# FINANCIAL TECHNOLOGY AND PERFORMANCE OF DEPOSIT MONEY BANK IN NIGERIA

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**A PROJECT WRITTEN AND SUBMITTED TO THE DEPARTMENT OF FINANCE, FACULTY OF MANAGEMENT SCIENCES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF SCIENCE(B.SC) DEGREE IN FINANCE OF THE UNIVERSITY OF BENIN, BENIN CITY.**

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## DECLARATION

I, Peter Osaro PAUL, do hereby declare that this project is undertaken by me in the department of finance, Faculty of Management Sciences, University of Benin, Benin City, Edo State under the supervision of Mrs. I. Ovie The work embodied in this project has not previously been submitted in candidature for any other degree and is not concurrently being submitted for any other degree. All references made to works of other persons have been duly acknowledged.

Any litigation or liability arising from this work is wholly bone by me and not the supervisor for this work.

_____ _____

Peter Osaro Paul

## CERTIFICATION

This is to certify that this project work was carried out by Peter Osaro Paul with Matriculation Number MGS2104769 in the Department of Finance, Faculty of Management Sciences, University of Benin, Benin city, Edo State, in partial fulfillment for the award of Bachelor of Science (B.Sc) in Finance.

**Mrs. I. Ovie** **Date**

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**Head of Department**

## DEDICATION

This project is dedicated to the Almighty God, the fountain of all wisdom, knowledge, and understanding, who has guided me through every step of this journey and granted me the strength and perseverance to complete this work and to my dearest parents, Mr. and Mrs. Paul, for their unwavering love, support, and guidance have been my constant inspiration, I dedicate this project as a token of my gratitude and love.

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**ABSTRACT**

This study examined the effect of financial technology on the performance of deposit money banks in Nigeria. Quarterly time series data for the period $2009Q_1$-$Q_4$ to $2023Q_1$-$Q_4$ was generated from the Central Bank of Nigeria Statistical Bulletin and global financial index of the World Bank. The study used the ordinary least squares multivariate regression estimation method to analyze the data generated. The findings reveal that that Internet banking, ATM usage and POS terminal usage have significant impact on deposit money banks performance in Nigeria while mobile banking has no significant effect on deposit money bank performance. According to the study's findings, financial technology (FINTECH) variables play a significant role in Nigeria's deposit money bank performance. Based on the findings, the study recommends that deposit money banks should improve their security on mobile transaction and also cut down the various charges associated with mobile transaction usage in Nigeria. Also, It's also important to solve Nigeria's poor Internet access. In order to gain consumers' trust, network communications security should also be strengthened. Concerns about security when using internet banking should be addressed by banks in order to reverse the negative impact on their performance. Furthermore, deposit money banks should upgrade ATM technology to include features like cardless transactions, biometrics, and improved security measures to enhance user experience and attract more customers and with more customers using this platform it will improve the performance of deposit money banks. In addition, the adoption rate of point-of-sale (POS) terminals in Nigeria should continue to be improved so that it will continue to contribute positively to deposit money bank performance. This can be done by lowering the excessive transaction fees and making improvements to the infrastructure needed to run POS, such as network access. This will further improve the performance of banks in Nigeria.

# Chapter One

# Introduction

## 1.1 Background to the Study

Technological innovation has been a principal driver of change in the global financial services industry. In developed economies and developing economies, financial technology (fintech) application has redefined how financial institutions deliver services, manage customer relationships, and compete in markets (Adewuyi & Okonkwo, 2023). Financial technology entails a sequence of digital infrastructure and tools—notably mobile banking, internet banking, automated teller machines (ATMs), and point-of-sale (POS) terminals—that enhance the efficiency, accessibility, and convenience of financial services (Ogunleye & Adesina, 2022).

The growth of fintech has tremendously impacted the business models of Deposit Money Banks (DMBs) in Nigeria. As of 2023, the Nigerian Inter-Bank Settlement System (NIBSS) reported that mobile transactions in Nigeria amounted to over ₦27 trillion, from ₦8 trillion in 2020—registering a 230%+ increase in three years (NIBSS, 2023). Similarly, volumes of POS transactions were over 1.2 billion in 2023, against a paltry 438 million in 2019, representing deepening retail penetration and access towards the adoption of cashless payment systems (CBN, 2023). Deposit Money Banks have, in turn, responded to these changes with major investments in digital infrastructure. Tier-1 banks such as Access Bank, Zenith Bank, and GTBank have been

developing mobile apps, expanding internet banking platforms, and using intelligent ATMs in a bid to remain competitive and enhance customer satisfaction (Adeleke & Yusuf, 2023).

The innovations have streamlined service delivery, reduced queuing time, expanded access among rural customers, and reduced operational costs in the long run. On a policy level, the Central Bank of Nigeria (CBN) has been influential in driving digital financial services through policies such as the National Financial Inclusion Strategy (Revised, 2018) and fintech testing regulatory sandboxes. Policy interventions aim to drive the financial inclusion rate from 64% in 2020 to at least 95% by 2024 (CBN, 2022).

Furthermore, implementation of the Cashless Policy and licensing of Payment Service Banks (PSBs) are part of broader plans to bridge the digital gap as well as foster financial innovation (Ede & Lawal, 2023). Despite these advancements, empirically supported impact of fintech on bank performance in Nigeria remains a source of ongoing controversy. Even though certain empirical studies show that fintech enhances profitability and operating efficiency (Okorie & Agu, 2022), others document persistent challenges. These include high technology acquisition costs, weak cybersecurity infrastructure, low consumer digital literacy, and high frequency downtimes of services—most especially in the rural and underserved segments (Chukwu & Musa, 2023). In addition, the sudden boom in online transactions has exposed banks to greater dangers of fraud and data breaches, resulting in massive financial and reputation losses.

A comparative analysis among other African economies reveals that while Nigeria leads the continent in terms of digital transaction value, it also lags Kenya and South Africa on customer satisfaction, network stability, and fintech integration into core banking operations (World Bank, 2023). For instance, the M-Pesa platform has achieved virtually universal coverage among

Kenyan adult citizens, while Nigerian fintech products fall behind on scaling up with regulatory challenges and consumer confidence-related issues. With such realities in existence, it becomes imperative to examine the distinctive contribution of leading fintech platforms—i.e., mobile banking, internet banking, ATM withdrawals and deposits, and POS transfers—to Deposit Money Banks' financial and business performance in Nigeria. This study attempts to fill the gap by providing empirical evidence that will guide bank managers, policymakers, and fintech operators on how best to utilize technology to achieve sustainable banking performance.

### 1.2 Statement of the Problem

The Nigerian financial sector has undergone dramatic transformation with the increased application of financial technology (fintech) in its operations. This transformation has introduced new avenues such as mobile banking, internet banking, automatic teller machines (ATMs), and point-of-sale (POS) terminals, all aimed at greater access, improved service delivery, and increased operational efficiency. But the extent to which these technologies manifest themselves in terms of measurable improvement in bank performance is not settled. Scholars have looked at so many features of this fintech revolution, and yet there are gaps. For instance, Okorie and Agu (2022) found that mobile banking has the impact of significantly boosting bank profitability, especially in cities, but that the impact in semi-urban and rural regions is less evident due to infrastructural limitations. Adewuyi and Okonkwo (2023) further argued that even though fintech is improving transaction volumes as well as customer experience, concerns of cybersecurity threats, user education, and inconsistent service quality all continue to erode its benefits. In another work in the same vein, Chukwu and Musa (2023) observed that while ATMs and POS terminals improve access to banking services, their contribution towards operational

efficiency is overshadowed by high maintenance costs and frequent outages. Despite these significant contributions, among the most significant gaps in the literature is the sparse multi-channel examination of fintech instruments earlier research analyzes a single channel (e.g., mobile banking or automated teller machines) rather than cross-testing multiple fintech indicators simultaneously.

In addition, there has been extremely limited empirical work that connects these technologies to performance metrics such as profitability, operational efficiency, and customer satisfaction in Nigerian deposit money banks. This complicates decision-making by practitioners and policymakers on technology investment and deployment strategies based on evidence. This current study endeavors to close this gap by carrying out an empirical examination of the impact of four significant fintech channels—mobile banking, internet banking, ATM services, and POS terminal usage—on the performance of deposit money banks generally in Nigeria. With the incorporation of the different fintech indicators and the evaluation of the combined effect on bank profitability, operational efficiency, and customer satisfaction, the study proposes a more holistic and evidence-based understanding of the fintech–performance relationship in the Nigerian banking sphere.

### 1.3 Research Questions

For the achievement of the above objectives, the study will answer the following questions:

1. What is the effect of mobile banking on the performance of deposit money banks in Nigeria?

2. How does internet banking affect the performance of deposit money in banks in Nigeria?

3. What is the effect of ATM usage on the performance of deposit money banks in Nigeria?

4. What is the effect of POS terminal on performance of deposit money banks in Nigeria?

### 1.4 Research Objectives

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

1. Examine the effect of mobile banking on the performance of deposit money banks in Nigeria.

2. Determine how internet banking affects the performance of deposit money banks in Nigeria.

3. Assess the effect of ATM usage on the performance of deposit money banks in Nigeria.

4. Investigate the effect of POS terminal usage on the performance of deposit money banks in Nigeria.

### 1.5 Hypotheses Of Study

The following null hypotheses will be tested in the course of the study:

1. Mobile banking has no significant effect on the performance of deposit money banks in Nigeria.

2. Internet banking has no significant effect on the performance of deposit money banks in Nigeria.

3. ATM usage has no significant effect on the performance of deposit money banks in Nigeria.

4. POS terminal usage has no significant effect on the performance of deposit money banks in Nigeria.

## 1.6 Significance of the Study

This study is of significant concern to numerous stakeholders in the Nigerian financial sector. To bank managers and executives, the results of this research will provide greater insight into which specific fintech channels—e.g., internet banking, mobile banking, ATMs, and POS terminals—help best optimize bank performance. Such information will guide strategic technology adoption, resource allocation, and customer service improvements. The regulators, and specifically the Central Bank of Nigeria (CBN), will benefit from the research by obtaining evidence-based knowledge that can be utilized for informing digital banking policy-making and fintech regulation as well as designing financial inclusion strategies. Such knowledge will help in developing a more stable, safe, and innovation-friendly financial system. For investors and shareholders, the study offers valuable guidelines for understanding the operational effects of fintech investment on deposit money bank profitability and efficiency. This insight will aid in decision-making on funding, partnerships, and risk management. Lastly, the study contributes to academic research by bridging a research gap on the cumulative effect of different fintech tools on banking performance in Nigeria. The study will be of much use as a reference to scholars and researchers working on changing dynamics between financial technology and institution performance, particularly in the emerging market context.

## 1.7 Scope of the Study

This study centers on how financial technology has influenced the performance of some deposit money banks in Nigeria. The study targets four fintech measures—mobile banking, internet banking, ATM usage, and deployment of POS terminals—for the period 2009-2024. The analysis is based on aggregated data from selected deposit money banks operating in Nigeria.

### 1.8 Limitation of the Study

Notwithstanding this study's importance and expected contributions, some limitations are noted. First off, the study only looks at four fintech indicators: ATM usage, mobile banking, internet banking, and POS terminal deployment. It ignores other new fintech developments like blockchain, USSD banking, and agency banking, which could also have an impact on bank performance. Second, only a few Deposit Money Banks were included in the study (Zenith Bank, Access Bank, First Bank of Nigeria, and Guarantee Trust Bank). This may limit the findings' applicability to smaller banks or microfinance organisations. Accurate trend analysis may also be hampered by data consistency and availability, particularly for the years 2009-2014, given the changing operational and regulatory environment. Additionally, the study uses secondary data that may have been self-reported, which could have biases or inconsistent reporting standards. Last but not least, the findings' long-term applicability may be constrained by the dynamic nature of fintech and ongoing shifts in technology adoption, particularly in the absence of longitudinal tracking or real-time data updates.

# CHAPTER TWO

# LITERATURE REVIEW

## 2.1 Introduction

This chapter reviews relevant literature on fintech and bank performance, covering conceptual issues, theoretical underpinnings, empirical findings, and identified research gaps.

## 2.2 Conceptual Literature

### 2.2.1 Performance of Deposit Money Banks

The performance of deposit money banks has been conceptualized in various ways by scholars and regulatory authorities. Onaolapo and Odetayo (2023) define it as the extent to which banks achieve their business objectives and strategic goals, often measured by indicators such as profitability, operational efficiency, customer satisfaction, and financial inclusion. Similarly, Okonkwo and Adebayo (2022) describe bank performance as the ability of a financial institution to effectively utilize its resources to generate revenue, maintain competitive advantage, and satisfy stakeholder expectations. Ezeani and Okeke (2021) emphasize that bank performance encompasses the capacity of deposit money banks to deliver timely, cost-effective, and reliable financial services while simultaneously achieving growth in both customer base and financial returns. From a regulatory perspective, the Central Bank of Nigeria (CBN, 2022) views bank

performance as the measurable output of banking operations, which includes profitability, efficiency in transaction processing, and the extent of service coverage aimed at promoting financial inclusion. Collectively, these definitions suggest that the performance of deposit money banks is multidimensional, integrating financial outcomes, operational efficiency, and customer-focused metrics.

The performance in this study of deposit money banks entails the extent to which they meet business and strategic goals, particularly as set forth by adopting financial technology innovations. Performance is often measured using proxies such as return on assets (ROA), return on equity (ROE), net interest margin, customer base expansion, and transaction efficiency (Onaolapo & Odetayo, 2023). The Nigerian banking sector has also undergone significant developments in the past decade, primarily by virtue of the consolidation of electronic channels such as internet banking, mobile banking, automated teller machines (ATMs), and point-of-sale (POS) terminals. Fintech-driven services, according to the Central Bank of Nigeria (2023), have covered an average annual growth of 12.4% in the value of electronic payment transactions between 2015 and 2022, signifying a move away from traditional over-the-counter modes towards online platforms.

Relative to earlier pre-fintech adoption eras, recent data show that deposit money banks have recorded faster turnaround times for transactions, lower operating costs, and improved rates of financial inclusion (Okonkwo & Adebayo, 2022). For instance, the Nigerian Inter-Bank Settlement System (NIBSS) reported that the value of electronic payment transactions in 2022 was over ₦500 trillion, up from ₦80 trillion in 2015, representing over a 500% growth within a seven-year period. This surge is indicative of increased operating efficiency as well as more

widespread service coverage, both of which are the very fabric of bank performance. In addition, a comparative analysis of greater deposit money banks demonstrates that banks with higher fintech penetration, for instance, those with solid mobile and internet banking platforms, have higher chances of uncovering improved profitability ratios and customer retention compared to less digitally networked counterparts (Ezeani & Okeke, 2021).

Also, the use of digital banking has enabled banks to extend their customer base beyond geographical branch limitations to rural and previously unbanked communities, thereby assisting Nigeria's financial inclusion push (CBN, 2022). The expanded ability to process high volumes of transactions in real-time has also enhanced banks' competitiveness and robustness, particularly when the economy is experiencing shocks, such as the COVID-19 pandemic, where dependency on digital channels grew more than 40% (NBS, 2021). Therefore, the performance of the Nigerian deposit money banks can be seen as being irretrievably entrenched with their capacity to embrace and leverage fintech solutions in order to maintain revenue growth, efficiency, and customer satisfaction.

### 2.2.2 Measurement of deposite money bank performance

Profitability

Operational Efficiency

Customer Satisfaction

Transaction Volume and Outreach

**1. Profitability**

Profitability, as measured by Return on Assets (ROA) and Return on Equity (ROE), remains a fundamental indicator of the performance of Nigerian deposit money banks. ROA is an illustration of how efficiently the bank is employing its assets in making profits, while ROE indicates the return to the shareholders for the capital invested. During the past several years, the integration of financial technology (fintech) products—internet banking, mobile banking, automated teller machines (ATMs), and point-of-sale (POS) terminals—has significantly influenced these profitability ratios. For instance, the Central Bank of Nigeria (CBN, 2024) statistics indicate that the average ROA of major tier deposit money banks rose from 1.8% in 2015 to 2.6% in 2023, while the average ROE rose from 12.4% to 18.9% during the same period. This rise is a result of enhanced operational efficiency, reduced transactions cost, and enhanced customer outreach facilitated by digital channels. Comparatively, banks with more elevated fintech adoption levels—as measured by the proportion of transactions conducted on digital platforms—have continued to outperform peers with slower adoption. For example, a comparative analysis by the Nigeria Deposit Insurance Corporation (NDIC, 2023) shows that banks with over 70% of transactions conducted on digital channels reported ROEs 3–5 percentage points higher than those with less than 50% digital transaction penetration. In addition, the profitability advantage is not the preserve of the large banks; some of the mid-sized

banks, driven by assertive fintech drives, have posted ROE numbers close to those of traditional market leaders, highlighting the democratizing effect of technology on the sector. However, it is important to note that while fintech adoption increases profitability, it also exposes banks to greater cyber risks and technology maintenance costs, which can moderate the net benefit if not properly managed (Ogunleye & Salami, 2022).

**Return on Assets (ROA)**

Return on Assets (ROA) is a simple profitability measure that reflects the capability of a bank to use its total assets to generate net returns. It reflects management success in generating recurring earnings from loans, investments, and deposits. The greater the ROA, the greater the income generated by the bank relative to its asset base and therefore reflective of sound operating efficiency and efficient resource utilization (Owolabi & Ajayi, 2022).

In the Nigerian context, adoption of electronic banking channels—i.e., mobile phones, internet banking, automated teller machines (ATMs), and point-of-sale (POS) terminals—has had a tangible impact on ROA. The technologies reduce the cost of transactions, reduce reliance on physical branches, increase speed and number of transactions, all of which are positive to asset productivity. The Central Bank of Nigeria (CBN, 2024) reported that deposit money banks recorded a steady rise in ROA between 2020 and 2023, largely due to efficiency gains from digital transformation.

Empirical studies support this observation. Akintunde, Oladejo, Azeez, and Oyeleye (2023) found a statistically significant positive relationship between fintech expenditure and ROA among Nigerian deposit money banks over a fifteen-year period, highlighting that digital

investments yield measurable improvements in profitability. Similarly, Yua, Daniel, and Epor (2023) discovered that ATM and POS payments positively and in the long run affected ROA, whereas mobile banking payments negatively affected ROA though significantly, proving that not all digital channels contribute equally to asset-based performance. In another study, Adebayo and Hassan (2021) noted that every additional increase in ATM usage was accompanied by higher profitability metrics, such as ROA, due to increased customer convenience and transaction volume.

The appropriateness of ROA to the present study is that it could show how financial technology is making overall bank performance. Since ROA is a direct measure of profitability from the utilization of assets, its movement in correspondence with the adoption of fintech would provide a clear picture of whether or not banks are actually gaining profit through technological progress. The evidence presented that some channels such as ATMs and POS terminals enhance ROA, but others such as mobile banking have ambiguous implications reinforces the need for conducting a contextual analysis of the cumulative and comparative effect of these channels. This makes ROA a critical determinant of whether or not online banking projects are effective and culminate in measurable monetary outcomes for Nigerian deposit money banks.

**Return on Equity (ROE)**

Return on Equity (ROE) is among the most significant profitability ratio that examines the return obtained on shareholders' equity, reflecting the degree of profit which banks earn on each unit of investors' resources. A high ROE is usually favored by both the management and the shareholders as it reflects maximum utilization of equity capital and the ability of the bank to create high financial value (Okonkwo & Adebayo, 2022). While, ROE is also utilized to levels of

leverage, where extremely high levels at some points reflect high-risk-taking and not always genuine profitability (Ogunleye & Salami, 2022).

For the Nigerian banking sector, financial technology growth has added to a significant impact on ROE performance. By expanding customer outreach, increasing non-interest income streams, and reducing operational bottlenecks, fintech channels such as internet banking, POS systems, and mobile apps have enabled banks to increase efficiency and, in the process, improve returns to shareholders. The Nigeria Deposit Insurance Corporation (NDIC, 2023) indicated that banks with over 70% of their activities conducted digitally had mean ROEs of 19.5%, compared to 14.2% for banks with below 50% digital penetration. This difference of 5.3 percentage points is the clear profitability advantage of high digital adoption.

Underpinning this trend, Akintunde et al. (2023) found that fintech infrastructure capital investment had a strong and positive effect on ROE, while short-term operational fintech expenditure had no quantifiable effect. Similarly, Yua, Daniel, and Epor (2023) found that electronic payment channels, particularly ATMs and POS terminals, made a disproportionate contribution to the growth in ROE for Nigerian deposit money banks. A comparative study by Owolabi and Ajayi (2022) also showed how banks in the top quartile of fintech adoption continued to outperform counterparts in ROE, with an average of 17–20%, whereas low-adoption banks averaged below 13%.

But as fintech boosts shareholder returns, values of ROE must be carefully interpreted. While high ROE largely dependent on excessive leverage can expose banks to systemic risks, especially in volatile macroeconomic environments (Adebayo & Hassan, 2021), there must be sustainable ROE growth through efficiency brought on by innovation and not risk-based

financial models. For this study, ROE is particularly significant because it numerically measures the extent to which the adoption of fintech enhances shareholder value. Because investor trust in the banking sector is highly correlated with profitability indicators such as ROE, understanding the fintech–ROE relationship provides valuable information about the overall theme of how digitalization enhances Nigerian deposit money banks' performance.

**2. Operational Efficiency**

Operational effectiveness, as measured in terms of the cost-to-income ratio and the average time to complete transactions, remains a major determinant of profitability and competitiveness in Nigerian banking (Central Bank of Nigeria [CBN], 2024). The cost-to-income ratio, or the quantum of funds expended by a bank to generate one unit of income, has remained on the upward trend over recent years, with sector averages declining from 68% in 2019 to 61% in 2023 due to increased automation, branch rationalization, and digitisation of customer care (Nigerian Inter-Bank Settlement System [NIBSS], 2024). For top-tier banks such as Zenith Bank and Access Bank, their percentages are less than 55%, indicating superior operational efficiency compared to mid-profile banks whose percentages are still over 65%, due mainly to higher overhead costs and lower economies of scale (Okonkwo & Ibrahim, 2023).

Average transaction processing time has also risen significantly as banks introduce advanced core banking systems and fintech interfaces, with real-time gross settlement transactions now being processed within less than 30 seconds on average, from over two minutes in 2018 (NIBSS, 2024). Mobile bank transactions, accounting for over 45% of retail payment volumes, now take just an average of under 15 seconds to settle in top-performing banks, compared to over 25 seconds in poor-performing institutions (Ojo & Adebayo, 2023). Banks with advanced process

automation architectures always outperform those relying significantly on manual processing, and studies have shown that a 10% reduction in transaction time is comparable to a 3–5% differential in one-year customer retention rates (Ojo & Adebayo, 2023). Compared to some regional peers, Nigerian banks also lag in terms of operational efficiency; for instance, the South African banks operate with an industry cost-to-income ratio of approximately 55% and clear most retail transactions within 10 seconds, leaving room for additional Nigeria-based optimisation (CBN, 2024). This lack of efficiency marks the need for continued investment in AI-driven process optimisation, cloud-based systems, and employee reskilling to ensure competitiveness in a fast-digitalising financial landscape (Okonkwo & Ibrahim, 2023).

**3. Customer Satisfaction**

Customer satisfaction, as measured by the customer complaint resolution rate and the service reliability index, has become a decisive factor in measuring the competitiveness of deposit money banks in Nigeria. The customer complaint resolution rate measures the ratio of complaints resolved within a given service level agreement, whereas the service reliability index quantifies the reliability and consistency of banking services on physical and online platforms. According to the Consumer Protection Department of the Central Bank of Nigeria (CBN, 2024), complaints settlement across the industry was 82% in 2018 but had grown to 93% in 2023, largely because of the introduction of automated complaint management systems, customer care through chatbots, and processes of speedy escalation. This improvement accompanies enhanced service reliability, which, as determined by the Nigerian Inter-Bank Settlement System (NIBSS, 2024), attained a sector-wide average score of 87% in 2023 compared to 78% in 2019,

measuring fewer instances of failed transactions and less downtime in internet and mobile banking avenues.

Comparative performance data reveal that Tier-1 banks that have end-to-end omnichannel platforms that enable customers to execute smooth transactions via mobile applications, web pages, ATMs, and branch networks achieve increased resolution rates as well as service reliability scores. For example, Tier-1 banks such as Zenith Bank and GTBank consistently achieve resolution rates of above 95% and reliability scores of above 90%, performing better than several Tier-2 banks with scores lower than the industry average. This performance gap directly impacts customer loyalty, with NIBSS survey data showing that banks with complaint resolution performance in the top quartile are 1.6 times more likely to be retained by customers over three years than banks with performance in the bottom quartile. In addition, although fintech-powered banks have higher digital reliability rankings, they also experience a greater absolute number of complaints because of greater volumes of transactions, necessitating ongoing investment in customer care systems to maintain levels of satisfaction (Okonkwo & Adebayo, 2023).

**4. Transaction Volume and Outreach**

Transaction volume and coverage in deposit money banks are important indicators of their size of operations as well as market coverage, especially for financial technology adoption. The volume of transactions processed indicates the capacity of banks to serve increased customer needs via various fintech outlets such as mobile banking, online banking, Automated Teller Machines (ATMs), and Point of Sale (POS) terminals that have progressively risen in Nigeria since the last ten years (Ogunleye & Adepoju, 2023). For example, the Central Bank of Nigeria

(CBN) reported that electronic payment transactions grew from ₦48.4 trillion in 2019 to over ₦611.1 trillion in 2023, an indication of the rapid adoption of fintech products within banking transactions (CBN, 2024).

Customer reach, rural and urban alike, has also expanded due to digital banking channels eliminating the need for physical branch presence (Okonkwo & Ugochukwu, 2022). While urban centres account for the majority of transactions due to higher technology penetrance, rural reach has been supplemented by agent banking and mobile money services, growing financial inclusion among previously excluded groups (Eze & Nwachukwu, 2023). In 2022, Nigeria Inter-Bank Settlement System (NIBSS) reported that rural agent banking transactions increased by 78% compared to the same period last year, which is an indicator of heightened adoption of fintech in the rural regions (NIBSS, 2023). Conversely, greater transaction volume and reach in Nigerian banks are signs of better competitive position and customer loyalty, as captured in Tier-1 bank performance reports, where they processed over 65% of all electronic transactions in 2023 (Ogunleye & Adepoju, 2023). The statistics show that fintech-harbored growth in transactions not only increases the size of business but also supports national financial inclusion objectives (CBN, 2024).

### 2.2.3 Financial Technology (Fintech)

Financial technology or fintech refers to the application of digital technologies to enhance the delivery of financial services, facilitating faster transactions, enhanced efficiency, and greater accessibility to individuals and organizations as well (Ozili, 2023). Fintech has transformed the global banking sector during recent times by integrating mobile applications, digital banking platforms, blockchain technologies, and artificial intelligence into the traditional financial system

(Arner, Barberis, & Buckley, 2020). In Nigeria, the adoption of fintech solutions has picked up speed through improved smartphone penetration, improved internet connection, and regulatory initiatives promoting cashless payment (CBN, 2022). For example, data from Nigeria Inter-Bank Settlement System (NIBSS) show that electronic payment transactions increased from ₦80.4 trillion in 2019 to more than ₦600 trillion in 2023, evidently showing the leading role technology plays in expanding banking operations (NIBSS, 2023).

The quick pivot towards fintech-based banking services has also been driven by customer needs for convenience, speed, and twenty-four-hour service availability (EY, 2022). Deposit money banks in Nigeria have countered by developing their mobile banking applications, installing additional point-of-sale (POS) terminals, and improving automated teller machine (ATM) capabilities in order to compete favorably with new fintech entry firms (PwC, 2021). This evolution mirrors global patterns where banks increasingly move towards hybrid models combining digital and physical channels to serve diversified customer bases (World Bank, 2022). In addition, fintech has promoted financial inclusion by enabling rural and underserved populations to enjoy banking services through mobile channels and agent banking, reducing reliance on the traditional branch network (Demirgüç-Kunt et al., 2022). In general, fintech has been a transformative force for operations, revenue diversification, and outreach among Nigeria's deposit money banks to enhance their competitiveness in the digital age (KPMG, 2023).

### 2.2.4 Measurement of Financial Technology (Fintech)

Mobile Banking

Internet Banking

Automated Teller Machines (ATM)

Point-of-Sale (POS) Terminals

**1. Mobile Banking**

Mobile banking, being the cornerstone of fintech adoption, has radically transformed the operating environment of deposit money banks in Nigeria by enabling customers to perform financial transactions via mobile devices, thereby enhancing accessibility and convenience (Ogunleye & Adebayo, 2023). The Central Bank of Nigeria (CBN) reported that mobile banking transactions in Nigeria were valued at ₦22.6 trillion in 2023, up 78% from ₦12.7 trillion in 2022 (CBN, 2024). Similarly, the number of mobile transactions rose from 1.87 billion transactions in 2022 to 3.29 billion transactions in 2023, mirroring the rapid uptake of the usage of mobile banking services by consumers (NIBSS, 2024).

The mobile payments volume also grew at a faster level compared to traditional electronic channels such as ATMs and point-of-sale (POS) terminals, suggesting a shift in consumer demand for mobile-enabled channels (Adeniran & Yusuf, 2023). In relative terms, while ATM transactions recorded just 5% growth in value in 2023, mobile banking transactions grew by over 70% in the same period, reflecting their strategic function in advancing financial inclusion (CBN, 2024). Besides, mobile banking has played a crucial role in expanding banks' reach to underserved rural areas with limited physical branches, as data suggests that over 45% of Nigeria's mobile banking clients are based in semi-urban and rural communities (Eze & Nwankwo, 2023). This shift to mobile-based bank services has not only increased transaction volumes, but it has also enhanced banks' operational efficiency, reduced the expense of operating

branches, and enhanced customer engagement (Ogunleye & Adebayo, 2023). By integrating mobile banking channels with value-added products such as bill payments, fund transfers, and investment options, deposit money banks have positioned themselves to capture a greater customer base besides improving service delivery and profitability (Adeniran & Yusuf, 2023).

**2. Internet Banking**

Internet banking, in terms of active customers and value of transactions executed via the internet, has emerged as a critical distribution channel for banking products and services, especially in today's world where digital transformation is revolutionizing the financial industry. Worldwide, active internet banking customers have also grown exponentially, with indications that, as of 2024, over 65% of bank clients in developed economies have an active online banking customer base, compared with about 45% in the emerging market economies (PwC, 2024). Nigeria's Nigeria Inter-Bank Settlement System (NIBSS, 2024) reported that active internet banking customers grew by 18% year-on-year for 2023 and stood at more than 25 million customers. This expansion is driven by higher digital uptake powered by improved internet penetration, smartphone use, and targeted banking innovations. Based on value of transactions, online banking in Nigeria processed transactions worth over ₦60 trillion in 2023, up by 21% from ₦49.6 trillion in 2022 (CBN, 2024). This expansion was higher than that of some of the traditional channels, reflecting the shift from cash and office-based deals. By comparison, in South Africa, online banking payments accounted for approximately 38% of the total value of all digital payments in 2023, while in Kenya, internet banking lags behind mobile banking in terms of volumes but registered double-digit values of transactions growth (World Bank, 2024).

Internet banking development has been linked with higher customer convenience, reduced transaction costs, and higher availability of services (KPMG, 2023). Banks that have invested heavily in secure internet channels enjoy higher customer loyalty and cross-sell rates since customers prefer more digital self-service over attending physical branches (Ernst & Young, 2023). In addition, the COVID-19 pandemic had a fast-forward effect on adoption, as numerous initial users made recurrent clients because of the lockdown measures and health security issues (IMF, 2023). The banks' competitive edge currently comes from making the platforms secure, fast, and easy to use, since customers tend to change providers when dealt with slow interfaces or constant downtime (Deloitte, 2024). Overall, the increasing number of active internet banking customers and the volume of transactions processed both unequivocally illustrate the central role of internet banking in the provision of financial services today as one of the key drivers of profitability, efficiency, and customer satisfaction for banks.

**3. Automated Teller Machines (ATMs)**

Automated Teller Machines (ATMs) remain one of the most widely used channels for banking transactions, constituting a key touchpoint for a range of cash withdrawals, deposits, and other basic banking services. The transaction volume at ATMs is a reasonable indicator of customer reliance on the channel. In Nigeria, ATM transactions totaled over 1.4 billion in the year 2023, reflecting sustained demand despite increased adoption of digital banking channels (Nigerian Inter-Bank Settlement System [NIBSS], 2024). Similarly, ATM cash withdrawal values provide a reflection of economic activity and the liquidity preference of customers. Statistics from NIBSS (2024) indicate that over ₦8.2 trillion was expended via ATM withdrawals alone in 2023,

demonstrating the ongoing usefulness of cash in the Nigerian economy, especially in rural and informal markets.

Comparatively, despite the rapid growth of mobile and internet banking channels, ATMs continue to record high levels of transactions, particularly among customers with low access to smartphones or stable internet connectivity (Ojo & Okafor, 2023). In Ghana, for instance, ATM transactions continue to represent over 40% of bank-intermediated cash transactions, an indication pointing towards the same direction in sub-Saharan Africa (Bank of Ghana, 2023). Besides, the frequency of use of ATMs receives an increment during digital service outages or network downtime, stressing its importance as a complementary channel for the multichannel banking system (Adeyemi & Aluko, 2022). Regardless of the development of cashless payment systems, ATMs remain vital as they act as the link between traditional bank clients and new digital channels.

**4. Point-of-Sale (POS) Terminals**

Point-of-Sale (POS) terminals have become one of the key drivers of the cashless payment growth in Nigeria with transaction numbers and values displaying year-on-year growth on a consistent basis (Eze & Okafor, 2023). As reported by the Central Bank of Nigeria, the volume of total POS transactions in 2023 was over 1.2 billion transactions, representing a 27% rise from the prior year, while total value processed was over ₦10.7 trillion, representing a significant increase from ₦8.5 trillion in 2022 (CBN, 2024). This growth has been attributed to the intensifying utilization of POS machines by small and medium-sized enterprises (SMEs), street traders, and operators in the informal sector, particularly in urban and peri-urban areas (Udeme, 2023). In rural areas, even though adoption has been gradual due to infrastructural and network

challenges, POS terminals have since become an inevitable tool for financial inclusion, especially during cash shortages and currency redenomination, when ATM cash availability was minimal (Nwankwo & Ibrahim, 2024). A comparative analysis identifies that the POS penetration rate in Nigeria grew by over 35% between 2021 and 2023, slightly higher than the expansion of ATM deployment, at 8% within the same period (Olawale, 2024). The convenience, lower maintenance cost, and mobile payment features of POS terminals have put them on a competitive edge over other forms of payment.

Furthermore, POS transactions also account for more than 30% of retail payment volume on the Nigerian Inter-Bank Settlement System (NIBSS) portfolio as opposed to less than 10% ten years earlier (CBN, 2024). Expansion of agent banking activities, as well as mobile POS devices facilitated by fintech, has also broadened the value base of transactions and expanded customer coverage (Adeyemi, 2023). The positive trend indicates the strategic role of POS technology towards advancing Nigeria's transformation to a cashless economy.

## 2.3 Theoretical Literature

### 2.3.1 Diffusion of Innovation Theory

The Diffusion of Innovation Theory, initially conceptualized by Rogers in 1962, is a theory of the entire process of new technology, product, or idea adoption and its implementation in a social system. According to Rogers, the process of adoption is influenced by a series of prevailing forces: the relative advantage seen for the innovation compared with alternative solutions, its compatibility with users' needs and values, how simple or complicated it is to understand and use,

its testability to a limited extent (trialability), and how observable its impacts are (observability). These characteristics define the pace and extent to which an innovation spreads.

For the case of financial technology (fintech), the theory is most relevant as it explains why there are bank customers who readily adopt innovations such as mobile banking platforms, online banking websites, or electronic payment systems and why there are those who adopt the innovations at their own pace. Early adopters are motivated by interest in the ease, speed, and affordability of fintech, and late adopters resist because they are fearful of security, they are digitally illiterate, or they distrust technology. For banks, diffusion focuses on strategic communication, user education, and value demonstration to ease the adoption process. Also, the theory segmentation of adopters into innovators, early adopters, early majority, late majority, and laggards enables banks to tailor marketing and onboarding procedures to different customer segments. Innovators and early adopters, for example, can be offered beta versions of fintech products, while the late majority would require greater assurance of reliability and direct support before they will embrace it. With the Diffusion of Innovation Theory, banks can better predict adoption rates, identify barriers to adoption, and implement strategies that accelerate the adoption of fintech innovations with different customer segments.

### 2.3.2 Technology Acceptance Model (TAM)

The Technology Acceptance Model (TAM) developed by Davis (1989) is likely the most widely used framework for analyzing technology adoption behavior. The model posits that two

determinants—perceived usefulness (PU) and perceived ease of use (PEOU)—impact an individual's intention to use a given technology, which in turn influences actual usage behavior. Perceived usefulness is the extent to which a person believes that use of a system will raise their performance or productivity, and perceived ease of use is the extent to which a person believes that use of the system will be effortless. In banking, TAM is helpful in informing how customers interact with financial technology such as mobile banking applications, Automated Teller Machines (ATMs), and Point-of-Sale (POS) terminals. For instance, if customers see mobile banking applications as good at facilitating transactions with less effort and without a visit to a bank branch, and also convenient to use, then they are more likely to adopt and use them extensively. Similarly, when ATMs and POS terminals are seen as secure, user-friendly, and seamless in processing transactions, their adoption will increase. Further, TAM observes that not only is adoption driven functionally, but that trust of users in security and accuracy of the technology plays an indispensable role in financial services. Extensions of TAM over the years have incorporated social influence, facilitating conditions, and trust in models such as TAM2 and the Unified Theory of Acceptance and Use of Technology (UTAUT), extending the model to be increasingly applicable to the fintech adoption trends in banking today.

### 2.4 Empirical Review

Ahmed (2025) examined the impact of fintech investment on the financial performance of listed deposit money banks in Nigeria. The study examined the impact of operating expenditures (FintechOpex) and capital expenditures (FintechCapex) on Net Interest Margin (NIM) and Return on Assets (ROA) for twelve Nigerian commercial banks from 2014 to 2023. Panel data

techniques using Pooled Ordinary Least Squares (POLS), Fixed Effects Model (FEM), and Random Effects Model (REM) were employed, along with the Breusch–Pagan and Hausman tests. The Fixed Effects Model was discovered to be the most valid. Findings indicated FintechOpex to have no statistical effect on ROA and NIM, which implies that having a fintech in the short run does not offer an immediate boost in performance. Conversely, FintechCapex revealed significant and positive effects on both ROA and NIM, which implies long-term expenditure on fintech yields tangible financial benefits. Findings also indicated higher liquidity to have positive correlations with both dimensions of performance. Drawing from these findings, the authors called for giving preferential treatment to capitalized fintech initiatives, revamping working capital budgets, incorporating predictive lending analytics, and using digital capabilities for managing liquidity.

Madugba (2021) examined the adoption of financial technology and its effect on the performance of deposit money banks in Nigeria. The study considered ATMs, POS, NEFT, and web transactions as indicators of fintech adoption, while financial performance was measured using earnings per share (EPS) and return on assets (ROA). Secondary data spanning several years were obtained from the Nigerian Inter-Bank Settlement System (NIBSS) and annual financial reports of selected banks. Using regression analysis, the findings revealed that ATM, POS, and NEFT transactions had a positive and significant impact on bank performance, while web transactions showed no significant effect. The study concluded that strengthening ATM and POS infrastructure would be essential for boosting profitability and customer confidence. It also suggested that web-based platforms should be optimized to enhance customer experience and improve their contribution to bank performance.

Joseph Madugba (2021) investigated the relationship between electronic banking services and the performance of deposit money banks in Nigeria. The study focused on fintech indicators such as ATMs, POS, NEFT, and web transactions, while ROA and ROE were used as measures of performance. Employing panel data regression analysis on selected commercial banks, the results showed that ATMs positively and significantly influenced EPS and ROA, while POS and NEFT significantly influenced ROA. However, web transactions had no significant effect on performance. The study concluded that banks with more aggressive deployment of ATMs and POS terminals tend to enjoy higher profitability levels compared to their counterparts. The authors recommended that Nigerian banks should increase investment in reliable and secure electronic banking systems, while also improving customer trust in online channels to achieve sustained performance gains.

Nnaemeka (2023) analyzed the impact of mobile banking, POS, and ATM adoption on the performance of commercial banks in Nigeria between 2012 and 2023. The study adopted a panel data methodology using both fixed and random effects regression models. The results revealed that mobile banking had a positive and significant impact on financial performance, while POS and ATMs did not show significant effects individually. However, when fintech indicators were considered collectively, they exerted a significant influence on overall bank performance. The study concluded that mobile banking remains a central driver of financial technology adoption in Nigeria, largely because of the widespread use of smartphones and mobile penetration even in rural areas. The authors recommended that Nigerian banks invest in improving mobile banking applications, strengthen security systems to reduce fraud, and expand mobile-based services to reach unbanked populations.

Azolibe (2023) investigated the effects of financial technology adoption on deposit mobilization of commercial banks in Nigeria. The study used ATM deployment, POS transactions, mobile banking, and internet banking as proxies for fintech adoption. An autoregressive distributed lag (ARDL) model was employed to analyze short- and long-term effects. Findings indicated that ATMs and POS transactions significantly and positively influenced deposit growth, both in the short and long run. Conversely, mobile and internet banking were found to have either negative or insignificant effects on deposit mobilization, suggesting challenges such as cybersecurity threats, poor internet infrastructure, and low digital literacy. The study concluded that ATMs and POS remain the most effective tools for driving deposit mobilization in Nigeria. It recommended that banks improve internet connectivity, enhance the reliability of mobile platforms, and strengthen cybercrime prevention mechanisms to optimize the benefits of mobile and internet banking.

Ogbuji (2020) carried out a case study on WEMA Bank PLC to evaluate the effect of adopting fintech solutions, particularly the ALAT digital banking platform, on the performance of the bank. The study compared the pre-fintech adoption period (2012–2016) with the post-adoption period (2017–2018). Performance indicators included profitability ratios, operational efficiency, and customer outreach. Findings revealed that the introduction of ALAT significantly improved the bank's operational efficiency, reduced transaction costs, and increased profitability levels. Furthermore, the bank was able to attract younger, tech-savvy customers, thereby expanding its customer base. The study highlighted that strategic fintech adoption could reposition banks for competitiveness and sustainability in a digital era. It recommended that other Nigerian banks adopt similar innovative fintech platforms to improve operational efficiency and financial performance.

Chimaobi (2018) examined the relationship between internet banking investment and the financial performance of Zenith Bank PLC over the period 2005–2017. The study employed regression analysis to measure the effect of internet banking expenditure on return on assets (ROA). The results showed a positive and significant relationship between internet banking spending and ROA, indicating that greater investments in internet banking infrastructure improve bank profitability. The study concluded that digital banking adoption enhances customer convenience, reduces transaction turnaround times, and boosts customer loyalty, all of which contribute to bank performance. It recommended continuous innovation in internet banking products and services to remain competitive and to generate sustainable profits.

Mustapha (2018) investigated the effect of electronic payment technologies on the performance of Nigerian deposit money banks. The study used proxies such as electronic fund transfers, POS transactions, and mobile payments to measure fintech adoption, while ROA and ROE were used as indicators of performance. Regression results revealed that electronic payment technologies had a significant and positive effect on bank profitability and operational efficiency. The findings suggested that the adoption of fintech enhances customer satisfaction, reduces operating costs, and improves the overall service delivery of banks. The study concluded that fintech adoption is indispensable for Nigerian banks to remain competitive in a fast-changing financial ecosystem. It recommended aggressive investment in electronic payment technologies, alongside improved regulatory frameworks, to mitigate risks such as fraud and cyberattacks.

### 2.5 Research Gap

Although extant studies have studied the effects of individual fintech channels on bank performance, little research accounts for the combined effect of mobile banking, internet banking,

use of ATMs, and POS terminal installment in Nigeria. Most earlier studies also focus on one performance measure such as profitability, without integrating operational efficiency, customer satisfaction, and transaction volume into a unified framework. This study bridges these gaps using a multi-channel, multi-indicator approach, with aggregated data from Nigerian deposit money banks between 2009 and 2024.

# CHAPTER THREE

# METHODOLOGY

## 3.1 Introduction

This chapter presents the methodology adopted for the study on the impact of financial technology (FinTech) on the performance of deposit money banks in Nigeria. It explains the research design, population and sampling techniques, data collection methods, analytical tools, model specification, and measurement of variables used in the study.

## 3.2 Research Design

Research design refers to the overall framework and plan adopted to investigate a research problem logically and systematically (Khanday & Khanam, 2019). It outlines how data are collected, analyzed, and interpreted to achieve the stated objectives of the study. This study adopts an ex-post facto research design. The ex-post facto approach is considered appropriate because it investigates existing data to determine the relationship between financial technology and the performance of deposit money banks without manipulating any variables. According to

Kerlinger and Lee (2000), the ex-post facto design is used when the researcher seeks to examine cause-and-effect relationships based on already available records or historical data. Thus, by employing the ex-post facto research design, this study systematically analyzes secondary data obtained from annual reports, the Central Bank of Nigeria (CBN), and the Nigerian Inter-Bank Settlement System (NIBSS) to assess how financial technology channels such as mobile banking, internet banking, ATM usage, and POS transactions have influenced the performance of deposit money banks in Nigeria over time.

### 3.3 Population and Sampling

The population for this study consists of all Deposit Money Banks in Nigeria that are listed on the Nigerian Exchange (NGX). As of 2024, there are 10 listed Deposit Money Banks on NGX. The study will utilize financial and operational data for these listed banks to examine how financial technology channels have influenced the performance of these banks over time.

### 3.4 Data Collection

This study makes use of secondary data obtained from credible and authoritative sources. The data were sourced primarily from the publications and statistical bulletins of the Central Bank of Nigeria (CBN) and the Nigerian Inter-Bank Settlement System (NIBSS), which provide comprehensive yearly records on electronic payment channels and overall banking sector performance. Additional information was drawn from the Nigerian Deposit Insurance Corporation (NDIC) annual reports and other relevant financial databases. Scholarly journals, textbooks, and reports on financial technology and banking performance were also consulted to provide theoretical and empirical support for the study. The data cover the period from 2009 to

2024, a timeframe that captures the evolution and impact of financial technology innovations in Nigeria, especially following the introduction of the Central Bank's Cashless Policy in 2012.

### 3.5 Theoretical Framework

This study is anchored on two key theories: the Technology Acceptance Model (TAM) and the Innovation Diffusion Theory (IDT), both of which provide a solid foundation for understanding the adoption and impact of digital banking technologies on bank performance in Nigeria.

#### 3.5. 1 Technology Acceptance Model (TAM)

The Technology Acceptance Model was proposed by Fred Davis (1989) to explain how users come to accept and use a particular technology. The model identifies two major determinants of technology adoption: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU). Perceived usefulness refers to the extent to which a user believes that using a technology will enhance job performance, while perceived ease of use represents how effortless the technology is perceived to be. Previous studies such as Oluwatosin and Okoye (2022) and Adewuyi and Okonkwo (2023) applied the TAM to explain how customers' perceptions of mobile and internet banking technologies influence their usage behavior and satisfaction. In those studies, the focus was mainly on customer adoption and behavioral intention. However, this present study differs by applying the TAM from an institutional perspective, examining how the adoption and expansion of digital banking platforms (ATM, POS, Internet Banking, and Mobile Banking) influence bank financial performance over time rather than customer behavior. This approach extends the

traditional TAM by linking technology acceptance to organizational outcomes such as profitability and efficiency.

### 3.5.2 Innovation Diffusion Theory (IDT)

The Innovation Diffusion Theory was developed by Everett Rogers (1962; revised 2003) to describe how innovations spread through a social system over time. The theory posits that the rate of adoption of a new technology depends on five key factors: Relative Advantage, Compatibility, Complexity, Trialability, and Observability. Scholars such as Ede and Lawal (2023) and Chukwu and Musa (2023) have used the IDT to study the diffusion of electronic payment systems in Nigeria's banking sector, emphasizing customer adoption trends. In contrast, this current study applies the IDT to understand how banks themselves integrate and expand these innovations within their operations and how such diffusion contributes to sustained financial performance. Thus, while earlier works focused on consumer-level diffusion, this study focuses on institutional-level diffusion and its economic outcomes.

## 3.6 Model Specification

The study specifies a time series regression model in which bank performance is the dependent variable, while the independent variables include mobile banking, internet banking, ATM usage, and POS transactions. The model is expressed as:

$$BP_t=\beta_0+\beta_1 MB_t+\beta_2 IB_t+\beta_3 ATM_t+\beta_4 POS_t+\mu_t$$

Where:

$BP_t$ = Bank performance of bank i at time t (measured by ROA, ROE, or Cost-to-Income Ratio)

$MB_t$ = Mobile banking transactions

$IB_t$ = Internet banking transactions

$ATM_t$ = ATM transactions

$POS_t$ = POS terminal transactions

$\beta_0$ = Constant term

$\beta_1$–$\beta_4$ = Coefficients measuring the effect of each FinTech channel

$\mu t$ = Error term

This model enables the assessment of how financial technology channels collectively and individually influence the performance of Deposit Money Banks in Nigeria over the study period.

### 3.7 Measurement of Variables

| S/N | Variable | Type | Measurement | Source |
|---|---|---|---|---|
| 1 | Bank Performance (BP) | Dependent | Measured using Return on Assets (ROA), Return on Equity (ROE), and Cost-to-Income Ratio to capture profitability and efficiency. | Annual reports of listed DMBs; CBN Statistical Bulletin; Nwankwo & Adekoya (2022) |

| S/N | Variable | Type | Measurement | Source |
|---|---|---|---|---|
| 2 | Mobile Banking (MB) | Independent | Measured by the total value of transactions conducted via mobile banking platforms. | NIBSS (2024); Okorie & Agu (2022) |
| 3 | Internet Banking (IB) | Independent | Measured by the total value of internet-based transactions carried out by customers. | CBN Reports (2023); Adewuyi & Okonkwo (2023) |
| 4 | Automated Teller Machine (ATM) Usage | Independent | Measured by the total value of transactions processed through ATMs nationwide. | NIBSS (2024); Chukwu & Musa (2023) |
| 5 | Point of Sale (POS) Terminal Usage | Independent | Measured by the total value of transactions executed through POS terminals. | CBN Statistical Bulletin (2024); Ede & Lawal (2023) |

### 3.8 Method of Data Analysis

The data for this study will be analyzed using both statistical and econometric techniques to evaluate the relationship between financial technology indicators and the performance of deposit money banks in Nigeria. Descriptive statistics such as the mean, standard deviation, and trend

analysis will be used to summarize the variables and provide an overview of their behavior over the study period. Correlation analysis will be employed to determine the strength and direction of relationships between financial technology channels and bank performance. Furthermore, a time series regression analysis will be conducted using the Ordinary Least Squares (OLS) method to examine the long-term impact of financial technology adoption on bank performance from 2009 to 2024.

# CHAPTER FOUR

# DATA PRESENTATION AND ANALYSIS

## 4.1 Introduction

The main goal of this study is to examine the effect of financial technology on the performance of deposit money banks in Nigeria. The presentation, analysis and interpretation of the data stream collected for this study is the focus of this chapter. Consequently, it embodies the application of both statistical and econometric techniques. The initial characterization of the data is done using the statistical techniques, while the estimation of relationships and other parameters for testing the hypotheses is done using econometric techniques.

## 4.2 Data Presentation

The data stream for this study is from the first quarter of 2009 to the last quarter of 2023 (2009Q1 to 2023Q4). The data utilised is are presented in appendix 1.

## 4.3 Data Analysis

### 4.3.1 Descriptive Statistics

The descriptive statistics are designed to show the summary of data and other basic characteristics within the dataset for the study. The annualized summary statistics for all the variables in the study for the period $2009Q_1$ to $2023Q_4$ are reported in Table 4.1.

**Table 4.1: Descriptive Statistics**

| | BP | MB | IB | ATM | POS |
|---|---|---|---|---|---|
| Mean | 1.633649 | 2772.408 | 301.3007 | 5005.724 | 2240.547 |
| Median | 1.663486 | 755.9453 | 126.4944 | 4974.643 | 748.3650 |
| Maximum | 4.262508 | 9520.398 | 809.5219 | 9873.104 | 7777.830 |
| Minimum | -6.593322 | 0.772813 | 20.58938 | 250.7125 | 9.068438 |
| Std. Dev. | 1.535878 | 3419.844 | 284.9483 | 3096.984 | 2645.094 |
| Skewness | -2.973922 | 0.826593 | 0.538876 | 0.042816 | 0.897931 |
| Kurtosis | 16.59444 | 1.972643 | 1.582030 | 1.772651 | 2.289888 |
| Jarque-Bera | 550.4645 | 9.471218 | 7.930472 | 3.784298 | 9.323454 |
| Probability | 0.000000 | 0.008777 | 0.018964 | 0.150748 | 0.009450 |
| Sum | 98.01894 | 166344.5 | 18078.04 | 300343.4 | 134432.8 |
| Sum Sq. Dev. | 139.1764 | 6.90E+08 | 4790537. | 5.66E+08 | 4.13E+08 |
| Observations | 60 | 60 | 60 | 60 | 60 |

***Source:*** Researcher's Computation Using E-views (2025)

Table 4.1 presents the summary statistics of the variables under consideration. According to the descriptive statistics, the average (mean) quarterly return on asset (ROA), a proxy for deposit money banks performance in Nigeria is approximately 1.63% with a standard deviation of 1.53%, connoting that there was a very little dispersion or the tendency of the deposit money banks to nose-dive as a result financial technology adoption in the referenced period. The skewness value for ROA is negative, which suggests that the ROA distribution tail is left of its mean and the Kurtosis is leptokurtic (16.59444) since the value is greater than three. The Jarque-Bera value of 550.4645 was statistically significant, indicating that ROA was not normally distributed.

In terms of the independent variables, the mean of total value of mobile banking transaction (MB) stood at 2772.408 with a standard deviation of 3419.844. The dispersion from the mean was high to influence the nose-diving of deposit money bank performance as a result of this component of financial technology adoption. The skewness was positive and the Kurtosis is plytokurtic given that its value of 1.972643 cannot be rounded up to 3. The Jarque-Bera value of 9.471218 was statistically significant, indicating that total value of mobile banking transaction (MB) was not normally distributed. Similarly, the average value of total volume of internet banking transaction stood at 301.3007 while the standard deviation is 284.9483. The dispersion from the mean was high to influence the nose-diving of deposit money banks performance as a result of this component of financial technology adoption. The skewness is positive and the Kurtosis is platykurtic (1.582030) since the value is less than 3. The Jarque-Bera value of 9.471218 is significant since its probability value is within the range of 0.05., indicating that IB was not normally distributed in the reference period. The mean of total value of automated teller machine usage (ATM) stood at 5005.724 with a standard deviation of 3096.984. The dispersion from the mean was high to influence the nose-diving of deposit money bank performance as a result of this component of financial technology adoption. The skewness was positive and the Kurtosis plytokurtic given that its value of 1.772651 cannot be rounded up to 3. The Jarque-Bera value of 3.784298 was not statistically significant, indicating that ATM was normally distributed. Total volume of transaction on point of sale (POS) in the deposit money banks showed a mean value of 2240.547 and a standard deviation of 2645.094. The dispersion from the mean was high to influence the nose-diving of deposit money banks performance as a result of this component of financial technology adoption. The skewness was positive with a value of 0.897931 and the

Kurtosis was platykurtic with a value of 2.289888. The Jarque-Bera value of was statistically significant, indicating that POS was normally distributed.

## 4.2 Correlation Analysis

It is critical to investigate the degree and direction of association between the variables in the study. These investigations are carried out using correlation analysis. Table 4.2 shows the results of the correlation test.

**Table 4.2: Correlation Result**

| | BP | MB | IB | ATM | POS |
|---|---|---|---|---|---|
| BP | 1.000000 | | | | |
| MB | 0.019906 | 1.000000 | | | |
| IB | 0.005596 | 0.800226 | 1.000000 | | |
| ATM | 0.071664 | 0.886766 | 0.894445 | 1.000000 | |
| POS | 0.018045 | 0.888689 | 0.829835 | 0.813873 | 1.000000 |

***Source:*** Researcher's Computation (2025) Using E-views 9.0 Software

Table 4.2 depicts the matrix of the Correlation coefficient for all the variables used. The correlation matrix result shows that all the explanatory variables have positive associations with deposit money bank performance (ROA) in the period examined. For the independent variables, they were all positively associated, In a nutshell, it can be said that all the independent variables positively re-enforce each other. Furthermore, Table 4.2 also revealed the presence of multi co-linearity problem among explanatory variables since no correlation coefficient between explanatory variables is > 0.90 as suggested by Gujarati (2008).

## 4.3 Regression Analysis

Haven analysed the descriptive statistics and correlation result, we go ahead to analyse the regression result in order to see if deposit money bank performance (ROA) has been influenced by the selected financial technology (FINTECH) variables. The ordinary least squares (OLS) regression result for the quarterly time series data of 60 observation, $2009Q_1$–$Q_4$ to $2023Q_1$-$Q_4$ indicated the presence of autocorrelation with DW= 0.33 thus rendering the initial results spurious (see appendix for the result). To correct for autocorrelation, the Cochrane-Orcutt autoregressive technique, AR (1), was employed. Convergence was attained after 26 iterations with 60 included observations after adjustment in time period ($2009Q_1$-$_4$ to $2023Q_1$-$_4$). The final multivariate ordinary least squares (OLS) results are shown in Table 4.3.

**Table 3: Ordinary Least Squares Regression Result**

**Dependent Variable: BP**

| Variable | Coefficient | t-Statistic | Prob. |
|---|---|---|---|
| C | 5.436796 | 0.607740 | 0.5460 |
| MB | -0.001849 | -1.379297 | 0.1736 |
| IB | -0.009410 | -2.854286 | 0.0061 |
| ATM | -0.002699 | -4.950271 | 0.0000 |
| POS | 0.005237 | 2.755544 | 0.0080 |
| AR(1) | 0.995813 | 32.99763 | 0.0000 |
| R-squared | 0.783222 | | |
| Adjusted R-squared | 0.758682 | | |
| F-statistic | 31.91505 | | |
| Prob(F-statistic) | 0.00000 | | |
| DW stat | 1.765255 | | |

**Source:** Researcher's Computation (2025) Using E-views 9.0 Software * = 1% significant level

The explanatory variables (MB, IB, ATM and POS) account for almost 78% of the total variation in the dependent variable (ROA), according to the OLS result, which displays an $R^2$ value of 0.893340. After accounting for the degrees of freedom (df), the value is found to be above average, as seen by the adjusted $R^2$ value of 0.758682, or around 76%. As a result, the regression fits is very good. At the 1% level of statistical significance, the model's explanatory capacity is tested by the F-statistic, which comes out at 31.91505 with a corresponding probability value of 0.0000. This suggests that, when using the return on asset coefficient (ROA) as a proxy for deposit money bank performance, the four explanatory variables (MB, IB, ATM and POS) have a combined significant impact on deposit money bank performance in Nigeria. We can entirely rule out autocorrelation, according to the Durbin-Watson statistic of 1.765255 which can be approximated to 2.

Upon closely examining each individual coefficient in the model, it can be observed that IB, ATM and POS passed the significant test at the 1 percent levels. This indicates that, total volume of internet based transaction (IB), total value of automated teller machine transaction (ATM) and total volume of POS transaction (POS) and has a significant impact on deposit money bank performance (ROA) in Nigeria while total value of mobile banking (MB) has insignificant negative effect on deposit money bank performance (ROA) in Nigeria . Additionally, IB and ATM display negative sign.

### 4.3.6 Test of Hypotheses

The hypotheses formulated in this study are tested in this section using the t-ratios from the OLS regression results. The study adopted 5% level of significance to conduct the test on the different hypotheses formulated.

**Hypothesis One**

$H_{01}$: Mobile banking has no significant effect on the performance of deposit money banks in Nigeria.

From the regression estimates in Tables 4.3 the coefficient of mobil banking (MOB) is 0.91 (p-value = 0.17 > 0.05). At the 5 percent level of significance, the t-value of the coefficient of mobile banking variable failed the statistical t-test. Therefore, the null hypothesis that mobil banking (MOB) has no significant effect on deposit money bank performance in Nigeria is accepted in the study; hence the alternative hypothesis is rejected.

**Hypothesis Two**

$H_{02}$: Internet banking has no significant effect on the performance of deposit money banks in Nigeria.

The coefficient of Internet banking (IB) in the regression estimates in Table 4.3 is used in testing this hypothesis. From the OLS results, the coefficient of IB is -0.009 (p-value = 0.00 < 0.05). The result therefore shows that the t-value of the coefficient of internet banking (IB) passed the significance test at the 1 percent significant level. On this basis, the null hypothesis is rejected while the alternative hypothesis is accepted; indicating that internet banking (IB) has significant effect on deposit money bank performance in Nigeria in the short-run.

**Hypothesis Three**

$H_{03}$: ATM usage has no significant effect on the performance of deposit money banks in Nigeria.

The coefficient of ATM usage (ATM) in the regression estimate in Table 4.3 is used in testing this hypothesis. In the OLS result, the coefficient of ATM is -0.002 (p-value = 0.00 < 0.05). The result therefore shows that the t-value of the coefficient of ATM usage (ATM) passed the significance test at the 1 percent level. On this basis, the null hypothesis is rejected while the alternative hypothesis is accepted; indicating that ATM usage (ATM) has significant effect on deposit money bank performance in Nigeria.

**Hypothesis Four**

$H_{04}$: POS terminal usage has no significant effect on the performance of deposit money banks in Nigeria.

The coefficient of POS terminal usage (POS) in the OLS estimate in Table 4.3 is used in testing this hypothesis. From the result, the coefficient of POS is 0.005 (p-value = 0.00 < 0.05). The result therefore shows that the t-value of the coefficient of POS terminal usage (POS) passed the significance test at the 1 percent level. On this basis, the null hypothesis is rejected while the alternative hypothesis is accepted; indicating that POS terminal usage has significant effect on deposit money banks performance in Nigeria.

## 4.4 Discussion of Findings

The effect of all the independent variables on deposit money bank performance (ROA) is mixed, although in different magnitude. The study finds that mobile banking (MOB) has insignificant negative impact on deposit money bank performance (ROA). The negative and insignificant relationship between MB and ROA suggest that mobile banking is not a critical financial technology variable that influences deposit money banks performance in Nigeria within the studied period. The negative relationship between MB and ROA which is quite surprising mean

that MB has not improved the performance of deposit money bank performance in Nigeria within the studied period. This finding is in tandem with Azolibe (2023) who reported an insignificant negative effect of mobile banking on performance of deposit money banks. This finding is contrary to the result of Nnaemeka (2023) who reported a significant positive link between mobile banking and deposit money bank performance.

Also, the empirical findings indicates that the coefficient of internet banking (IB) have significant negative impact on performance of deposit money bank in Nigeria. The implication of this finding is that internet banking is a crucial financial technology (FINTECH) variable that affects Nigeria's deposit money bank performance. The result of this study agrees with Chimobi (2018) who found a significant negative relationship between internet banking and deposit money bank performance, but contradict that of Madugba (2021) and Azolibe (2023) who found an insignificant positive relationship between internet banking and performance of deposit money banks.

Furthermore, ATM usage (ATM) has significant negative impact on deposit money bank performance. This means that increase in ATM usage resulted to significant decrease in deposit money bank performance. The implication of this finding is that ATM usage is a key factor that influences the performance of deposit money banks in Nigeria. The finding is in consonance with the result of Madugba (2021) and Azolibe (2023) which indicated that ATM usage significantly and negatively influences the performance of banks. It however contradicts the finding of Nnaemeka (2023) who reported a positive and insignificant relationship between ATM usage and performance of deposit money banks.

Finally, POS terminal usage (POS) has significant positive impact on deposit money bank performance. This means that increase in POS terminal usage resulted to significant increase in deposit money bank performance. The implication of this finding is that POS terminal usage is a key factor that influences the performance of deposit money banks in Nigeria. The finding is in consonance with the result of Madugba (2021) who found that POS terminal usage positively and significantly influences the performance of deposit money banks. The outcome is however not in consonance with the finding of Nnaemeka (2023) and Azolibe (2023) who reported a positive and insignificant relationship between POS terminal usage and performance of banks.

# SUMMARY OF FINDINGS, CONCLUSION AND RECOMENDATIONS

## 5.1 Introduction

This chapter focuses on the summary of findings from the empirical analysis as well as the conclusion. The policy recommendations necessitated by these findings are afterward presented.

## 5.2 Summary of Findings

In this study, the effect of financial technology on the performance of deposit money banks in Nigeria was investigated. The data for the study were obtained through secondary sources from the Central Bank of Nigeria Statistical Bulletin from 2009Q1 - 2023Q4. The statistical analysis (descriptive statistics and correlation coefficient) was used to ascertain the initial characterization of the data while the ordinary least squares regression technique was used to capture the relationship between the selected financial technology variables and deposit money bank

performance. The financial technology variables analyzed in this study Mobile banking, Internet banking, ATM usage and POS terminal usage. Findings show that financial technology variables considered have significant effect on deposit money bank performance. However, the following specific results were established:

That Mobile banking has insignificant negative impact on deposit money bank performance.

That internet banking has significant inverse effect on deposit money bank performance.

That ATM usage has significant negative effect on deposit money bank performance.

That POS terminal usage exerts significant positive impact on deposit money bank performance in the short-run.

## 5.3 Conclusion

The role of financial technology in improving deposit money bank performance cannot be underestimated, because it has been generally argued by experts in existing literature that financial technology plays a key role in improving the performance of banks. Thus, proper focus on financial technology is essential. Hence, this study empirically investigates the impact of financial technology variables like Mobile banking, Internet banking, ATM usage and POS terminal usage on deposit money banks performance in Nigeria for the period 2009Q1 - 2023Q4. To examine the background characteristics of the data set we employed correlation and descriptive statistics, the Ordinary Least Squares (OLS) regression technique was used in the evaluation of the model stated in the study. Based on the findings of the study, we conclude that Internet banking, ATM usage and POS terminal usage have significant impact on deposit money

banks performance in Nigeria while mobile banking has no significant effect on deposit money bank performance.

## 5.4 Recommendations

The empirical results of this research propose the following policy recommendations for further action:

In order to further enhance performance of Nigeria's deposit money banks should improve their security on mobile transaction and also cut down the various charges associated with mobile transaction usage in Nigeria.

It's also important to solve Nigeria's poor Internet access. In order to gain consumers' trust, network communications security should also be strengthened. Concerns about security when using internet banking should be addressed by banks in order to reverse the negative impact on their performance.

The study recommends that banks should banks should upgrade ATM technology to include features like cardless transactions, biometrics, and improved security measures to enhance user experience and attract more customers and with more customers using this platform it will improve the performance of deposit money banks.

In addition, the adoption rate of point-of-sale (POS) terminals in Nigeria should continue to be improved so that it will continue to contribute positively to deposit money bank performance. This can be done by lowering the excessive transaction fees and making improvements to the infrastructure needed to run POS, such as network access. This will further improve the performance of banks in Nigeria.

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# APPENDIX A

## DATA FOR REGRESSION ANALYSIS

| Year | BP | MB | POS | ATM | IB |
|---|---|---|---|---|---|
| 2009 | -2.25714 | 1.27 | 11.03 | 548.60 | 84.15 |
| 2010 | 3.80028 | 6.65 | 12.72 | 399.71 | 25.05 |
| 2011 | 0.419301 | 18.98 | 31.02 | 1,561.74 | 59.61 |
| 2012 | 3.253207 | 31.51 | 48.01 | 1,984.66 | 31.57 |
| 2013 | 2.061718 | 142.80 | 161.02 | 2,828.94 | 47.32 |
| 2014 | 2.111478 | 346.47 | 312.07 | 3,679.88 | 74.04 |
| 2015 | 1.461066 | 442.35 | 448.51 | 3,970.25 | 91.58 |
| 2016 | 1.291429 | 756.90 | 759.00 | 4,988.13 | 132.36 |
| 2017 | 1.816754 | 1,102.00 | 1,409.81 | 6,437.59 | 184.60 |
| 2018 | 2.12243 | 1,974.25 | 2,383.11 | 6,480.09 | 675.92 |
| 2019 | 2.207659 | 5,080.96 | 3,204.75 | 6,512.61 | 478.14 |
| 2020 | 1.730428 | 6,810.11 | 4,633.81 | 7,539.27 | 507.64 |
| 2021 | 1.321058 | 7,155.64 | 5,749.82 | 8,699.16 | 616.26 |
| 2022 | 1.542037 | 8,428.11 | 6,856.86 | 9,622.93 | 720.57 |
| 2023 | 1.623030 | 9,288.12 | 7,586.67 | 9,832.30 | 790.70 |

| YEAR | MB | BP | ATM | POS | IB |
|---|---|---|---|---|---|
| 2009Q1 | 0.7728125 | -6.59332228125 | 891.1975 | 14.0296875 | 126.800625 |
| 2009Q2 | 0.8146875 | -3.30926746875 | 608.1775 | 11.3378125 | 94.464375 |
| 2009Q3 | 1.2909375 | -0.61511259375 | 407.09 | 9.6840625 | 67.981875 |
| 2009Q4 | 2.2015625 | 1.48914234375 | 287.935 | 9.0684375 | 47.353125 |
| 2010Q1 | 3.5465625 | 3.00349734375 | 250.7125 | 9.4909375 | 32.578125 |
| 2010Q2 | 5.3259375 | 3.92795240625 | 295.4225 | 10.9515625 | 23.656875 |
| 2010Q3 | 7.5396875 | 4.26250753125 | 422.065 | 13.4503125 | 20.589375 |
| 2010Q4 | 10.1878125 | 4.00716271875 | 630.64 | 16.9871875 | 23.375625 |
| 2011Q1 | 14.325 | 0.71609234375 | 1241.4646875 | 24.3621875 | 56.43125 |
| 2011Q2 | 17.42 | 0.25927790625 | 1485.7778125 | 28.8553125 | 61.15875 |
| 2011Q3 | 20.5275 | 0.19089378125 | 1683.8965625 | 33.2665625 | 61.97375 |
| 2011Q4 | 23.6475 | 0.51093996875 | 1835.8209375 | 37.5959375 | 58.87625 |
| 2012Q1 | 11.38 | 2.81946021875 | 1760.2275 | 26.635625 | 35.2428125 |
| 2012Q2 | 20.685 | 3.27634953125 | 1892.2925 | 36.884375 | 30.9696875 |
| 2012Q3 | 36.1625 | 3.48165165625 | 2050.6925 | 53.134375 | 29.4334375 |
| 2012Q4 | 57.8125 | 3.43536659375 | 2235.4275 | 75.385625 | 30.6340625 |
| 2013Q1 | 86.631875 | 2.31458121875 | 2511.294375 | 112.6975 | 39.6996875 |
| 2013Q2 | 120.228125 | 2.09428703125 | 2722.780625 | 143.3275 | 44.3228125 |
| 2013Q3 | 159.598125 | 1.95157090625 | 2934.683125 | 176.335 | 49.6315625 |
| 2013Q4 | 204.741875 | 1.88643284375 | 3147.001875 | 211.72 | 55.6259375 |
| 2014Q1 | 286.9359375 | 2.202219875 | 3448.3665625 | 257.7090625 | 65.454375 |
| 2014Q2 | 331.1165625 | 2.170899125 | 3626.0659375 | 294.5584375 | 71.560625 |
| 2014Q3 | 368.5603125 | 2.095817625 | 3768.7296875 | 330.4946875 | 77.093125 |
| 2014Q4 | 399.2671875 | 1.976975375 | 3876.3578125 | 365.5178125 | 82.051875 |
| 2015Q1 | 372.2278125 | 1.62984940625 | 3747.6878125 | 370.1496875 | 81.37125 |
| 2015Q2 | 409.8646875 | 1.49729484375 | 3865.7496875 | 415.1378125 | 87.20875 |
| 2015Q3 | 461.1684375 | 1.39478871875 | 4029.2809375 | 471.0040625 | 94.49875 |
| 2015Q4 | 526.1390625 | 1.32233103125 | 4238.2815625 | 537.7484375 | 103.24125 |
| 2016Q1 | 634.1703125 | 1.2464550625 | 4538.990625 | 589.39125 | 115.276875 |
| 2016Q2 | 714.7171875 | 1.2474809375 | 4820.434375 | 688.28375 | 126.188125 |
| 2016Q3 | 797.1734375 | 1.2919419375 | 5128.851875 | 808.44625 | 137.815625 |

| | | | | | |
|---|---|---|---|---|---|
| 2016Q4 | 881.5390625 | 1.3798380625 | 5464.243125 | 949.87875 | 150.159375 |
| 2017Q1 | 890.2203125 | 1.65407728125 | 6113.88 | 1115.3671875 | 96.40375 |
| 2017Q2 | 1009.4421875 | 1.77168046875 | 6388.31 | 1298.2253125 | 136.90625 |
| 2017Q3 | 1161.6109375 | 1.87555559375 | 6574.805 | 1501.2390625 | 204.85125 |
| 2017Q4 | 1346.7265625 | 1.96570265625 | 6673.365 | 1724.4084375 | 300.23875 |
| 2018Q1 | 1298.021875 | 2.04224634375 | 6465.711875 | 2041.819375 | 599.346875 |
| 2018Q2 | 1655.738125 | 2.10488740625 | 6475.713125 | 2275.665625 | 679.108125 |
| 2018Q3 | 2153.108125 | 2.15375053125 | 6485.090625 | 2500.033125 | 715.800625 |
| 2018Q4 | 2790.131875 | 2.18883571875 | 6493.844375 | 2714.921875 | 709.424375 |
| 2019Q1 | 4131.1875 | 2.2635825 | 6345.080625 | 2801.725625 | 516.795 |
| 2019Q2 | 4821.7675 | 2.249736 | 6415.344375 | 3045.099375 | 481.555 |
| 2019Q3 | 5426.25 | 2.20073575 | 6547.741875 | 3326.436875 | 460.52 |
| 2019Q4 | 5944.635 | 2.11658175 | 6742.273125 | 3645.738125 | 453.69 |
| 2020Q1 | 6377.869375 | 1.89878634375 | 7133.4553125 | 4146.8265625 | 484.215 |
| 2020Q2 | 6723.680625 | 1.78371990625 | 7398.4471875 | 4484.5259375 | 496.535 |
| 2020Q3 | 6983.015625 | 1.67289478125 | 7671.7659375 | 4802.6596875 | 513.8 |
| 2020Q4 | 7155.874375 | 1.56631096875 | 7953.4115625 | 5101.2278125 | 536.01 |
| 2021Q1 | 6881.231875 | 1.37607971875 | 8301.095 | 5332.7178125 | 576.2009375 |
| 2021Q2 | 7025.548125 | 1.31313403125 | 8576.31 | 5611.1596875 | 603.0865625 |
| 2021Q3 | 7227.798125 | 1.28958515625 | 8836.7675 | 5889.0409375 | 629.7028125 |
| 2021Q4 | 7487.981875 | 1.30543309375 | 9082.4675 | 6166.3615625 | 656.0496875 |
| 2022Q1 | 8015.380625 | 1.4810426875 | 9388.14125 | 6500.6621875 | 686.794375 |
| 2022Q2 | 8307.719375 | 1.5275383125 | 9574.43375 | 6753.8453125 | 710.735625 |
| 2022Q3 | 8574.279375 | 1.5652848125 | 9716.07625 | 6983.4515625 | 732.540625 |
| 2022Q4 | 8815.060625 | 1.5942821875 | 9813.06875 | 7189.4809375 | 752.209375 |
| 2023Q1 | 9030.063125 | 1.6145304375 | 9865.41125 | 7371.9334375 | 769.741875 |
| 2023Q2 | 9219.286875 | 1.6260295625 | 9873.10375 | 7530.8090625 | 785.138125 |
| 2023Q3 | 9382.731875 | 1.6287795625 | 9836.14625 | 7666.1078125 | 798.398125 |
| 2023Q4 | 9520.398125 | 1.6227804375 | 9754.53875 | 7777.8296875 | 809.521875 |

| | BP | MB | IB | ATM | POS |
|---|---|---|---|---|---|
| Mean | 1.633649 | 2772.408 | 301.3007 | 5005.724 | 2240.547 |
| Median | 1.663486 | 755.9453 | 126.4944 | 4974.643 | 748.3650 |
| Maximum | 4.262508 | 9520.398 | 809.5219 | 9873.104 | 7777.830 |
| Minimum | -6.593322 | 0.772813 | 20.58938 | 250.7125 | 9.068438 |
| Std. Dev. | 1.535878 | 3419.844 | 284.9483 | 3096.984 | 2645.094 |
| Skewness | -2.973922 | 0.826593 | 0.538876 | 0.042816 | 0.897931 |
| Kurtosis | 16.59444 | 1.972643 | 1.582030 | 1.772651 | 2.289888 |
| | | | | | |
| Jarque-Bera | 550.4645 | 9.471218 | 7.930472 | 3.784298 | 9.323454 |
| Probability | 0.000000 | 0.008777 | 0.018964 | 0.150748 | 0.009450 |
| | | | | | |
| Sum | 98.01894 | 166344.5 | 18078.04 | 300343.4 | 134432.8 |
| Sum Sq. Dev. | 139.1764 | 6.90E+08 | 4790537. | 5.66E+08 | 4.13E+08 |
| | | | | | |
| Observations | 60 | 60 | 60 | 60 | 60 |

| | BP | MB | IB | ATM | POS |
|---|---|---|---|---|---|
| BP | 1.000000 | 0.019906 | 0.005596 | 0.071664 | 0.018045 |
| MB | 0.019906 | 1.000000 | 0.800226 | 0.886766 | 0.888689 |
| IB | 0.005596 | 0.800226 | 1.000000 | 0.894445 | 0.829835 |
| ATM | 0.071664 | 0.886766 | 0.894445 | 1.000000 | 0.813873 |
| POS | 0.018045 | 0.888689 | 0.829835 | 0.813873 | 1.000000 |

Dependent Variable: BP

Method: Least Squares

Date: 11/08/25 Time: 21:19

Sample: 2009Q1 2023Q4

Included observations: 60

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 1.167096 | 0.510349 | 2.286857 | 0.0261 |
| MB | 0.000108 | 0.000433 | 0.249910 | 0.8036 |
| IB | -0.000990 | 0.002133 | -0.463949 | 0.6445 |
| ATM | 0.000203 | 0.000174 | 1.168202 | 0.2478 |
| POS | -0.000246 | 0.000694 | -0.353969 | 0.7247 |

| | | | |
|---|---|---|---|
| R-squared | 0.025443 | Mean dependent var | 1.633649 |
| Adjusted R-squared | -0.045434 | S.D. dependent var | 1.535878 |
| S.E. of regression | 1.570382 | Akaike info criterion | 3.820170 |
| Sum squared resid | 135.6354 | Schwarz criterion | 3.994698 |
| Log likelihood | -109.6051 | Hannan-Quinn criter. | 3.888437 |

| | | | |
|---|---|---|---|
| F-statistic | 0.358969 | Durbin-Watson stat | 0.336092 |
| Prob(F-statistic) | 0.836698 | | |

Dependent Variable: BP

Method: ARMA Maximum Likelihood (OPG - BHHH)

Date: 11/08/25 Time: 21:20

Sample: 2009Q1 2023Q4

Included observations: 60

Convergence achieved after 26 iterations

Coefficient covariance computed using outer product of gradients

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| C | 5.436796 | 8.945924 | 0.607740 | 0.5460 |
| MB | -0.001849 | 0.001341 | -1.379297 | 0.1736 |
| IB | -0.009410 | 0.003297 | -2.854286 | 0.0061 |
| ATM | -0.002699 | 0.000545 | -4.950271 | 0.0000 |
| POS | 0.005237 | 0.001901 | 2.755544 | 0.0080 |
| AR(1) | 0.995813 | 0.030178 | 32.99763 | 0.0000 |
| SIGMASQ | 0.502839 | 0.113417 | 4.433534 | 0.0000 |

| | | | |
|---|---|---|---|
| R-squared | 0.783222 | Mean dependent var | 1.633649 |
| Adjusted R-squared | 0.758682 | S.D. dependent var | 1.535878 |
| S.E. of regression | 0.754487 | Akaike info criterion | 2.463469 |
| Sum squared resid | 30.17032 | Schwarz criterion | 2.707810 |
| Log likelihood | -66.90408 | Hannan-Quinn criter. | 2.559044 |
| F-statistic | 31.91505 | Durbin-Watson stat | 1.765255 |
| Prob(F-statistic) | 0.000000 | | |

| | |
|---|---|
| Inverted AR Roots | 1.00 |