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Adoption of Financial Technology and performance of Deposit Money Banks in Nigeria

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Abstract: The present study investigated the impact of Fintech on the performance of Nigerian banks, focusing on United Bank for Africa (UBA) and Zenith Bank as case studies. In this study, the secondary used data are collected from the banks' quarterly report and payment information system from the Central Bank of Nigeria statistical bulletin from 2012 to 2019. The ARDL technique estimation was employed to analyse the models. The findings reveal that payment technologies have both positive and negative effects on key financial indicators such as earnings per share, price-earnings ratio, return on assets, and short and long term return on equity. However, the positive impact outweighs the negative impact. Consequently, payment financial technologies offer promising opportunities for enhancing the performance of Nigerian banks, as they can contribute to an increase in return on assets and equity, earnings per share, and price-earnings ratio. Therefore, the study recommends that banks

leverage the positive effects of these payment financial technologies while taking proactive measures to address potential challenges, such as cyber fraud and other obstacles that may adversely affect the performance. Nigerian banks can harness the benefits of Fintech to drive financial inclusion and improve their overall performance.

Keywords: Fintech, Financial Performance, Deposit Money Banks, Financial technologies, Payment technologies.

Introduction

Financial technology (Fintech) is swiftly emerging as a crucial innovation within the financial industry. This growth is pushed by factors such as the sharing economy, favourable regulatory environments, and advancements in information technology (Lee & Shin, 2018). Nigeria is a dynamic ecosystem for Fintech start-ups, enabling them to thrive and potentially become multimillion-dollar enterprises. As a key Fintech investment destination in Africa, Nigeria has experienced a surge in deal activity, with about 14 arrangements reported by September 2016, compared to just 2 in 2010. This growth is attributed to the increasing availability and adoption of innovative Fintech solutions (Babarinde et al., 2020; Agboola et al., 2019; Nwaeze, 2021).

The introduction of universal banking in 2001 and the cashless policy in 2011 boosted the emergence of Fintech in Nigeria. The Central Bank of Nigeria (CBN) and the Bankers Committee joined forces to introduce the cashless policy, with the objective of addressing long-standing obstacles to financial inclusion for millions of Nigerians. This policy facilitated the provision of mobile payment services, enabling secure and convenient financial transactions across urban, semi-urban, and rural regions (Itah & Emmanuel, 2014). Consequently, Nigeria's banking system transitioned to retail banking and e-banking channels, enhancing financial inclusion. E-banking is widely accepted internationally and gaining momentum in Nigeria, with more banks entering the market (Ovia, 2001). All Nigerian banks are leveraging e-banking facilities to excel in the competitive industry and provide enhanced services to customers, benefiting both individuals and corporations. The rapid development and global acceptance of e-banking have further encouraged its adoption (Orji et al., 2018; Ovia, 2001; Chimaobi, 2018; Ogbuji et al., 2020).

Electronic payment advancements have led to the emergence of financial technology companies, transforming the predominantly cash-driven Nigerian economy. Mobile money operations have experienced significant growth, with monthly transaction values rising from US$5 million in 2011 to US$142.8 million in 2016. The increasing penetration of Fintech can be attributed to the rise of e-commerce and smartphone usage. Fintech services, including payments, lending, and insurance, are reshaping how businesses and consumers conduct everyday transactions. The commonly used e-payment technologies in Nigeria are Automated Teller Machine (ATM), point-of-sale (POS), Mobile money transfer (MMT), and web pay (WEB) (Mustapha, 2018; Mohammed et al., 2022).

According to the CBN's 2017 report, electronic payment transactions in Nigeria increased by 32.5% to N83.1 trillion from N62.7 trillion in 2016. Nigerian banks are adopting innovative approaches and introducing digital financial products. Zenith Bank, for example, launched Scan to Pay, an app allowing quick online and in-store payments via QR code scanning. Banks and telecom companies have also introduced USSD codes for mobile banking transactions. The e-payment landscape in Nigeria is witnessing remarkable growth as banks, transaction companies, ATM vendors, POS vendors, and third-party entities compete to expand their market presence. According to reports from the Central Bank of Nigeria (2022), there has been a significant surge in the volume and value of e-card transactions. In 2011, the volume increased by 81.5% to 355,252,401 transactions, while the value rose by 55.8% to N1, 671.4 billion (Mustapha, 2018; Chimaobi, 2018). This growth can be attributed to the increasing public trust in electronic card payments.

Among various e-payment channels, ATMs hold the highest popularity, accounting for 97.8% of transactions, followed by web payments at 1.0%, and POS terminals and mobile payments at 0.6% each. In terms of value, ATMs contribute 93.4%, web payments 3.5%, POS 1.9%, and mobile payments 1.2%. As of 2014, Nigeria had 9,640 ATMs, facilitating a volume of 347,569,999 transactions with a value of N1, 561.75 billion (Mustapha, 2018). These figures represent significant increases compared to the previous year. Furthermore, mobile payments experienced substantial growth, with a volume increase of 215.6% and a value increase of 185.8%. By the end of December 2011, mobile payments reached 3,649,374 transactions and N19.0 billion in value (Itah & Emmanuel, 2014).

The implementation of electronic payment technologies has yielded both positive and negative effects on bank performance, specifically in terms of profitability, expected returns, and risk exposure (Madugba et al., 2021). In emerging economies, deposit money banks have witnessed increased profits, but their growth lacks sustainability. Conversely, the adoption of electronic payment technologies has resulted in reduced actual returns for bank stakeholders and an elevated level of risk exposure. Moreover, the introduction of these technologies has necessitated changes in the business models of Nigerian banks, leading to higher operational costs during the transitional phase. To remain competitive with Fintech firms, certain deposit money banks have made substantial investments to support the development of electronic payment systems (Mustapha, 2018).

Against this backdrop, the primary objective of this study is to analyse the influence of Fintech on banking services and, consequently, the financial performance in Nigeria.

Research Problem

The development of financial technology (Fintech) has emerged as a disruptive force in the global financial sector. This discussion has been widely discussed in research studies conducted by Kerényi and Molnár (2017); Kim et al. (2015); Saksonova and Kuzmina-Merlino (2017); Kolesova and Girzheva (2018); Leong et al. (2017); Pejkovska (2018); and Ojo and Nwaokike (2018), among others who shed light on the impacts, opportunities, and challenges of Fintech in a few sectors and regions. However, the crucial question remains: how will this advancement benefit countries, especially developing nations like Nigeria?

According to Manyika et al. (2016), who conducted interviews with 150 experts across several countries including Brazil, China, Ethiopia, India, Mexico, Nigeria, and Pakistan, the widespread adoption and utilisation of digital finance have the potential to significantly boost the Gross Domestic Product (GDP) of emerging economies by approximately 6 percent. This growth is estimated to amount to $3.7 trillion by the year 2025, which is comparable to adding an economy the size of Germany to the global economy or surpassing the combined economies of Africa. Furthermore, the report suggests that this increased GDP could result in the creation of up to 95 million new jobs across various sectors, while also providing access to banking services for 1.6 billion unbanked individuals, with a significant number being women.

In other regions, the lack of access to banking and financial services is a significant concern, particularly in Asia and Africa. According to Alexander et al. (2017), over 50 percent of the global unbanked population, referring to individuals without access to banking services, resides in Asia, including densely populated countries in Africa. While Asia has a relatively developed banking sector compared to similar regions, the large populations of China and India significantly contribute to the unbanked population in the region. In contrast, access to banking services in Africa is generally low. A Vanguard News report in June 2018 confirmed that the unbanked population in Nigeria accounted for 37 percent, falling short of the target of reducing it to 20 percent by 2020. This indicates that a substantial portion of the Nigerian population lacks access to banking and financial services, let alone exposure to Fintech. Even among the banked population, the level of Fintech adoption in comparison to traditional banking remains uncertain. However, with the recent disruptive innovations of Fintech in

Nigeria, the extent of adoption may not necessarily reflect the impact of Fintech on traditional banking businesses. Furthermore, there is a lack of comprehensive studies that fully examine the extent of the shift towards Fintech usage in relation to traditional banking and financial services in Nigeria.

Furthermore, while there are varying findings on the impact of Fintech on the financial performance of banks, there is a notable gap in the literature regarding the specific influence of increasing Fintech adoption on Nigerian banks, particularly prominent institutions like United Bank for Africa and Zenith Bank. Apart from Chimaobi's (2018) investigation of the profitability of commercial banks through internet banking, there is a lack of studies exploring the effects of Fintech adoption on market-based performance measures and traditional performance metrics in these specific banks. This research gap serves as the focal point of the present study, aiming to contribute valuable insights to the existing body of knowledge. Therefore, this study distinguishes itself from previous research by conducting a detailed analysis of individual banks, focusing on Zenith Bank and United Bank for Africa, which have received limited attention in the literature. Moreover, while prior studies have predominantly concentrated on traditional measures of firm performance like return on investment and earnings per share, this study stands out by incorporating market-based performance measures as well.

Research Focus

The study focuses on the payment technologies statistics as well as the market and non-market performance of banks in Nigeria analysis. It specifically examines the impact of financial technologies, particularly payment technologies, on the performance of major banks in the country.

Research Aim and Research Questions

The study intends to investigate the Fintech impacts on traditional banking and financial services of deposit money banks in Nigeria, using United Bank for Africa (UBA) and Zenith Bank as case studies. In order to achieve the main objective, the study attempts to provide answers to the research question:

-What is the impact of Fintech on the financial performance (traditional and market-based performance measures) of UBA and Zenith Bank in Nigeria?

Literature review

The literature review examines the influence of financial technologies on the bank performance in Nigeria and several other African countries. Recent studies explore different facets of Fintech, encompassing digital banking, payment system innovations, and electronic banking operations. These studies analyse the impact of Fintech on key bank performance indicators, including total deposits, net profits, return on assets (ROA), return on equity (ROE), and earnings per share (EPS). Through a comparative analysis of these findings, the aim was to uncover valuable insights regarding the connection between Fintech and bank performance within the African context.

The digital landscape is undergoing rapid transformations, impacting all aspects of the banking sector. To remain relevant, the banking industry in Nigeria should strive to keep up with digital advancements in service delivery (Babarinde et al., 2020; Agboola et al., 2019). Several studies have highlighted the positive effects of financial technologies on bank performance. For instance, Baker et al. (2023) conducted a study on the impact of Financial Technology on the Improvement of Banks' Financial Performance in Jordan and the United Arab Emirates, utilising multiple regression analysis. Their findings revealed that financial technology has a positive impact on total deposits and net profits. Similarly, Chukwu and Molokwu (2022) examined the Effects of Digital Banking on the Performance of Commercial Banks in Nigeria from 2010 to 2019. Their study indicated that digital banking has a positive and insignificant effect on the performance of commercial banks in Nigeria. In Nigeria, Mohammed et al. (2022) investigated the Effect of Payments System Innovations on the Financial Performance of Commercial Banks and obtained similar results. Through ARDL analysis, the study demonstrated that mobile payment, point-of-sales transactions, and internet payment have a positive

and significant impact on the return on assets of commercial banks in Nigeria. Nwaeze (2021), using a panel approach, also found the same outcome. The study revealed that automated teller machines, point of sale, and mobile transfer/web improved the performance of domestic systemically important banks in Nigeria between 2015 and 2019. Additionally, Akwam and Yua (2021) examined the Effect of Financial Products on the Performance of Selected Deposit Money Banks in Nigeria from 2005 to 2019. Employing multiple linear regression methodology, their study indicated that mobile banking has a significant positive effect on return on assets (ROA), point of sale has a positive significant effect on return on equity (ROE), and automated teller machine also has a positive significant effect on earnings per share (EPS). Other studies, such as Ibiam and Nwogo (2021) using the Vector Error Correction Model, Gambo (2020) utilizing multiple regression, and Ahmed-Ishmel et al. (2018), have shown that financial technology can contribute to national development and the financial performance of firms in Nigeria. Furthermore, Ibiam and Nwogo (2021) and Gambo (2020) in their studies on the Effect of Financial Technology (FinTech) on Financial System Development in Nigeria from 2005–2018 and the Effects of Technology Innovation on Financial Performance of Commercial Banks in Nigeria, respectively, identified payment technology innovations like mobile banking, Automated Teller machines, Point-of-sales and online banking as strong and positive determinants of financial performance and the financial system.

A few studies have also adopted a single-firm analysis approach. For instance, Ogbuji et al. (2020) and Chimaobi (2018) focused on specific banks in Nigeria. Ogbuji et al. (2020) conducted a comparative analysis of financial technology and traditional bank performance in Nigeria using the CAMELS approach, with a case study on WEMA Bank. Their findings indicated that digital Fintech operations, particularly ALAT in WEMA Bank, had a consistently positive impact on WEMA Bank's performance between 2017 and 2018, compared to the payment FinTech operations between 2012 and 2016. On the other hand, Chimaobi (2018) examined the impact of internet banking on the profitability of commercial banks in Nigeria, specifically using Zenith Bank PLC as a case study from 2005 to 2017. The study employed regression analysis and observed a positive and significant relationship between the logarithm of internet banking service expenses and the return on assets in Zenith Bank.

The other strand of literature focuses on electronic banking operations and its impact on bank performance. Several studies have observed the relationship between electronic banking and financial performance. For instance, Madugba et al. (2021) investigated the effect of electronic banking on the financial performance of deposit money banks in Nigeria. Through regression analysis, they found a positive and significant association between ATMs and earnings per share (EPS) and return on assets (ROA). Point of sale (POS) and national electronic funds transfer (NEFT) significantly affected ROA, while web transactions had an insignificant impact on both EPS and ROA. Similar results were obtained by Mustapha (2018) in their examination of the effect of E-Payment Technology on bank performance in emerging economies like Nigeria. Orji et al. (2018) also noted that major e-banking innovations, including automated teller machine (ATM), point of sale (POS), and mobile banking transactions, contribute to the performance of both old and new banks in Nigeria.

On the contrary, Amos et al. (2020) conducted a study using multiple regression analysis to examine the effect of electronic banking on bank performance in Nigeria. Their findings revealed that e-banking had no significant impact on performance measures such as return on equity (ROE), return on assets (ROA), and earnings per share (EPS) of banks in Nigeria. Nwakoby et al. (2020) empirically investigated the impact of electronic banking on the profitability of selected banks in Nigeria. Using a panel regression estimator, they found mixed results. The study revealed that automated teller machine (ATM) payment method had a negative but statistically insignificant effect on return on equity of deposit money banks. Point of sale (POS) payment method also had an insignificant effect on return on equity, while mobile banking payment (MPAY) had a positive and statistically significant effect on return on equity.

Other studies, such as Frank and Binaebi (2019), examined the impact of electronic payment system implementation on the performance of commercial banks in Nigeria. Their findings showed a statistically significant positive relationship between ATM transactions and the asset base of commercial banks. Internet (online) banking transactions had a positive relationship with the asset base, while mobile banking transactions had a positive and statistically significant relationship. However, point of sale (POS) transactions had a negative statistical relationship with the asset base of banks. These findings indicate that the implementation of electronic payment systems has had a mixed effect on bank performance. While ATM, internet banking, and mobile banking lead to improvements, point of sale machines have a negative impact.

Similarly, Obiekwe and Anyanwaokoro (2017) analysed panel data using the panel least square method to examine the effect of electronic payment methods on the profitability of banking firms in Nigeria. Their findings revealed that automated teller machine (ATM) and mobile phone payments had a significant effect on the profitability of commercial banks, while point of sale (POS) had an insignificant effect.

Furthermore, the utilisation of electronic banking has also been observed to impact the operational efficiency of banks. Rabiu et al. (2019) examined the impact of e-banking on the operational efficiency of banks in Nigeria and found that the use of e-banking, including internet and mobile banking, has improved the efficiency of banks in various aspects. This includes providing efficient services to customers electronically, reducing service time, allowing new customers to open accounts online, and providing 24/7 access to customer accounts. Additionally, the e-banking has eliminated the cost of cheques and postage, while also enabling an easy access to customer information from the database. Based on these findings, Adaramola and Kolapo (2019) advocate for the increased distribution of teller machines and raising awareness about mobile banking as result-oriented marketing strategies for banks to fully leverage the potential of electronic banking. Moreover, Agwu (2017) suggests that the implementation of e-banking has created additional channels within the banking operations.

In summary, while there are mixed findings regarding the impact of Fintech on the financial performance of banks, there is a gap in the literature when it comes to specifically addressing how the increasing adoption of Fintech will influence the performance of Nigerian banks, particularly leading banks like United Bank for Africa and Zenith Bank. With the exception of Chimaobi's (2018) examination of the impact of internet banking on the profitability of commercial banks, no known studies have explored how the adoption of Fintech in these specific banks affects market-based performance measures and traditional performance metrics. This research gap serves as the focus of the present study that aims making a valuable contribution to the existing body of knowledge. Therefore, this study differs from previous researches by conducting a single-firm analysis using the cases of Zenith Bank and United Bank for Africa, which have not been extensively examined in the literature. Additionally, while previous studies have primarily focused on traditional measures of firm performance such as return on investment and earnings per share, this study distinguishes itself by also incorporating market-based measures of firm performance.

Research Methodology

Sample / Participants / Group

In this study quarterly data from three primary sources were collected: the Central Bank of Nigeria payment system statistics and the quarterly reports of Zenith Bank and United Bank for Africa (UBA), covering the period from 2012 to 2019. The Central Bank of Nigeria Payment System Statistics were obtained from the Quarterly Central Bank of Nigeria Statistical Bulletin (Central Bank of Nigeria, 2022). The quarterly financial statements of Zenith Bank and UBA were obtained from the respective banks' websites (Zenith Bank, 2022; United Bank for Africa, 2022).

The sample period was selected to align with significant events in the Nigerian banking sector. For instance, the year 2012 marked the inauguration of financial inclusion by the Central Bank of Nigeria, signalling the emergence of payment Fintech beyond traditional electronic banking. Additionally, the year 2019 was chosen as the endpoint of the sample period due to potential structural breaks in performance indicators and payment system data caused by the disruptive effects of the Covid-19 pandemic. It should be noted that there were insufficient data points to separate the sample into distinct groups or account for specific structural breaks. Future research in this field could explore the impact of structural breaks on the models. This is further emphasised in the conclusion of this study.

The payment system data, including the point of sale (POS) transactions, mobile money transfers (MOB), online payments (OPT), and Automated Teller Machine (ATM) transactions, were extracted from the Central Bank of Nigeria database (Central Bank of Nigeria, 2022). The quarterly financial statements of Zenith Bank and UBA were used to calculate relevant financial ratios for the study. The mentioned reports can be accessed on the respective websites of Zenith Bank and United Bank for Africa (Zenith Bank, 2022; United Bank for Africa, 2022). These banks were selected as the focus of the study due to their prominence as tier-one banks in Nigeria. While they are among the top five largest banks in the country based on the value of total asset size, they have exhibited relatively low levels of financial technology adoption (Ogbuji, Ologundudu, & Oluyomi, 2020). Consequently, this study aims providing insights into the potential of financial technology impact, on their adaptation, their assets, shares, equity, and market price. The market-based performance was assessed using metrics such as the price-earnings ratio and earnings per share, while the traditional performance was evaluated using indicators such as return on equity and return on assets. The operational variables for the study are:

P/E ratio (Price per share - earnings per share ratio) = Market price per share/Earnings per share

EPS (Earning Per share) = Net profit after tax attributable to shareholders/Outstanding shares

ROE (Return on Equity) = Net profit after tax/shareholders' equity

ROA (Return on asset) = Net Profit after tax/Total asset

The previous studies, including those by Mohammed et al. (2022), Akwam and Yua (2021), and Madugba et al. (2021), among others, have also utilised these variables to assess the market performance of banks. This study adds the price-earnings ratio as an additional measure of market performance for the banks.

Instrument and Procedures

Following Itah and Emmanuel (2014) with modification to suit the context of the study, the functional representation of the regression specification is rendered below:

$$ROE_t = f(VPOS, VMOB, VATM, VOPT) \quad (1)$$

$$ROA_t = f(VPOS, VMOB, VATM, VOPT) \quad (2)$$

$$EPS_t = f(VPOS, VMOB, VATM, VOPT) \quad (3)$$

$$PER_t = f(VPOS, VMOB, VATM, VVOPT) \quad (4)$$

Equation (1) to (4) can further be represented in econometric form as:

$$ROE_t = \gamma_1 + \beta_1\, logVPOS_t + \delta_1 logVMOB_t + \alpha_1 logVATM_t + \theta_1 VOPT_t + e_t \quad (5)$$

$$ROA_t = \gamma_2 + \beta_2\, logVPOS_t + \delta_2\, logVMOB_t + \alpha_2\, logVATM_t + \theta_2 VOPT_t + e_t \quad (6)$$

$$EPS_t = \gamma_3 + \beta_3\, logPOS_t + \delta_3\, logMOB_t + \alpha_3\, logATM_t + \theta_3 OPT_t + e_t \quad (7)$$

$$PER_t = \gamma_3 + \beta_3\, logPOS_t + \delta_3\, logMOB_t + \alpha_3\, logATM_t + \theta_3 OPT_t + e_t \quad (8)$$

Where: VPOS = value of Point-of-sale transactions; VMOB = value of mobile money transfer; VATM = value of Automated Teller Machine transaction; OPT = value of online payment transfer; ROA = return on assets; ROE = return on equity; EPS = Earnings per share; PER =price earnings ratio. The dependent variables are ROA, ROE, EPS and PER. They are used to capture the traditional based performance measure (ROA and ROE) and the market-based performance measure (EPS and PER). The independent variables, on the other hand, are the payment innovation systems (automated teller machine transactions, online payment transactions, mobile money transfer, and point-of-sale transactions), representing financial technology in this study.

The a priori expectation for the impact analysis is expected to be positive for all coefficients. That is:

$$\beta_i > 0, \delta_i > 0, \alpha_i > 0, \theta_i > 0$$

Where i = model 1-4

This study employs the autoregressive distributed lag (ARDL) model as the chosen estimation technique. The utilisation of this model is driven by several identified advantages it offers. Firstly, the ARDL model allows for the assessment of both short-term and long-term effects of independent variables on the dependent variable. This distinguishes it from other static estimation techniques that only account for long-term or fixed effects. Secondly, the ARDL model provides an alternative method for examining the long-run equilibrium relationship through a bound test, which differs from the conventional residual-based co-integration test typically used in univariate analysis. The bound test offers flexibility as it accommodates both I (0) and I (1) variables, unlike other techniques that solely accommodate I (1) variables.

An autoregressive distributed lag (ARDL) model is a regression analysis that incorporates lagged values of both the dependent variable (autoregressive terms) and the explanatory variables (distributed lag terms). ARDL models are commonly represented notationally as ARDL (p, q_1.... q_K), where p represents the number of lags of the dependent variable, q1 indicates the number of lags of the first explanatory variable, qK signifies the number of lags of the Kth explanatory variable, and K denotes the total number of explanatory variables (X_1...X_K).

Data Analysis

The descriptive statistics of the study reveal that the deposit money banks in Nigeria recorded an average value of ATM transactions of N1, 100.32 billion, OPT N41.92 billion, POS N212.26 billion and MOB N163.90 billion, within the period of consideration. In terms of the coefficient of variation, OPT is the most volatile series, while ATM is the least volatile. The Jarque-Bera Statistic indicates that all the payment systems under consideration, except ATM, are not normally distributed at a 5% level of significance. These results have implications for the stationarity properties of the series.

Table 1

Summary of Descriptive Statistics

UNITED BANK FOR AFRICA (UBA)					
Variable	No. of Observation	Mean	Standard Deviation	Coefficient of variation (%)	Jarque-Bera statistic
eps_uba	29	0.737	0.470	63.800	3.035[0.219]
per_uba	29	16.368	28.551	174.430	628.7311[0.000]

roa_uba	29	0.009	0.006	68.920	0.009[0.006]
roe_uba	29	0.0707	0.035	48.990	0.071[0.035]
ZENITHBANK (ZEN)					
Variable	No. of Observation	Mean	Standard Deviation	Coefficient of variation (%)	Jarque-Bera statistic
eps_zen	29	2.351	1.469	62.490	4.957[0.084]
per_zen	29	12.140	9.570	78.820	85.426 [0.000]
roa_zen	29	0.019	0.010	51.480	1.196[0.550]
roe_zen	29	0.120	0.061	51.010	1.475[0.478]
PAYMENT STATISTICS					
Variable	No. of Observation	Mean	Standard Deviation	Coefficient of variation (%)	Jarque-Bera statistic
vatm	29	1100.315	419.987	38.170	1.975[0.373]
vopt	29	41.924	52.943	126.280	74.551[0.000]
vpos	29	212.258	215.009	101.300	5.433[0.066]
vmob	29	163.896	152.514	93.060	7.513[0.023]

Note: The values enclosed within square brackets [ ] represent probabilities. (vatm - value of ATM transactions; v=value; all other variables remain as defined in the previous section)

Source: Authors' design

Furthermore, Table 1 presents the statistics of the traditional and market-related performance of the selected banks. United Bank for Africa recorded average earnings per share of N0.74k within the period of consideration. The average price-to-earnings ratio recorded for the period is N16.37k, implying that investors, on average, place a cost of N16.37k for N1 worth of the company's earnings. Additionally, the average return on assets and return on equity of the bank are 0.9% and 7.06%, respectively. The price-to-earnings ratio is the most volatile of all the performance indicators, while the return on equity is the least volatile series based on the coefficient of variation. Furthermore, the Jarque-Bera Statistics show that all the series are not normally distributed at a 5% level of significance, except for the earnings per share.

Moreover, Zenith Bank recorded average earnings per share of N2.35 within the period of consideration. The average price-to-earnings ratio recorded for the period is N12.14, implying that investors, on average, place a cost of N12.14k for N1 worth of the company's earnings. Additionally, the average return on assets and return on equity of the bank are 1.9% and 12.03%, respectively. The price-to-earnings ratio is the most volatile of all the performance indicators, while the return on equity is the least volatile series based on the coefficient of variation. Furthermore, the Jarque-Bera Statistics show

that the return on assets and return on equity are normally distributed at a 5% level of significance, while the earnings per share and the price-to-earnings ratio are not normally distributed.

The results of the descriptive statistics have implications on the stationarity status of the series in the consideration, hence the need to check other time-series properties such as the unit root and the co-integration.

Research Results

This section presents the result of the study, starting with the unit root test to the estimation proper.

The Unit Root Test Result

Table 2

Result of the ADF Unit Root Test

Variable	Level	First Difference	Order of integration
eps_uba	-7.899***b	……..‡	I(0)
per_uba	-5.006***a	……..‡	I(0)
roa_uba	-4.352***a	……..‡	I(0)
roe_uba	-7.803***a	……..‡	I(0)
eps_zen	-2.810b	-23.918***b	I(1)
per_zen	-5.317***a	……..‡	I(0)
roa_zen	-1.425a	-12.564**a	I(1)
roe_zen	-1.764a	-29.035***b	I(1)
vatm	-1.989a	-5.318**a	I(1)
vopt	-4.190***b	……..‡	I(0)
vpos	-1.884***b	-10.068***a	I(1)
vmob	-4.536***a	……..‡	I(0)

Note: ***, **,* the rejection of the null hypothesis of a unit root is indicated at significance levels of 1%, 5%, and 10%, respectively. The symbol "‡" indicates that a series that is stationary at levels does not need to have its first difference reported. The letters "b" and "a" represent the model with intercept and trend, and the model with intercept only, respectively.

Source: Authors' design

The ADF unit root test results are presented in Table 2 below. In the case of UBA, all the performance indicators exhibit stationarity at the levels, with a 5% level of significance. For Zenith Bank, all the series become stationary after the first difference or are integrated at order one, except for the price-to-earnings ratio, which remains stationary at the levels. Only the test regressions that yielded statistically significant ADF statistics are reported, out of the three regressions employed, namely a model with an intercept and trend, a model with an intercept only, and a model with no intercept.

Since the series in the analysis are either I (0) or I (1) and there are no I (2) series, it is appropriate to apply a linear autoregressive distributed lag model.

The Co-integration Test Result

This section presents the results of the ARDL co-integration test, which aim was to establish the existence of a long-run equilibrium relationship in the models. The co-integration results were reported separately for each selected bank.

In model 1, which examines the relationship between the return on equity and Fintech represented by payment statistics, the evidence reveals that the F-statistic exceeds the upper bound of the critical values at a 1% level of significance for both banks. Therefore, it can be concluded that there exists a long-run equilibrium relationship between return on equity and the payment statistics in the selected banks.

In model 2, which focuses on the relationship between Fintech and return on assets, the F-statistic surpasses the upper bound (I1) critical value at a 1% level of significance for both banks. Thus, it can be inferred that a long-run equilibrium relationship exists between return on assets, the value of ATM transactions, the value of mobile money transfers (MOB), the value of online payment transactions (OPT), and the value of point of sale (POS) transactions in both banks.

Similar findings are observed for model 3 and model 4 at a 1% level of significance. This implies the presence of a long-run equilibrium relationship between earnings per share and the price-to-earnings ratio, as well as the selected payment financial technologies, including the value of ATM transactions, the value of MOB, the value of OPT, and the value of POS transactions in all the selected banks.

Estimation of the ARDL Regression Result

The results encompass various components, including short-run and long-run ARDL estimates, important statistics such as R2 and F-statistic, and post-estimation tests for normality, serial correlation, and heteroscedasticity. The post-estimation tests confirm the goodness of fit of the estimated models, indicating their suitability. Furthermore, the coefficient on the error correction term meets the convergence criteria: it is negative, absolute value is less than 1, and statistically significant at the 5% level for all models across both banks. This provides evidence of a long-run relationship between financial technologies and the traditional and market-based performance measurements of the banks.

Table 3

ARDL Estimates for UBA

Short Run estimates				
Dependent variable	Δeps_uba_t	Δroa_uba_t	Δroe_uba_t	Δper_uba_t
D ((-1))	0.590***(0.009)	-	0.553**(0.014)	-
D(VATM)	1.858*(0.096)	0.042**(0.023)	0.094(0.330)	-95.541(0.276)
D(VMOB)	0.232(0.450)	-0.000(0.892)	0.002 (0.912)	6.174(0.712)
D(VOPT)	0.590**(0.041)	0.006 (0.160)	0.038 (0.191)	-26.298(0.201)
D (VOPT (-1))	-0.776*(0.084)	-	-	-
D(VPOS)	-0.448(0.570)	-0.015**(0.041)	0.046(0.590)	38.707(0.301)
D (VPOS (-1))	-	-	-0.067**(0.053)	-
CointEq(-1)	-0.718***(0.000)	-0.895***(0.000)	-0.842***(0.000)	-0.981***(0.000)

C	-19.231** (0.014)	-0.225**(0.023)	-1.415**(0.034)	552.710(0.243)
Long-run estimates				
Dependent variable	eps_uba_t	roa_uba_t	roe_uba_t	per_uba_t
VATM	1.970***(0.009)	0.038**(0.017)	0.150**(0.027)	-97.411(0.310)
VMOB	0.135(0.466)	-0.000(0.892)	0.001(0.912)	6.294(0.711)
VOPT	0.710**(0.028)	0.005(0.155)	0.042**(0.021)	-26.812(0.222)
VPOS	-0.979**(0.035)	-0.014**(0.040)	-0.071**(0.034)	39.464(0.335)
C	-11.195***(0.005)	-0.206**(0.017)	-0.768**(0.029)	563.525(0.278)
Vital Statistics				
R^2	0.821	0.720	0.709	0.833
F-stat	7.322[0.000]	2.073[0.007]	3.897 [0.007]	0.676[0.006]
Ramsey RESET linearity test	2.229[0.156]	1.191[0.247]	0.983 [0.341]	1.955[0.064]
Jarque-Bera normality test	0.385 [0.825]	1.636[0.44]	0.149[0.928]	451.381[0.000]
Breusch-Godfrey serial correlation LM test	1.350[0.291]	1.221[0.316]	0.197 [0.823]	0.364 [0.699]
Breusch-Pagan-Godfrey Heteroscedasticity test	0.555[0.827]	0.388[0.852]	0.553[0.828]	0.337[0.885]

Note: ***, **,* the rejection of the null hypothesis indicated at significance levels of 1%, 5%, and 10%, respectively; the values enclosed within square brackets [ ] represent probabilities.; RESET implies Regression Error Specification Test.
Source: Authors' design

The regression estimates of the models for UBA are presented in Table 3. The table shows that the value of ATM transactions has a positive and significant impact on earnings per share and return on assets in UBA at a 10% level of significance, in the short run, but positively impact earnings per share, return on assets and returns on equity in the long run at 10% significance level. However, the impact on price earnings ratio is insignificant in the short run and long run at 10% level. The impact coefficients align with the expected outcome, and since the p-value is less than 0.1, they are significant at a 10% level. This implies that a 1% increase in the value of ATM transactions leads to an approximate N1.86k increase in earnings per share, 0.042% increase in the return on asset, in the short run. In the long run, a 1% increase in the value of ATM transactions, on average, results in an increase in earnings per share, return on asset and return on equity by N1.97k, 0.038% and 0.150%, respectively.

Furthermore, the impact of mobile transfer transactions on earnings per share, return on assets and return on equity are positive but not statistically significant both in the short run and long run, at a 10% level of significance. Similarly, the value of point-of-sale transactions have a negative and significant impact on return on asset and return on equity, but a negligible impact on earnings per share

in the short run. However, in the long run, there is a negative and significant relationship between the value of point-of-sale transactions and earnings per share, return on equity, and return on asset at a 10% level of significance. The impact coefficients indicate that a 1% increase in the value of point-of-sale transactions reduces return on assets and return on equity by 0.015% and 0.067% in the short run. In the long run, a 1% increase in the value of point-of-sale transactions reduces the earnings per share, return on assets and return on equity by 0.979k, 0.014% and 0.017%, respectively. However, the impact of value of point-of-sale on the price earnings ratio is negligible both in the short run and long run.

Additionally, the value of online payment transaction (OPT) shows an overall negative impact on earnings per share in the short run, but a positive and significant impact on earnings per share and return on equity in the long run, at a 10% level of significance. The short run and long run coefficients are -0.186 and 0.710, respectively. This implies that a 1% increase in the value of OPT decreases earnings per share by N0.186k in the short run, while increasing earnings per share by N0.710k in the long run. Also, a 1% increase in value of OPT increases return on equity by 0.042%, in the long run.

Examining the impact of Fintech on other market-based performance indicators for UBA, Table 3 shows that Fintech, represented by payment statistics, does not have a significant impact on the price-earnings ratio in both the short run and long run, at a 5% level of significance.

Moreover, the probabilities associated with the Ramsey RESET linearity test, Jarque-Bera normality test, Breusch-Godfrey serial correlation test, and Breusch-Godfrey heteroscedasticity test for the UBA models are all greater than 0.05. This suggests that the estimated ARDL models do not suffer from wrong functional form, non-normality in the residuals, serial correlation in the residuals, or non-constant residual variance. Examining the vital statistics, the coefficient of determination indicates that Fintech accounts for approximately 82% of the variation in earnings per share, 72% of the variation in return on assets, 71% of the variation in return on equity, and 83% of the variation in the price-earnings ratio.

Table 4

ARDL Estimates for Zenith

Short-run estimates				
Dependent variable	Δ***eps***_zen$_t$	Δ***roa***_zen$_t$	Δ***roe***_zen$_t$	Δ***per***_zen$_t$
D ((-1))	-	-	0.592***(0.000)	0.179(0.216)
D(VATM)	6.313*(0.065)	0.034*(0.088)	0.139 (0.133)	-5.588 (0.312)
D (VATM (-1))	-	-	-	-3.497**(0. 048)
D(VMOB)	-0.069 (0.923)	-0.004 (0.245)	-0.127***(0.006)	3.444 (0.404)
D(VOPT)	2.576***(0.004)	0.013**(0.013)	0.041 (0.136)	5.733 (0.393)
D (VOPT (-1))	-	-	0.183***(0.002)	-
D(VPOS)	-2.994 (0.043)	0.051**(0.017)	0.282***(0.006)	-2.805***(0.001)
D (VPOS (-1))	-	-0.014**(0.032)	-0.158***(0.000)	-
CointEq(-1)	-0.291***(0.000)	-0.608***(0.000)	-0.803***(0.000)	-0.578***(0.000)
C	-34.580***(0.061)	-0.178*(0.087)	-0.470(0.330)	-174.902(0.349)
Long-run estimates				

Dependent variable	eps_zen_t	roa_zen_t	roe_zen_t	per_zen_t
VATM	4.890**(0.074)	0.029*(0.079)	0.063(0.144)	9.879(0.204)
VMOB	-0.053 (0.922)	-0.016**(0.014)	-0.112***(0.000)	2.183(0.397)
VOPT	1.996***(0.004)	0.011***(0.007)	-0.022 (0.313)	3.634 (0.401)
VPOS	-2.320**(0.067)	0.001 (0.917)	0.099***(0.003)	-0.225*(0.063)
C	-26.790***(0.070)	-0.150*(0.080)	-0.214(0.342)	-0.851 (0.356)
Vital Statistics				
R^2	0.488	0.815	0.923	0.712
F-stat	4.186 [0.001]	9.921[0.000]	16.351[0.000]	4.667[0.003]
Ramsey RESET linearity test	2.220[0.338]	0.117 [0.909]	0.627[0.541]	6.012[0.110]
Jarque-Bera normality test	1.192 [0.551]	1.688[0.4210]	0.851[0.653]	451.381[0.0000]
Breusch-Godfrey serial correlation LM test	0.768 [0.477]	2.686 [0.099]	0.737 [0.497]	0.536[0.596]
Breusch-Pagan-Godfrey Heteroscedasticity test	1.042[0.418]	0.314[0.951]	0.864 [0.594]	1.151[0.382]

Note: *, **,*** the rejection of the null hypothesis indicated at significance levels of 1%, 5%, and 10%, respectively; the values enclosed within square brackets [ ] represent probabilities.; RESET implies Regression Error Specification Test;

Source: Authors' design

The regression estimates for models pertaining to Zenith Bank are presented in Table 4. Specifically, ATM transactions have a positive and significant impact on Zenith Bank's earnings per share in both the short and long run, with impact coefficients of 6.313 and 4.890, respectively. This suggests that a 1% increase in ATM transaction value leads to an increase in earnings per share by approximately N6.31k in the short run and N4.89k in the long run. Similarly, online payment transactions positively and significantly impact earnings per share, with impact coefficients of 2.576 in the short run and 1.996 in the long run. This indicates that a 1% increase in online payment transaction value results in an increase in earnings per share of Zenith Bank by approximately N2.58k in the short run and N1.996k in the long run. However, the value of POS transactions has a negative and insignificant impact on earnings per share in the short, but negative and significant in the long run at a 10% level of significance, with impact coefficients of -2.994 and -2.320, respectively. This implies that a 1% increase in POS transactions leads to a decrease in earnings per share by approximately N2.32k in the long run. Additionally, the constant term has a negative impact on earnings per share in both the short and long run, with significant impact coefficients at a 10% level.

Examining the market-based performance indicators further reveals that only the value of ATM transactions and the value of POS transactions have a significant impact on the price-earnings ratio in both the short, while only POS show a negative and significant impact on price-earnings ratio in the long run. Other payment statistics do not significantly affect the price-earnings ratio of Zenith Bank. Specifically, ATM transactions and POS transactions exhibit a negative and significant impact on the price-earnings ratio in the short run, with impact coefficients of -3.496806 and -2.805396, respectively. This suggests that a 1% increase in either of these payment transactions leads to a decrease in the price-earnings ratio by approximately N3.50k and N2.81k, respectively. However, in the long run, only the value of POS transactions has a significant impact on the price-earnings ratio at a 10% level of significance, with an impact coefficient of -0.224850. This indicates a negative and significant relationship between the value of POS transactions and the price-earnings ratio in the long run. Consequently, if there is a 1% increase in the value of POS transactions, the price-earnings ratio will decrease by approximately N0.22k in the long run.

The traditional performance indicators presented in Table 4 reveal a positive relationship between the value of ATM transactions and return on assets in both the short and long run, with coefficients of 0.034 and 0.029 at a 10% level of significance, respectively. This suggests that a 1% increase in ATM transactions leads to an average increase in return on assets by approximately 0.034% in the short run and 0.029% in the long run. Similarly, the value of OPT transactions has a positive and significant impact on return on assets in both the short and long run, with impact coefficients of 0.013 and 0.011 at a 5% level of significance. This implies that an attempt to increase the value of OPT transactions generates an average increase in return on assets by approximately 0.013% in the short run and 0.0101% in the long run. Additionally, a 1% increase in the value of POS transactions results in a 0.037% increase in return on assets in the short run.

In the long run, only the values of MOB and POS transactions significantly affect return on equity at a 5% level of significance. The value of MOB transactions has a negative impact, while the value of POS transactions has a positive impact. The impact coefficients indicate that return on equity will decrease by 0.112% with an increase in the value of MOB transactions, while it will increase by 0.099% with an increase in the value of POS transactions on average.

In the short run, the value of ATM transactions does not have a significant effect on return on equity in Zenith Bank. However, the value of MOB transactions negatively influences return on equity in the short run at a 5% level of significance, with an impact coefficient of -0.127. This implies that an increase in the value of MOB transactions decreases return on equity by 0.127% in the short run. The value of OPT transactions impacts return on equity by -0.225, indicating a 0.225% decrease in return on equity with a 1% increase in the value of OPT transactions. The POS transactions also exert a positive impact on return on equity. Table 4 also demonstrates a positive relationship between the value of POS transactions and return on equity in the short run. The value of POS transactions impacts returns on equity by approximately 0.123% on average at a 5% level of significance in the short run.

Moreover, since the probabilities associated with the Ramsey RESET linearity test, Jarque-Bera normality test, Breusch-Godfrey serial correlation test, and Breusch-Godfrey heteroscedasticity test for the models for Zenith Bank are greater than 0.05, it can be concluded that the estimated ARDL models do not suffer from incorrect functional form, non-normality in the residuals, serial correlation in the residuals, and non-constant residual variance. Examining the vital statistics, the coefficient of determination reveals that Fintech accounts for approximately 49% of the variation in earnings per share, 82% of the variation in return on assets, 92% of the variation in returns on equity, and 71% of the variation in the price-earnings ratio.

Discussion

The study presents compelling evidence of the significant influence of payment financial technologies, commonly known as Fintech, on the performance of the selected banks in both the short and long term. The performance indicators analysed in this study include earnings per share, price-earnings ratio, return on assets, and return on equity. The primary focus of the investigation was to examine the specific impact of Fintech on United Bank for Africa (UBA) and Zenith Bank (ZENITH). Interestingly, while certain findings from this study align with previous research, there are also noteworthy disparities between the results.

For UBA, the findings reveal that the value of ATM transactions has a positive and significant impact on earnings per share, both in the short and long term. This result aligns with prior expectations and is consistent with the findings of studies such as Akwam and Yua (2021) and Madugba et al. (2021). On the other hand, the value of POS transactions does not have a significant impact on earnings per share in the short term, but it exhibits a negative impact in the long term. This long-term result contradicts prior expectations and differs from the findings of Akwam and Yua (2021) and Nwaeze (2021), among others. Additionally, the value of online payment (OPT) transactions demonstrates a negative impact on earnings per share in the short term, but a positive impact in the long term, which contradicts the findings of Amos et al. (2020). These results suggest that financial technologies have a significant influence on UBA's performance in terms of dividend payments to shareholders. Increased usage of electronic card transactions, particularly through ATMs, leads to higher earnings per share and return on assets in both the short and long term, as well as the return on equity in the long term. However, in the long term, a rise in e-card transactions, specifically through the point-of-sale payment system, may potentially decrease earnings per share, return on assets, and return on equity, especially if faced with issues such as network failures and transaction failures. This finding is noteworthy as it contradicts studies such as Mohammed et al. (2022), Nwaeze (2021), and Akwam and Yua (2021), among others.

The study also suggests that the widespread use of online payment transactions may initially decrease earnings per share in the short term due to increased risks of fraud and cybercrime. However, with effective regulations and cybersecurity measures, online payment systems can enhance earnings per share and return on equity in the long term. This result is consistent with the findings of Ibiam and Nwogo (2021) and Gambo (2020) in the long run, but it differs from the findings of Amos et al. (2020). Furthermore, the study indicates that Fintech does not significantly influence how UBA is perceived in the market, as reflected by the price-earnings ratio. This finding is also unique for UBA.

Similarly, the findings related to Zenith Bank indicate that an increase in electronic card transactions has a positive impact on earnings per share and return on assets in both the short and long term, which aligns with the results of Akwam and Yua (2021) and Madugba et al. (2021). However, it is important to note that there may be a potential decrease in the price-earnings ratio in the short term. In the case of POS-based e-card payments, they have a favorable influence on return on assets in both the short and long term, as well as on return on equity in the short term, which is consistent with the findings of Akwam and Yua (2021) and Madugba et al. (2021). However, as mentioned earlier, this payment system could have an adverse effect on earnings per share and the price-earnings ratio in both the short and long term.

Furthermore, unlike UBA, Zenith Bank stands to benefit from the increased utilisation of smartphones. The widespread adoption of smartphone technologies, which leads to a surge in online and mobile payment transactions, is likely to enhance Zenith Bank's earnings per share and return on assets in both the short and long term. However, it is crucial to acknowledge that the implementation of mobile money payments may have a negative impact on return on equity in the short term and return on assets in the long term if certain challenges, such as technological barriers and self-efficacy issues, are not addressed through knowledge creation regarding the use of these e-payment technologies.

Limitation of the Study

However, it is important to acknowledge and address some limitations that may have impacted this study finding. The following constraints were encountered: firstly, one of the limitations was the unavailability of data. The quarterly financial statements of certain banks were not easily accessible during the study, which restricted the number of case studies that could be included in the analysis. This limited the overall sample size and potentially affected the generalisability of the findings. Secondly, the availability of data on payment financial technologies was limited to the year 2012 and onwards. Consequently, the study's timeframe was confined to the period between the first quarter of 2012 and the first quarter of 2019. This restricted the examination of more recent developments and trends in financial technology adoption. Furthermore, the outbreak of the Covid-19 pandemic introduced a significant issue of structural breaks to the data. The pandemic had a profound impact on the global economy and financial sector, potentially influencing the performance indicators and the relationship between financial technology and bank performance. To mitigate the potential biases caused by these structural breaks, the study focused on data up until 2019, before the onset of the pandemic. Despite these limitations, the study made efforts to minimize bias and provide valuable insights within the available scope and data limitations. Future research can address these constraints by incorporating more comprehensive and up-to-date data and the inclusion of structural breaks effect, allowing for a more robust analysis of the impact of financial technology on bank performance.

Conclusions and Implications

The results presented in the study showed that Fintech, together with payment financial technologies exert a great impact on the performance of the selected banks both in the short run and long run within the period of consideration. Using market related performance measures in terms of earnings per share and price earnings ratio, and the traditional performance measure in terms of return on assets and return on equity, clear conclusion can be drawn as to how beneficial Fintech has been in the banking sector. This study was carried out using the case study of United Bank for Africa (UBA) and Zenith Bank (ZENITH). The study provided insight into the Fintech potential to affect traditional banking services. The results showed that the payment financial technologies provide good prospects for improved performance in Nigerian banks. Evidence exists that they could facilitate increased return on assets, equity earnings per share, return on equity and price-earnings ratio. Based on the findings, banks should train or educate customers on how to use payment financial technologies and increase awareness, especially among those with a low educational background. Furthermore, more financial technologies such as ATMs and POS systems should be installed, particularly in rural areas, to increase quick access to banking services. Reducing payment terminal charges would encourage the continuous use of these payment technologies. Also, applicable regulations on customer protection and e-transactions should be introduced and standardised.

To counter possible threats and insecurity associated with online banking, such as cyber-crime and fraud, necessary legal codes should be developed and enforced. This would not only mitigate possible negative effects but also foster industry growth.

Suggestion for Future Research

This study primarily focused on individual firm analysis. However, it is recommended that future research expands the scope of analysis by adopting a panel approach instead of analysing the banks individually. By examining a broader range of deposit money banks in Nigeria and other locations, future studies can provide a more comprehensive understanding of the relationship between financial technology and bank performance. Furthermore, it would be valuable to explore alternative proxies for financial technology and investigate their effects on non-banking financial institutions. This would help to shed light on the impact of financial technologies beyond traditional banking institutions. Additionally, future studies could incorporate the analysis of structural breaks in the study design.

Extending the sample period and including a larger number of banks would provide a more robust assessment of the relationship between financial technology and bank performance, taking into account potential shifts in the industry over time. By considering these suggestions, future research in this area can contribute to a deeper understanding of the role of financial technology and its effects on various types of financial institutions.

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Conflict of Interest

None.

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