increased as a result of e-banking.

Agwu, Atuma, Ikpefan, and Aigbiremolen (2014) examined the obstacles that the Nigerian state faced when trying to market e-banking services. Using a mixed-method approach, the study gathered data via the use of questionnaires and interviewing techniques. Three distinct perspectives on the findings—user-based, institutional-based, and government-related roles—are offered by these multifaceted findings. Other findings were that there was insufficient policy framework to protect customers' money and that there was an inadequate educational disparity, especially between the North and the South. Each of these has obvious strategic implications, and the ensuing clear recommendation should be followed by all parties.

Amu and Nathaniel (2016) carried out a study on the relationship between electronic banking and the performance of Nigerian commercial banks. While client deposits acted as a stand-in for commercial banking success, the value of point-of-sale transactions represented electronic banking. The Engle-Granger cointegration model was used to analyze the data for the sample period spanning January 2009 to December 2013. The results show that while demand deposits and POS are cointegrated, savings and time deposits are not. It is recommended that commercial

banks and monetary authorities initiate a thorough education campaign for the banking public, as well as that they adopt e-banking channels for transactional purposes.

Sulieman and Ahlam-Jebreen (2017) looked into how customer loyalty at Jordanian commercial banks was impacted by electronic banking services. The accessibility, value, cost, website design, privacy, and ease of use of online banking services. The study included 400 randomly selected participants, and SPSS version 17 was used to analyze the study hypotheses and achieve the objectives. The study found that consumers' loyalty to commercial banks in Jordan is significantly impacted by the electronic banking services' usability, usefulness, website design, and privacy. The study found that the impact of accessibility on customer loyalty was insignificant.

Mawutor (2014) investigated the impact of electronic banking on a Ghanaian bank's profitability. The approach was numerically based. 150 clients of the selected Agricultural Development Bank branches were given questionnaires to complete in order to collect data regarding e-banking. The data gathered from the structured self-administered surveys were all arranged correctly. The application used for this was called the Statistical Package for Social Sciences (SPSS). Using inferential statistics, the hypothesis was tested and it was discovered that E-banking has an impact on the profitability of the Agricultural Development bank. The bank's net profit margin increased significantly in the year that e-banking was introduced (2011), and it increased again in

the following year (2013) despite slightly declining the following year (2012). The analysis shows that E=banking boosts ADB's profitability.

Agboola (2016) found that technology was the main factor driving competition in the banking industry through his research on Information and Communication Technology (ICT) in Banking Operations in Nigeria. He did this by examining the type and extent of novel technologies adopted, the degree of utilization of the identified technologies, and the impact of ICT device adoption on banks. Throughout his research, he observed an increase in the use of smart cards, ATMs, EFT, electronic home and office banking, and telephone banking. He contends that the use of ICT improves banks' standing and expands the market in a quicker, more efficient manner. To ascertain the effect of the point-of-sale (POS) payment method on the financial performance of deposit money banks in Nigeria, Okonkwo and Ekwueme (2022) carried out a study. Out of the 22 banks that are in operation in the nation, the writers sampled 13 deposit money banks using an ex post facto research design.

Regression analysis was performed using E-Views 9.0, a statistical program. The results showed that the POS payment mechanism had a detrimental effect on the return on assets of listed deposit money banks in Nigeria, even though this effect was not statistically significant at the 5% level of significance. The authors advise banks to host workshops and seminars to educate clients and company owners on the advantages of taking POS payments.

The adoption of digital banking in Nigeria was examined by Awoniyi (2022) using an enlarged Technology Acceptance Model (TAM) paradigm. A Cronbach's alpha test with a value greater than 0.70 suggested that the electronic surveys, which included 250 participants, were a reliable research tool. The sample size was determined by purposeful sampling, and the data were analyzed using multiple regression. Findings: Motive for digital banking adoption (as proxied by perceived usage, ease of use, security, and banking regulation) significantly impacted both mobile and internet banking ($AdR2 = 0.255$, $F = 8.357$, $p\text{-value} = 0.000$ and $AdR2 = 0.270$, $F = 8.960$, $p\text{-value} = 0.000$, respectively). The study concluded that the adoption of digital banking is driven by factors other than the traditional TAM variables, such as security and banking laws. As such, these factors should be considered in future models for technology adoption.

2.5 Gaps in Empirical literature

The majority of the studies focus on electronic banking in specific countries, such as Nigeria, Ghana, and Jordan. An empirical gap could involve more cross-country comparisons to identify similarities and differences in the impact of electronic banking across diverse economic and cultural contexts. Some studies, like the one by Agboola (2016), touch on the use of technology in banking operations over a period. However, there might be an empirical gap in more longitudinal studies that track the evolution and sustained impact of electronic banking over an

extended timeframe, considering technological advancements and changes in customer behaviour.

While some studies assess the impact of electronic banking on financial performance (e.g., Mawutor's study on a Ghanaian bank), there could be an empirical gap in more comprehensive assessments that consider various dimensions, such as customer satisfaction, operational efficiency, and overall organizational performance. The study by Okonkwo and Ekwueme (2022) touches on the effect of the point-of-sale (POS) payment method on financial performance. However, an empirical gap might exist in exploring the role of customer education and awareness in enhancing the adoption and success of new electronic banking methods.

While Awoniyi (2022) delves into factors influencing digital banking adoption, there may be an empirical gap in more in-depth examinations of the role of security measures and banking regulations in shaping customers' trust and confidence in electronic banking systems. The literature covers various aspects of electronic banking, including profitability, obstacles, and customer loyalty. However, there could be an empirical gap in studies that comprehensively analyze different electronic banking services (e.g., mobile banking, internet banking, POS payments) and their collective impact on financial institutions.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter focusses on the research methods adopted by this study which includes the research design, nature and sources of data, techniques of data analysis and model specification.

3.2 Research Design

In this study, ex-post facto design is adopted in obtaining, analyzing and interpreting data relating to the objectives of this study on the impact of electronic banking on performance of deposit money banks in Nigeria. This design enables the researcher to observe variables over a long period of time.

3.3 Population and sample

This study on the impact of electronic banking and performance of deposit money banks in Nigeria covers the period 2009 to 2023. The population of the study which is also the sample size is all the listed deposit money banks in Nigeria. The census sampling technique where population equals sample size was employed in the study.

3.4 Sources of Data

Relevant data for this study were sourced from the Central Bank of Nigeria Statistical Bulletin and it covered the period 2009 to 2023.

3.5 Model Specification

The dependent variable in this work is return on assets and was adopted as the proxy for deposit money banks performance (DMBP). The major explanatory variables in use in this study are mobile banking (MBANK), internet banking (IBANK), point of sales terminal (POS) and Volume of automated teller machine transactions (ATM). The model is generally specified as:

$$\text{DMBP} = f(\text{MBANK}, \text{IBANK}, \text{POS}, \text{ATM}) \dots \dots \dots 3.1$$

The equation can be re-written thus in line with the objectives of this study:

$$\text{DMBP} = \beta_0 + \beta_1\text{MBANK} + \beta_2\text{IBANK} + \beta_3\text{POS} + \beta_4\text{ATM} + \mu \dots \dots \dots 3.2$$

Where:

DMBP = Deposit Money Bank Performance (Proxied by return on assets (ROA))

MBANK = Mobile Banking

IBANK = Internet Banking.

POS = Point of Sales Terminal

ATM = Volume of Automated teller machine transactions

μ = Stochastic variable or error term.

Apriori Expectations are $\beta_1, \beta_2, \beta_3, \beta_4 > 0$

3.6 Method of Analysis

Three methods are used in the analysis of this study; these are unit root test, correlation coefficient and the Fully Modified Ordinary Least Squares (FMOLS). The was used to ascertain the stationarity properties of the data set, the correlation coefficient was used to ascertain the background characteristic among the data set. The Fully Modified Ordinary Least Squares

(FMOLS) was employed for the main estimation of the study. The FMOLS is a non-parametric analysis and is usually preferred to the OLS estimator because it takes care of small sample bias and endogeneity bias by taking the leads and lags of the first-differenced regressors. It also imposes additional requirements that all variables should be integrated of the same order [i.e.,I(1)] and that the regressors themselves should not be cointegrated (Philips, 1993).

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION AND ANALYSIS

4.1 Introduction

This chapter empirically investigate the impact of electronic banking on performance of deposit money banks in Nigeria. As stated in the previous chapter, the unit root test was used for

the stationarity property of the data, the correlation coefficient were used to analyze the background characteristics among the data set used. The fully modified Least Square (FMOLS) was used to analyze the data for the study.

4.2 Unit Root Analysis

The Augmented Dickey Fuller (ADF) test is employed in order to analyze unit roots. The results are presented in levels and first difference in Table 4.1. In the result, the ADF test statistic for each of the variables is shown in the second and fifth column, while the 95 percent critical ADF value is shown in the third and sixth column respectively. The result indicates that all the variables are not stationary at levels (see panel 1). However, after the first difference was taken, all the variables were now stationary (see panel 2). This implies that the variables are actually difference-stationary, attaining stationarity after the first differences of the variables. Thus, we would accept the hypothesis that the variables possess unit roots. Indeed, the variables are integrated of order one (i.e. I[1]).

Table 4.1: Unit Root Tests

	At Levels	Panel 1		First	Difference	Panel 2
Variable	ADF Test Statistic	95% Critical ADF Value	Remark	ADF Test Statistic	95% Critical ADF Value	Remark
DMBP	-2.368687	-3.098896	Non-Stationary	-4.078466	-3.144920	Stationary
MBANK	-2.786362	-3.098896	Non-Stationary	-5.287249	-3.119910	Stationary
IBANK	-2.143383	-3.098896	Non-Stationary	-4.676261	-3.119910	Stationary

POS	-1.874586	-3.098896	Non-Stationary	-3.754266	-3.119910	Stationary
ATM	-1.641601	-3.098896	Non-Stationary	-3.064446	-3.119910	Stationary

Source: Author's Computation 2024

4.3 Correlation Analysis

We present the ordinary correlations matrix to examine the background behavioural patterns in the data set. The results of the correlation matrix in table 4.2 below shows that deposit money banks performance (DMBP) Has a weak positive correlation values of 0.046916, 0.072829, 0.036270 and with mobile banking (MBANK), internet banking (IBANK) and point of sales terminal (POS); and a weak negative correlation value of -0.267992 with automated teller machine (ATM). On the other hand, mobile banking (MBANK) has a significant positive correlation values of 0.938556 and 0.889914 internet banking (IBANK) and point of sales terminal (POS); and a moderate positive correlation value of 0.470359 with automated teller machine (ATM). Also, internet banking (IBANK), point of sales terminal (POS) and automated teller machine (ATM) are positively and significantly correlated. Thus, we conclude that, the correlation matrix results above indicate the absence of multicollinearity among the hypothesized variables in the model.

Table 4.2: Pairwise Correlation Matrix

	ROA	MBANK	IBANK	POS	ATM
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DMBP	1				
MBANK	0.046916	1			
IBANK	0.072829	0.938556	1		
POS	0.036270	0.889914	0.985408	1	
ATM	-0.267992	0.470359	0.639919	0.705182	1

Source: Author's computation (2024).

4.4 The Fully Modified Least Square (FMOLS) Regression Analysis

In the results of the estimated FMOLS regression for the model that explain the impact of electronic banking and deposit money banks performance in Nigeria is presented in table 4.3 below and the diagnostic indicators are very good. The model is shown to have a high predictive ability as is shown in the high R squared value of 0.59. This shows that over 59 percent of the systematic variations in deposit money banks performance in Nigeria is captured by changes in the explanatory variables at any given period. The adjusted R-squared value of 0.29 percent is weak, indicating that the model has a weak predictive ability. Thus, we cannot reject the hypothesis of a significant linear relationship between deposit money banks performance and the hypothesized explanatory variables combined.

Now, considering the relevance of the individual variables in Table 4.3 above, we observed that the coefficient of mobile banking (MBANK) has significant negative impact on deposit money banks performance in Nigeria; as it passed the 1 percent significance level. This

suggests that mobile banking (MBANK) plays significant role in determining deposit money banks performance in Nigeria within the investigating period. However, the negative sign is an indication that as mobile banking (MBANK) increases in the country, deposit money banks performance reduces by approximately $-3.30E-07$ percent.

The coefficient of internet banking (IBANK) is seen to be positively related with deposit money banks performance, the variable passed the 1 percent significance level. This results further suggests that as the level of internet banking (IBANK) increases in the country, overall deposit money banks performance increases by approximately $2.93E-6$ percent.

The coefficient of point of sales terminal (POS) is significant and passed the 5 percent level of significance. By implication, point of sale terminal is potential factor affecting DMBP in the country. However, its negative sign indicates any increases in the use of POS reduces DMBP by $-3.91E-07$ approximately. However, those of automated teller machine (ATM) has a weak negative impact on deposit money banks performance, hence, the variable does not play any significant role in determining the performance of DMBs in Nigeria during the period of investigation.

We therefore conclude that, in the determination of deposit money banks performance (DMBP), MBANK, IBANK and POS are major factors to be considered by management, policy makers and the government. These variables must not be ignored in policy decision making otherwise, it will spell doom for the Nigerian banking industry.

Table 4.3: Electronic Banking and Deposit Money Banks Performance in Nigeria (FMOLS)

Variable	Coefficient	T-Ratio	Prob.
MBANK	-3.30E-07	-4.209474	0.0040**
IBANK	2.93E-06	3.778675	0.0069**
POS	-3.91E-07	-2.875465	0.0238*
ATM	-7.13E-09	-0.514871	0.6225
ROA(-1)	0.797580	3.561914	0.0092
Constant	1.267991	0.224923	0.8285
R ² = 0.59	= 0.29		

Source: Author's Compilations 2024 Note: **sig. at 1%; *sig. at 5% level

CHAPTER FIVE

SUMMARY OF FINDINGS, RECOMMENDATIONS AND CONCLUSION

5.1 Summary of Findings

In view of the empirical analysis in chapter four in relation to the impact of electronic banking and performance of deposit money banks in Nigeria, the following specific findings were made:

- (i) That mobile banking (MBANK) has significant negative impact on deposit money banks performance in Nigeria; as it passed the 1 percent significance level. This suggests that mobile banking (MBANK) plays significant role in determining deposit money banks performance in Nigeria within the investigating period.
- (ii) That internet banking (IBANK) is seen to be positively related with deposit money banks performance, the variable passed the 1 percent significance level. This results further suggests that as the level of internet banking (IBANK) increases in the country, overall deposit money banks performance increases by approximately 2.93E-6 percent.
- (iii) That point of sales terminal (POS) is negatively signed significant and passed the 5 percent level of significance. By implication, point of sale terminal is potential factor affecting DMBP in the country. However, its negative sign indicates any increases in the use of POS reduces DMBP by -3.91E-07 approximately.
- (iv) That automated teller machine (ATM) has a weak negative impact on deposit money banks performance, hence, the variable does not play any significant role in determining the performance of DMBs in Nigeria during the period of investigation.

5.2 Conclusion

The role of electronic banking in determining the performance of deposit money banks in any country across the globe cannot be over emphasized. In the extant literature, there is a general consensus that electronic banking is central to deposit money banks financial performance as well as overall profitability. For this reason, this current study was carried out in order to find out the extent to which electronic banking had impacted the performance of deposit money banks in Nigeria over the period 2009 to 2023. To this end, the fully modified least square econometric technique was employed for analysis of data and the results indicate that mobile banking (MBANK) and point of sales terminal (POS) has significant negative impact on deposit money banks performance; internet banking (IBANK) and has significant positive relationship with deposit money banks performance; while automated teller machine (ATM) has a weak negative impact on deposit money banks performance in Nigeria. The study therefore conclude that, in the determination of deposit money banks performance (DMBP), MBANK, IBANK and POS are major factors to be considered by management, policy makers and the government. These variables must not be ignored in policy decision making otherwise, it will spell doom for the Nigerian banking industry.

5.3 Recommendations

On the bases of the outcome of the empirical analysis of this study, the following useful recommendations for policy implementation and direction are made:

First, since the finding of this study has shown that mobile banking (MBANK) and internet banking (IBANK) are significant factors affecting deposit money banks performance in the Nigerian banking sector; therefore, appropriate policies aimed at devising measures for ensuring that MBANK has the much needed positive impact performance as well as sustaining the positive impact of IBANK on bank performance should not be overlooked by CBN and other relevant regulatory agencies.

Secondly, since the automated teller machine (ATM) is not a significant factor affecting deposit money banks performance in Nigeria, it therefore follows that the government, banks' management and regulatory authority should not relax in their current policy effort on automated teller machine (ATM). Rather, they should strengthen it in order to continuously ensure fraud-free electronic funds transfer relating to ATM usage in Nigeria. This will go a long way to boost customers' confidence in using this channel for business transactions and in turn, improve the overall financial performance of deposit money banks in Nigeria.

Finally, in view of the observed significant positive relationship between point of sale terminals (POS) and performance of deposit money banks, deliberate efforts with respect to engaging appropriate and current state of the art technology, with tracking and detective devices in minimizing the rate of fraudulent practices associated with the use of point of sale terminals (POS), should be vigorously pursued by management and the regulatory authority (CBN). Doing this will go a long to improve the overall financial performance of DMBs in Nigeria.

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APPENDICES

Dependent Variable: ROA		
Method: Fully Modified Least Squares (FMOLS)		
Date: 02/18/24 Time: 19:58		
Sample (adjusted): 2011 2023		

Included observations: 13 after adjustments				
Cointegrating equation deterministics: C				
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 3.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MBANK	-3.30E-07	7.84E-08	-4.209474	0.0040
IBANK	2.93E-06	7.75E-07	3.778675	0.0069
POS	-3.91E-07	1.36E-07	-2.875465	0.0238
ATM	-7.13E-09	1.39E-08	-0.514871	0.6225
ROA(-1)	0.797580	0.223919	3.561914	0.0092
C	1.267991	5.637442	0.224923	0.8285
R-squared	0.591419	Mean dependent var		5.270446
Adjusted R-squared	0.299575	S.D. dependent var		12.57753
S.E. of regression	10.52631	Sum squared resid		775.6219
Long-run variance	35.02184			

	ROA	MBANK	IBANK	POS	ATM
ROA	1	0.04691608455781714	0.07282944553196274	0.03627068058131674	-0.2679923072623135
MBA	0.04691608455	1	0.93855604864	0.88991482900	0.4703596716

NK	781714		20824	54355	773098
IBAN	0.07282944553	0.93855604864		0.98540887532	0.6399194327
K	196274	20824	1	47376	607719
POS	0.03627068058	0.88991482900	0.98540887532		0.7051826411
	131674	54355	47376	1	427662
ATM	-				
	0.26799230726	0.47035967167	0.63991943276	0.70518264114	
	23135	73098	07719	27662	1

Unit root test (at levels)

ROA

Null Hypothesis: ROA has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.368687	0.1667
Test critical values:	1% level		-4.004425	
	5% level		-3.098896	
	10% level		-2.690439	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 14				

Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(ROA)				
Method: Least Squares				
Date: 02/18/24 Time: 20:07				
Sample (adjusted): 2010 2023				
Included observations: 14 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ROA(-1)	-0.636983	0.268918	-2.368687	0.0355
C	3.140655	3.416460	0.919272	0.3761
R-squared	0.318595	Mean dependent var		0.005836
Adjusted R-squared	0.261812	S.D. dependent var		13.71676
S.E. of regression	11.78515	Akaike info criterion		7.903122
Sum squared resid	1666.678	Schwarz criterion		7.994416
Log likelihood	-53.32185	Hannan-Quinn criter.		7.894671
F-statistic	5.610679	Durbin-Watson stat		1.691451
Prob(F-statistic)	0.035486			

MBANK

Null Hypothesis: MBANK has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.786362	0.0852
Test critical values:	1% level		-4.004425	
	5% level		-3.098896	
	10% level		-2.690439	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 14				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(MBANK)				
Method: Least Squares				
Date: 02/18/24 Time: 20:07				
Sample (adjusted): 2010 2023				
Included observations: 14 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
MBANK(-1)	-0.800847	0.287417	-2.786362	0.0165

C	61736305	32349410	1.908421	0.0805
R-squared	0.392830	Mean dependent var	1125819	2
Adjusted R-squared	0.342232	S.D. dependent var	1.24E+08	
S.E. of regression	1.00E+08	Akaike info criterion	39.81639	
Sum squared resid	1.21E+17	Schwarz criterion	39.90769	
Log likelihood	-276.7147	Hannan-Quinn criter.	39.80794	
F-statistic	7.763814	Durbin-Watson stat	2.007965	
Prob(F-statistic)	0.016455			

IBANK

Null Hypothesis: IBANK has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-2.143383	0.2325
Test critical values:	1% level		-4.004425	
	5% level		-3.098896	
	10% level		-2.690439	

*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 14				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(IBANK)				
Method: Least Squares				
Date: 02/18/24 Time: 20:07				
Sample (adjusted): 2010 2023				
Included observations: 14 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
IBANK(-1)	-0.536561	0.250334	-2.143383	0.0533
C	13250431	8553410.	1.549140	0.1473
R-squared	0.276851	Mean dependent var		1865980.
Adjusted R-squared	0.216589	S.D. dependent var		28342038
S.E. of regression	25085689	Akaike info criterion		37.04506
Sum squared resid	7.55E+15	Schwarz criterion		37.13635
Log likelihood	-257.3154	Hannan-Quinn criter.		37.03661
F-statistic	4.594090	Durbin-Watson stat		2.104441
Prob(F-statistic)	0.053269			

POS

Null Hypothesis: POS has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.874586	0.3332
Test critical values:	1% level		-4.004425	
	5% level		-3.098896	
	10% level		-2.690439	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 14				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(POS)				
Method: Least Squares				
Date: 02/18/24 Time: 20:08				
Sample (adjusted): 2010 2023				
Included observations: 14 after adjustments				

Variable	Coefficient	Std. Error	t-Statistic	Prob.
POS(-1)	-0.431647	0.230262	-1.874586	0.0854
C	50014675	35862790	1.394612	0.1884
R-squared	0.226509	Mean dependent var		9189697.
Adjusted R-squared	0.162051	S.D. dependent var		1.16E+08
S.E. of regression	1.07E+08	Akaike info criterion		39.93884
Sum squared resid	1.36E+17	Schwarz criterion		40.03013
Log likelihood	-277.5719	Hannan-Quinn criter.		39.93039
F-statistic	3.514074	Durbin-Watson stat		1.892703
Prob(F-statistic)	0.085391			

ATM

Null Hypothesis: ATM has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-1.641601	0.4369
Test critical values:		1% level	-4.004425	

	5% level		-3.098896	
	10% level		-2.690439	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 14				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(ATM)				
Method: Least Squares				
Date: 02/18/24 Time: 20:08				
Sample (adjusted): 2010 2023				
Included observations: 14 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
ATM(-1)	-0.338800	0.206384	-1.641601	0.1266
C	1.46E+08	1.00E+08	1.456712	0.1709
R-squared	0.183388	Mean dependent var		6658012.
Adjusted R-squared	0.115337	S.D. dependent var		2.12E+08
S.E. of regression	2.00E+08	Akaike info criterion		41.19321
Sum squared resid	4.78E+17	Schwarz criterion		41.28450
Log likelihood	-286.3525	Hannan-Quinn criter.		41.18476
F-statistic	2.694854	Durbin-Watson stat		1.621617
Prob(F-statistic)	0.126602			

Unit root test (firs diff.)

ROA

Null Hypothesis: D(ROA) has a unit root				
Exogenous: Constant				
Lag Length: 1 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.078466	0.0107
Test critical values:	1% level		-4.121990	
	5% level		-3.144920	
	10% level		-2.713751	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 12				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(ROA,2)				

Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-5.287249	0.0013
Test critical values:	1% level		-4.057910	
	5% level		-3.119910	
	10% level		-2.701103	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 13				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(MBANK,2)				
Method: Least Squares				
Date: 02/18/24 Time: 20:11				
Sample (adjusted): 2011 2023				
Included observations: 13 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(MBANK(-1))	-1.438213	0.272015	-5.287249	0.0003
C	15924779	33601715	0.473928	0.6448

R-squared	0.717623	Mean dependent var	3616102.
Adjusted R-squared	0.691952	S.D. dependent var	2.18E+08
S.E. of regression	1.21E+08	Akaike info criterion	40.19883
Sum squared resid	1.61E+17	Schwarz criterion	40.28574
Log likelihood	-259.2924	Hannan-Quinn criter.	40.18096
F-statistic	27.95501	Durbin-Watson stat	2.333438
Prob(F-statistic)	0.000257		

IBANK

Null Hypothesis: D(IBANK) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-4.676261	0.0035
Test critical values:	1% level		-4.057910	
	5% level		-3.119910	
	10% level		-2.701103	

*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 13				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(IBANK,2)				
Method: Least Squares				
Date: 02/18/24 Time: 20:12				
Sample (adjusted): 2011 2023				
Included observations: 13 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(IBANK(-1))	-1.330193	0.284457	-4.676261	0.0007
C	2703637.	8079120.	0.334645	0.7442
R-squared	0.665322	Mean dependent var		248984.8
Adjusted R-squared	0.634897	S.D. dependent var		48107116
S.E. of regression	29068133	Akaike info criterion		37.34882
Sum squared resid	9.29E+15	Schwarz criterion		37.43574
Log likelihood	-240.7673	Hannan-Quinn criter.		37.33096
F-statistic	21.86742	Durbin-Watson stat		2.112160
Prob(F-statistic)	0.000676			

POS

Null Hypothesis: D(POS) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.754266	0.0169
Test critical values:	1% level		-4.057910	
	5% level		-3.119910	
	10% level		-2.701103	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 13				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(POS,2)				
Method: Least Squares				
Date: 02/18/24 Time: 20:12				
Sample (adjusted): 2011 2023				
Included observations: 13 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(POS(-1))	-1.123068	0.299144	-3.754266	0.0032

C	11024789	34949677	0.315448	0.7583
R-squared	0.561657	Mean dependent var		621141.3
Adjusted R-squared	0.521808	S.D. dependent var		1.82E+08
S.E. of regression	1.26E+08	Akaike info criterion		40.27600
Sum squared resid	1.74E+17	Schwarz criterion		40.36291
Log likelihood	-259.7940	Hannan-Quinn criter.		40.25813
F-statistic	14.09452	Durbin-Watson stat		2.060412
Prob(F-statistic)	0.003186			

ATM

Null Hypothesis: D(ATM) has a unit root				
Exogenous: Constant				
Lag Length: 0 (Automatic - based on SIC, maxlag=1)				
			t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic			-3.064446	0.0549
Test critical values:	1% level		-4.057910	

	5% level		-3.119910	
	10% level		-2.701103	
*MacKinnon (1996) one-sided p-values.				
Warning: Probabilities and critical values calculated for 20 observations				
and may not be accurate for a sample size of 13				
Augmented Dickey-Fuller Test Equation				
Dependent Variable: D(ATM,2)				
Method: Least Squares				
Date: 02/18/24 Time: 20:12				
Sample (adjusted): 2011 2023				
Included observations: 13 after adjustments				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(ATM(-1))	-0.918492	0.299725	-3.064446	0.0108
C	10291594	63636986	0.161723	0.8745
R-squared	0.460542	Mean dependent var		2967339.
Adjusted R-squared	0.411500	S.D. dependent var		2.99E+08
S.E. of regression	2.29E+08	Akaike info criterion		41.47946
Sum squared resid	5.78E+17	Schwarz criterion		41.56638
Log likelihood	-267.6165	Hannan-Quinn criter.		41.46160
F-statistic	9.390827	Durbin-Watson stat		1.792377
Prob(F-statistic)	0.010766			

DATA

YEAR	ROA	MBANK	IBANK	POS	ATM
2009	0	1,809,251	2,703,516	918,256	109,161,646
2010	0.4649	1,156,533	1,601,086	1,072,426	60,133,610
2011	0.2325	3,649,374	1,932,355	2,100,673	347,569,999

2012	0.3129	2,297,688	2,276,464	2,555,045	375,487,756
2013	0.1424	15,812,435	2,900,473	9,402,255	295,292,940
2014	0.1250	29,156,406	5,587,081	20,817,423	400,102,507
2015	0.1969	43,933,362	7,981,361	33,720,933	433,587,623
2016	1.5159	47,053,252	14,088,247	63,715,203	590,238,934
2017	0.0049	47,804,561	28,991,097	146,267,156	800,549,099
2018	0.1944	94,653,446	50,815,901	295,890,167	875,519,307
2019	-0.0861	377,265,208	103,497,007	438,614,182	839,819,922
2020	0.0798	41,473,006	20,382,111	83,762,144	202,959,732
2021	39.8432	63,300,927	27,594,789	103,933,015	221,659,945
2022	25.8723	113,067,332	26,692,867	121,345,008	212,826,437
2023	0.0817	159,423,943	28,827,240	129,574,015	202,373,808

Source: CBN Statistical Bulletin (2023)