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Financial Technology and Economic Growth: Evidence From Nigeria

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Abstract

This paper examined the effect of financial technology on economic growth in Nigeria using time series data for the period 2009-2023. Real gross domestic product (RGDP) represented economic growth as the dependent variable while mobile banking, automated teller machine, point of sales and web payment system proxied financial technology. The variables were obtained from the Central Bank of Nigeria (CBN) Statistical Bulletin. Vector Auto Regression (VAR) technique was used in data analysis. Findings show that Automated teller machine technology had a positive and significant effect on economic growth in Nigeria. Point of sales (POS) and web payment technology had positive and insignificant effect on economic growth in Nigeria while mobile banking technology exerted a negative and insignificant effect on economic growth in Nigeria. Thus, the paper recommended amongst others the need to expand mobile banking services to underserved communities: the Central Bank of Nigeria (CBN) and banks should ensure that robust security measures are put in place to prevent or reduce fraud as well as protect customers' funds as it relates to the point of sales (POS) and web systems and others. Additionally, the need to provide 24/7 customer support through chatbots and human representations is highly recommended.

Keywords: Automated Teller Machine, Economic Growth, Mobile Banking, Point of Sales, Web System,

1. Introduction

The retard growth or performance of the banking sector as a result of the continued use of primitive and outdated techniques in banking business over the years is glaring. Issues such as waste of time on the part of customers and bankers, low profits, inconveniences in banking operations as well as the unattractiveness of banking transactions give rise to this major problem of retard growth and performance of the banking sector and by extension, the economy in the absence of modern technology in the sector.

An outstanding development in the industry aimed at solving the problems pointed above is the adoption of information and communication technology in rendering banking services. This can be referred to as financial technology (Fintech). Fintech is an amalgamation of finance and information technology whose use is facilitated by the internet (Zuo, 2023). It is a new technology that seeks to positively enhance, improve and automate the delivery and use of financial services using technology-based platforms or channels. All these are aimed at reducing costs while improving efficiency

of the financial services industry to serve the public. According to Okon, Umoh and Samuel (2023), financial technology encompasses the intersection of finance and technology, leveraging digital platforms, software, and data analytics to enhance financial services, transactions and experiences.

Fintech channels adopted in this study will include, mobile banking, automated teller machines, point of sales and web payment/technology. With these channels, there is greater opportunity for the financial sector to have significant cost advantage, increasing productivity and facilitate lower risks than traditional banking products (Uruakpa, Iheadindu and Nwankpa, 2022). Fintech is revolutionizing the banking industry and transforming the economy by driving innovation, efficiency and financial inclusiveness. Thus, this study broadly examined the effect of Fintech on economic growth in Nigeria for the period 2009-2023. Specifically, the study investigated the effect of mobile banking, automated teller machine, point of sales and web banking on economic growth in Nigeria. To achieve these objectives, the research questions such as to what extent does mobile banking, automated teller



machine, point of sales and web banking impact on Nigeria economic growth for the period studied?

2. Review of Related Literature

Conceptual Review

The following concepts as it relates technology-based banking products and services are discussed below:

Mobile Banking

Mobile banking is also known as M-banking. It is a term used for performing balance checks, accounts payment, credit application and other banking transactions through a mobile device such as a mobile phone or computer. The earliest mobile banking services were offered over short message services (SMS), known as SMS banking. Mobile banking is used in many parts of the world with minimal structures facilities especially remote and rural areas.

Automated Teller Machines

The Automated Teller Machine (ATM) represents the most visible form of electronic fund transfer (EFT) in retail banking technology in Nigeria. ATM came into Nigeria in the 1990s and has assisted banks in cash dispensing, cash deposits, account enquiries, fund transfers as well as payment of utility bills e.g. recharging of cell phones as well as cable television, subscriptions, etc. Rose (1999) as cited in Babatunde and Salawudeen (2017), described ATM as a combination of computer terminals, database systems and cash vaults in one unit, permitting customers to enter the bank's book keeping system with a plastic card containing a pin or by punching a signal code number terminal linked to the bank's computerized record 24 hours a day.

Point of Sales (POS)

Point of Sales (POS), a critical piece of purchase refers to the place where a customer executes the payment for goods and services and where sales taxes may become payable. It can be a physical store where POS terminals and systems are used to process card payment or virtual sales in the point such as computer or mobile electronic device. POS allows customers to place orders and reservations and pay bills electronically. It is sometimes called point of purchase or checkout.

Web (Internet) Banking

Generally, Web payment system is one of the Fintech channels that have transformed Nigeria's economy, driving growth, financial inclusion and efficiency in financial transaction. The Web payment system is an online transaction platform which allows users to make various transactions such as payment of bills and fund transfers, etc. It offers convenience as transaction can be made from the comfort of one's home. Its adoption has been driven by increased smartphone penetration, improved internet connectivity and innovative Fintech solutions. Mobile money services, bank apps and USSD codes have made it easier for people to send and receive funds, pay bills and shop online.

Economic Growth

Mladen (2015), economic growth includes changes in material production and during a relative short period of time, usually one year. In economic theory, under the concept of economic

growth implies an annual increase of material production expressed in value. Economic growth also refers to an increase in production of goods and services produced within a country's borders. Economic growth can be driven by various factors as: increased productivity, technological advancements and investment in human capital

Theoretical Review

Theory of Innovation Diffusion

This innovation diffusion theory is postulated by Roger in 1983. He argued that individuals intend to adopt a technology as modality to perform traditional activity. The critical factors that determine the adoption of an innovation at the general level are the following: relative advantage, compatibility, complexity, trainability and observability. Many banks have found it advantageous to adopt information and communication technology (ICT) in their operation to improve their efficiency.

According to Ratcliff, Van Zand and McKoon (1999), the innovation diffusion theory proposed by Roger (1983) argues that diffusion refers to the process by which an innovation is converged through certain conduits over time among the participants in a social system. The theory tries to explain that individuals aim to adopt a technology as a methodology to perform or carry out a traditional activity or action. This work is hinged on the theory of innovation diffusion.

Endogenous Growth Model

This is the view of the Keynesian Financial Repression which argued against government restrictions on the banking system such as interest rate ceiling, high reserve requirements and direct credit programmes that hinder financial development and thus reduce output growth. They argued that the development of the banks will facilitate technological innovation as financial intermediaries and thus help in assembling or mobilizing huge savings from the surplus units and also make funds available for the deficit sector with investment opportunities and also attract foreign capital or investments. The endogenous model supports financial intermediary development and emphasizes on the impact of bank development through technological advancement on economic growth.

Empirical Review

Several researchers have investigated the relationship between bank technology-based products in Nigeria and other countries. Below are some of the empirical works in this area.

Obeh and Ohwofasa (2025) examined the extent to which financial technology affected farmers' income in Delta State, Nigeria. The study adopted farmers' incomes as the dependent variable with the components of fintech such as ATM, POS, WEB payment and Mobile transfers as the independent variables. The Ordinary Least Squares (OLS) technique was adopted in data analysis. Findings of the study revealed that POS and mobile payments exerted significant positive effect on farmers' income while the effects of ATM and web payments are negative with ATM statistically significant. The study thus recommended that government should mandate

network providers to ensure availability of networks in the rural communities.

In a study by Cevik (2024), the impact of Fintech on economic growth for the period 2012-2020 was investigated using 198 countries. The dynamic modeling approach and a cross-country data were employed – by using direct measures of Fintech to deal with problems associated with endogeneity. The study revealed that while digital lending had significant positive effects on economic growth, digital capital raising exerted statistical insignificant effect – but found that overall impact of Fintech including all instruments is positive and statistically insignificant on growth.

Chimaobi, Ejiogu and Tasie (2024) examined the impact of bank technology-based product on economic growth in Nigeria over the period of (2009-2018) in a quarterly basis. Secondary data were collected from the CBN Statistical Bulletin and the Nigerian Bureau of Statistics to establish the relationship between the dependent variables and the independent variables (Automated teller machines, point of sale, internet banking and mobile banking). The findings of the study showed that the technology-based products, had significantly impacted on the economic growth of Nigeria. The study recommended that banks should expand and improve on their electronic services in a planned and well articulated strategy for the long run, to have positive impact on economic growth.

Uruakpa, Iheadindu and Nwankpa (2022) examined effect of technology-based payment system on economic growth in Nigeria. The study specifically adopted automated teller machine (ATM), point of sales, web banking and mobile phone payment system as proxies for technology-based products which served as the independent variables while real gross domestic product was adopted as proxy for economic growth and dependent variable. Data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin for the period 2009-2018. Findings revealed that ATM had positive and significant effect on economic growth in Nigeria in both the short-run and long-runs period. Point of sales (POS) technology-based payment system had positive and significant effect on economic growth in Nigeria in the short run but had a positive and insignificant effect on economic growth in Nigeria in the long run. Web technology-based payment system had positive and significant effect on economic growth in Nigeria in the short run while it exhibited a negative and significant effect on economic growth in Nigeria in the long run. Mobile phone technology-based payment system had negative and significant effect on economic growth in Nigeria in the long run. In conclusion, the study argued that technology-based payment in Nigeria had significant effect on Nigeria's economic growth. The study recommended amongst others that commercial bank in Nigeria and the government should further educated the populace on how to make use of the technology-based banking products.

Obademi ad Adegboyega (2014) studied the relationship between banking development and economic growth and the direction of causality in Nigeria with emphasis on the

financial repatriation hypothesis over the period 1970-2010. The Ordinary Least Squares (OLS) method of regression analysis and the Pairwise Granger Causality test were employed in this study. Empirical results revealed that banks have significant and positive impacts on growth in Nigeria under all the regulatory period. However, the study concluded that although banking development showed a positive impact on growth, it cannot be said to be propelling force for economic growth in Nigeria.

Omodele and Onyeiwu (2019) critically examined the impact of electronic banking services on customer satisfaction and specifically probed into the various dimensions of electronic banking service quality. A descriptive survey research design was adopted in the study. The sample size was 93 respondents while the main research instrument was the questionnaire. Data collected were analyzed using descriptive statistics, followed by Pearson Correlation and Regression analysis to test the hypotheses. Findings of the study revealed that there was a significant relationship between customer satisfaction and the various electronic banking services quality dimensions. Electronic banking had significant impact on customer satisfaction.

Hassan, Mukhtar, Ullah, Shafique and Rehman (2012) in their study to demonstrate the technological improvement in payment systems using European Union Member States for the period 1995-2009, made use of retail payments data. Findings of the study revealed that technological improvements in payment systems have been found productive not only in terms of bank operating costs, but also in terms of increase in revenue. The study concluded that migration to efficient electronic retail payment systems had positive effect on GDP consumption and trade and that this relationship is strongest for card payments.

Awoyemi and Awoyemi (2017) examined the role of information technology on Nigeria economy. This was done using ordinary least square estimation technique. The study found that investment in the telecommunication sector and improved level of communication and information technology infrastructure such as computer and internet devices as well as high level of internet usage will achieve rapid economic growth and development if the resources are channeled efficiently. Thus study recommended or suggested an improvement in the supply of information and communication infrastructure.

Aliyu, Tasmin and Lame (2013) examined the impact of electronic banking on customer service delivery in the Malaysian banking industry using Kano's model. The study adopted structural equation modeling as a tool and instrument for data analysis. The study revealed that the mutual relationship that exist between electronic banking. It could be established through the findings of the study that based on the extensive review of existing literatures, the expected and likely outcome as well as the research gaps identified in the research could also provide some direction for future research.

Hammound, Bizri and Ibrahim (2018) investigated the impact of e-banking services quality on customer satisfaction:

evidence from the Lebanese banking sector. The study adopted primary data, which was gotten from survey instrument, which was distributed among bank client in the Lebanese banking sector. The data were statistically analysed using structural equation modeling with SPSS and Amos (20). The study revealed that reliability, efficiency and ease of use; responsiveness and communication and security and privacy all have a significant impact on customer satisfaction, with reliability being the dimension with the strongest impact. E-banking has become one of the essential banking services that can, if properly implemented, increase customer satisfaction, and give banks a competitive advantage knowing the relative importance of service quality dimensions can help the banking industry focus on what satisfies customers the most.

3. Materials and Methods

Methods

This study is an empirical analysis of the effect of financial technology on economic growth of Nigeria. The *Ex-post facto* design is adopted in this study. It is usually used to foist a link between the dependent and independent variables as it relies on already existing data (Osuala, 2010). The nature of data is secondary. Annual series data for this study is collected from the CBN Statistical Bulletin for the period (2009-2023). The choice of the period is based on the period when e-banking became a common practice in the banking sector.

In this study the dependent variable is Real Gross Domestic Product. It depicts the value of all outputs produced in a country valued at the cost of the factor services that went into production. The independent variables in this research are: mobile banking, automated teller machine, point of sales and web banking. These variables will be examined for their impact on the growth of the Nigerian economy. Vector Auto Regression (VAR) technique was used in data analysis.

Model Specification

Uruakpa, Iheadindu and Nwankpa (2022) specified a model in their study to captive the effect of technology-based services on economic growth in Nigeria as:

$$RGDP = f(ATM, POS, WB, MB) \dots\dots \text{Eqn. 1}$$

Where

- F = Function
- ATM = Automated Teller Machine
- POS = Point of Sales
- WB = Web Banking
- MB = Mobile Banking

Model 1 was adopted to suit the object of our study. Thus, we have:

$$RGDP = f(MB, ATM, POS, WB) \dots\dots \text{eqn. 2}$$

Where

- RGDP = Real Gross Domestic Product
- MB = Value of Mobile Banking
- ATM = Value of Automated Teller Machine
- POS = Value of Point of Sale
- WB = Value of Web Banking

Transforming eqn. 2 into an economic model, we have:

$$RGDP = \beta_0 + \beta_1 MB + \beta_2 ATM + \beta_3 POS + \beta_4 WB + \mu \dots \text{Eqn. 3}$$

Where

- B_0 = Constant term (intercept)
- $B_1 \beta_2 \beta_3 \beta_4$ = Co-efficient parameters of the independent variables
- μ = Stochastic or error term

in order to bring the variables to the same base eqn. 3 is transformed as below:

$$\text{LnRGDP} = \beta_0 + \beta_1 \text{LnMB} + \beta_2 \text{LnATM} + \beta_3 \text{LnPOS} + \beta_4 \text{LnWB} + \mu \dots \text{Eqn. 4}$$

By apriori, $B_0 > 0$, $B_1 > 0$, $\beta_2 > 0$ and $\beta_3 > 0$.

4. Data Analysis and Discussion of Findings

Data Analysis

Table 1: Unit Root Test Results

Variable	ADF Values		0.05 Critical Values		Decision
	Levels	1 st Difference	Levels	1 st Difference	
LOG(RGDP)	-3.862747		-3.098896		I(0)
LOG(MB)	-4.389073		-3.212696		I(0)
DLOG(ATM)	-1.014364	-5.555189	-3.098896	-3.119910	I(1)
DLOG(POS)	0.639175	-4.588829	-3.098896	-3.119910	I(1)
DLOG(WEB)	0.027441	-4.243614	-3.098896	-3.119910	I(1)

D = Change notation, LOG = Logarithm

Source: Author’s computation (2025) from E-views 10 software package

From table 1 above, evidence suggested that real gross domestic product (RGDP) and mobile phone (MB) transactions were stationary at levels given that their ADF values in absolute terms (3.862747) and (4.389073) were greater than their critical values in absolute terms (3.098896)

and (3.212696), respectively. On the other hand, automated teller machine (ATM), point of sale (POS) and web pay (WEB) had their ADF values being less than their critical values. Thus, there was need to difference them. At first difference, automated teller machine (ATM), point of sale (POS) and web pay (WEB) became stationary as their ADF values in absolute terms (5.555189), (4.588829) and (4.243614) exceeded their critical values (3.119910) at 5



percent level of significance. Having obtained mixed order of integration (I(0) and I(1)), this study carried out Bounds cointegration test.

Table 2: ARDL Bounds Test Result

Test Statistic	Value	Critical Value	I(0)	I(1)
F-Statistic	3.158173	10%	2.20	3.09
K		5%	2.56	3.49*
		2.5%	2.88	3.87

1% 3.29 4.37

Source: Author's computation (2025) from E-views 10 software package

Table 2 above showed the ARDL bounds cointegration test result and it revealed that the F-statistic value at 5 percent level of significance (3.158173) exceeded the critical value for the lower bound (2.56). Nevertheless, it was less than the upper bound (3.49). With this result, the cointegration of the variables could be said to be indeterminate. Based on this, the researcher employed vector autoregression (VAR) technique.

Table 3: Vector autoregression (VAR) Result

	LOGRGDP	LOGMB	LOGATM	LOGPOS	LOGWEB
LOGRGDP(-1)	1.029395 (0.34199) [3.01004]	-26.17263 (22.3400) [-1.17156]	-22.22030 (7.64852) [-2.90518]	-10.94757 (6.17836) [-1.77192]	-141.2937 (51.5510) [-2.74085]
LOGMB(-1)	-0.016387 (0.01671) [-0.98051]	1.888945 (1.09178) [1.73015]	1.537773 (0.37379) [4.11399]	0.473582 (0.30194) [1.56845]	9.994439 (2.51935) [3.96707]
LOGATM(-1)	0.094201 (0.02798) [3.36731]	-0.780817 (1.82747) [-0.42727]	-1.323141 (0.62567) [-2.11477]	0.670217 (0.50540) [1.32610]	-9.016290 (4.21699) [-2.13809]
LOGPOS(-1)	0.014714 (0.01403) [1.04853]	-0.686453 (0.91671) [-0.74883]	-0.646548 (0.31385) [-2.06005]	-0.218195 (0.25352) [-0.86065]	-4.903109 (2.11535) [-1.54056]
LOGWEB(-1)	0.000862 (0.00574) [0.15008]	-0.337534 (0.37500) [-0.50010]	-0.163295 (0.12839) [-1.27191]	-0.006458 (0.10371) [-0.06227]	-1.433633 (0.86532) [-1.656761]
Adjusted R-squared = 0.990974					
F-statistic = 132.7522					

Critical values: $t_{0.05} = 1.761$

$F_{0.05} (4, 10) = 3.48$

() accommodates standard error, [] accommodates t-statistics

Source: Author's computation (2025) from E-views 10 software package

From the VAR result in table 3, there was a negative relationship between mobile phone technology payment and real GDP in Nigeria. 1 percent increase in lagged one year mobile phone payment transaction led to 1.64 percent decrease in real GDP in Nigeria. The computed t-statistic for MB in absolute terms (0.9805) was less than the critical t-statistic (1.761) at 5 percent level of significance. Thus, the study concluded that mobile phone payment technology had insignificant effect on real GDP in Nigeria.

Automated teller machine (ATM) enjoyed negative relationship with real GDP in Nigeria. 1 percent increase in lagged one year ATM payment transactions led to 9.42

percent increase in real GDP in Nigeria. Computed t-statistic for ATM (3.36731) exceeded the critical t-statistic (1.761) at 5 percent level of significance. Thus, this study concluded that ATM payment technology had significant effect on real GDP in Nigeria.

Point of sale (POS) payment technology had positive nexus with real GDP in Nigeria. 1 percent increase in lagged one year POS payment transactions led to 1.47 percent increase in real GDP in Nigeria. Computed t-statistic for POS (1.04853) was less than the critical t-statistic (1.761) at 5 percent level of significance and this indicated that POS payment technology insignificantly affected real GDP in Nigeria.

A positive relationship existed between web payment and real GDP in Nigeria. 1 percent increase in web pay transactions led to 0.09 percent increase in real GDP in Nigeria. Computed t-statistic for WEB (0.15008) was less than the critical t-statistic (1.761) at 5 percent level of significance. With this, it was concluded that web pay payment technology had insignificant effect on real GDP in Nigeria.

Coefficient of determination (adjusted R-squared) of 0.990974 indicated that about 99 percent of variations in Nigeria's economy are attributed to changes in mobile phone, automated teller machine, point of sale and web pay payment technologies. This implied that only 1 percent of changes in real GDP of Nigeria are due to other factors not included in the study. Computed F-statistic (132.7522) exceeded the critical F-statistic (3.48) which implied that the model adopted for this study is appropriate, significant and reliable.

4.2 Discussion of Findings

First, the study showed that mobile phone payment technology had negative and insignificant effect on economic growth in Nigeria. This finding contradicts Okereke (2016) which found a positive relationship between mobile banking and Nigerian economy. This finding is surprising given the huge mobile phone usage which has permeated the facets of the Nigerian society and the use of mobile phones to carry out financial transactions. However, this finding might be attributed to incidences of theft and other fraudulent/unwholesome activities that have bedeviled the use of mobile phone banking in Nigeria. With this scenario, the expected benefits of mobile banking to the economy might have been undermined.

Automated teller machine (ATM) payment technology positively and significantly affected economic growth in Nigeria. This finding is in line with the findings of Babtunde and Salawudeen (2017) which found that ATM increased customers' satisfaction in Nigeria. The finding might be attributed to the ease which ATM technology brought into payment systems in Nigeria. With the ATM technology, Nigerians no longer crowd banking halls of commercial banks just to carry out simple financial transactions. In this way, time wastages and undue stress on banks' customers are eliminated thereby increasing the spate of business activities and economic growth in Nigeria.

Third, the study showed that point of sale (POS) positively and insignificantly affected economic growth in Nigeria. This finding is in contrast with the work of Oginni, El-Mauden, Mohammed and Michael (2013) which argued that POS has a negative relationship with economic growth in Nigeria. With the POS technology, many Nigerians have ceased traveling long distances to the banks for banking transactions given that these transactions can be executed within their neighbourhood. In this way, transportation costs are reduced while the ease of carrying out economic activities is enhanced thereby increasing economic growth in Nigeria. This insignificant effect on economic growth may be attributable to the fact that a lot of people till date do not make use of POS majorly due to illiteracy and many other challenges inherent in its usage such as situations where a customer's account is debited without the transaction reflecting in the POS machine, etc.

Lastly the study revealed that web payment positively and insignificantly affected economic growth in Nigeria. This finding is in contrast with Uruakpa, Iheadindu and Nwankpa (2022) which found a negative relationship between Web

payment and economic growth in Nigeria. The insignificant effect on economic growth might be attributed to the various challenges inherent in web transactions – such as fraudulent practices. Due to this, many Nigerians over the years do not accept web payment as a reliable and creditable Fintech channel. This development, has discouraged many businessmen and investors from transacting business through this channel and thus, adversely affected growth of the Nigerian economy.

5. Summary of Findings, Conclusion and Recommendations

Summary of Findings

The findings of this study are summarized as below:

1. Mobile phone payment technology had a negative and insignificant effect on economic growth in Nigeria.
2. Automated teller machine (ATM) payment technology exerted a positive and significant effect on economic growth in Nigeria.
3. Point of Sales (POS) had a positive and insignificant effect on economic growth in Nigeria.
4. Web payment technology exerted a positive and insignificant effect on economic growth in Nigeria.

5.2 Conclusion

This study from its findings strongly argued in favour of the significance of financial technology channels on economic growth in Nigeria. Generally, the study indicated that about 99 percent of variations in Nigeria's real gross domestic product (RGDP) are attributed to changes in the financial technology channels such as mobile banking, automated teller machine, point of sales and web payment technology.

5.3 Recommendations

The following recommendations are made in this study in line with its findings.

1. There is the need to expand mobile banking services to reach underserved villages and communities. Banks can achieve this by collaborating with telecommunication companies as this will provide to access to many who are yet to embrace mobile banking applications.
2. The Central Bank of Nigeria (CBN) and banks should ensure that robust security measures are put in place to prevent fraud and as well protect customers' funds. This will further increase the usage of ATM with its attendant benefits.
3. Customer support should be enhanced on issues relating to the point of sale (POS) and other systems by providing 24/7 customer support through chatbots and human representations.
4. Government and banks should elaborate and fix the challenges preventing the people from embracing web payment technology such as

security issues and lack of trust in the system. This will boost morale of the people and increase its usage.

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