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An ARDL Approach on Fintech and Economic Growth in Nigeria

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Abstract

The purpose of the study was to examine fintech and economic growth in Nigeria Economy. This study adopted the ex-post facto research design to collect data and analyse the study's variables since the variables are after facts. Time-series quarterly data were collected on the variables from the CBN statistical bulletin from 2012 to 2021 on financial technology transaction channels such as ATM, POST, internet banking and mobile technology and economic growth. The study employed ARDL techniques to establish the effect of financial technology on economic growth. Based on the results, it was revealed that ATM has a negative and an insignificant impact on economic growth in Nigeria, MOB has a positive and an insignificant effect on economic growth in Nigeria, INB has an insignificant and a positive impact on the current value of economic growth in Nigeria. Lastly, further findings showed that changes in the current of POS have an insignificant and a negative impact on economic growth in Nigeria. The study recommended that ATM should be reduced by way of introducing additional security in form biometric of security question before transactions are approved. Finally, internet technology should be prevented by prompting the e-banking system to challenge the user to provide additional security questions or code generation with the physical device.

Keywords: financial technology, financial deepening, ATM, internet technology, point of sales, mobile technology, economic growth

1. Introduction

Banking technology is generally a bundle or package of different technological elements such as improved varieties of products and services. Banking technology consists of two components, a hardware aspect consisting of the tool that embodies the technology as a material or physical object such as machines and software aspects, consisting of the information base for the tool such as technical knowledge and skills about how to use the hardware aspect of technology (Kumar, 2011). In recent years, the concept of financial technology has risen rapidly around the world, which has aroused widespread concern in various countries and become a hot topic in the financial industry and the scientific and technological community. Central bank highly encourages the development of financial technology, especially new technologies such as network technology, digital currency, and blockchain, and supports science and technology enterprises to develop towards inclusive finance.

The "Sixth China Financial Technology Summit" held in Beijing on September 21, 2017, with the theme of "Science and Technology Innovation Practicing Inclusive Finance", proposed to give full play to the value of financial technology, promote the development of digital inclusive finance and serve our country's real economy

more effectively. The "2017 China Inclusive Finance International Forum" held in the same period clearly stated that the development of inclusive finance should be the long-term goal of the financial industry, and the development of financial technology is conducive to the realization of this goal. Technology fosters an organization to grow, prosper and transform in synchronization with the changes in the environment, both internal and external. It consists of firms developing new products or new production process to better perform their operations, in which the new products could be based on the new process.

In today's global and dynamic competitive environment, financial technology is becoming more relevant, mainly because of changing technologies. Banking industry that offers products that are adopted to the needs and wants of target customers and that market them faster and more efficiently than their competitors are in a better position to create a sustainable competitive advantage. Banking Institutions play a catalytic function to develop technological innovation-driven economy. According to Goh (2012), technological innovation is used to refer to the process through which technological advances are produced. The innovation process includes a set of activities that contribute to increase in the capacity to produce new goods and services (product innovations) or to implement new forms of production (process innovations). Therefore, the concept of technological innovation is associated with the idea of a flow generation, application, and dissemination of technologies.

According to Tufano (2012), technology is viewed as the act of creating and popularizing new financial instruments, institutions, and markets, which facilitates access to information, trading and means of payment. According to Nofle (2011), financial technology in the financial sector is the arrival of a new or better product and/or a process that lowers the cost of producing existing financial services. The financial sector is in the throes of a transformation caused by increasing globalization and deregulation. Financial innovations such as Automated Teller Machines (ATMs), phone technology, internet technology, debit cards, credit cards, agency banking and smart card applications are taking place at an overwhelmingly fast pace in the banking industry. Drucker (2013) noted that innovations provide firms with a strategic orientation to overcome the problems they encounter while they strive to attain sustainable competitive advantage. Therefore, this study examined the effect of financial technology on financial deepening in Nigeria.

Since the adoption of financial technology, several studies have been conducted on its effect on banking sector performance, business expansion and even economic growth without a specific study on whether it has enhanced the deepening of the financial sector in terms of enhancing the volatility of money in circulation or achieving financial inclusion of the sector. It is against this backdrop that a research impulse has been raised to assess the magnitude of the effect of financial technology on the financial deepening measure as the ratio of money supply to GDP. This study will depart from all other studies by regressing the electronic payment methods variables against the ratio of money supply to GDP in Nigeria.

To this end, the introduction section will closely be followed by related literature review and the review of relevant theories. Following this closely was the methodology. Immediately after the methodology, came data analyses and interpretation and then the concluding thoughts and policy implications of the study's findings. The general objective of the study was to examine financial technology and economic growth in Nigeria. The specific objectives include to:

(i) examine the effect of ATM technology on economic growth in Nigeria;

(ii) examine the effect of internet technology on economic growth in Nigeria;

(iii) To determine the effect of POS technology on economic growth in Nigeria;

(iv) To ascertain the impact of mobile technology on economic growth.

2. Literature Review

2.1 Transaction Cost Innovation Theory

This study is predicated upon the Hicks and Niehans (1983) transaction cost innovation theory. The theory argues that the need for organizations to reduce transaction cost while at the same time increasing the economic value or earnings necessitated the development and adoption of financial technology. To put it more succinct, cost reduction for services and increased earnings for services delivery are the crux of financial innovation. By this, it could be deduced that innovation in the financial sector was brought about by the need to reduce the cost of financial transactions and increase the inclusion and access to financial resources. It follows therefore that financial innovation is the product of technological advancement brought about by the desire to enhance the earnings potentials of the shareholders of financial sectors, increase the use of financial resources and broaden the access to finances.

According to the theory, all culminate into serious improvement in financial service quality which translates to increased financial patronage and enhanced earnings. This theory, though built from a microscopic economic structural change, suits this study as enhancements in financial innovation will, in sympathy, cause a decrease in

the operating costs, improved income, other performance indicators and an increase in both quantity and quality of service delivery. In a nutshell, this theory postulates a direct enhancement effect of financial innovation on the deepening of the financial system.

2.2 Conceptual Review

Different scholars have identified different financial technological innovation. As the world is advancing in ICT, more innovations in the financial sector are emerging. Some of these financial technological innovations include mobile payment, internet banking, payment cards or automated teller machines, point of sale technology and NIBSS payment (Siyanbola, 2013).

Mobile payment is defined as a type of payment transaction processing in which the payer uses mobile communication techniques in combination with mobile devices for initiation, authorization and confirmation of an exchange of financial value in return for goods and services (Pousttchi, 2008). Siyanbola (2013) define mobile payments as the use of mobile phone for settlement of financial transactions. He further posits that it uses card and SMS messaging applications to effect instant payments. Services covered include account balance enquiry; funds transfer; bill payments and other self-services like password change etc. The word mobile connotes the possibility of being able to do business anywhere and on the go (Chijioke & Nwala, 2014).

It is now a normal practice within the Nigerian financial space to pay items by simply dialling a number on one's mobile phone and having the amount charged to one's bank account. In recent times, the mobile phone is increasingly used to purchase digital contents (e.g., ringtones, music or games) tickets, parking fees and transport fares in many developed nations just by flashing the mobile phone in front of the scanner at 'manned' and 'unmanned' point of sale (Jashim, 2009). Telephone banking is a service provided by a financial institution which allows its customers to perform by telephone are known as phone banks. Mostly telephone banking uses an automated phone answering system with phone keypad response or voice recognition capability. To guarantee security, the customer must first authenticate through a numeric or verbal password or through security questions asked by a live representative located in a call centre or a branch, although this feature is not guaranteed to be offered 24/7.

Telephone banking has numerous benefits for both customers and banks. As far as the customers are concerned, it provides increased convenience, expanded access and significant time saving. On the other hand, from the banks' perspective, the costs of delivering telephone-based services are substantially lower than those of branch-based services. It has almost all the impact on productivity of ATMs, except that it lacks the productivity generated from cash dispensing by the ATMs. For, as a delivery conduit that provides retail banking services even after banking hours (24 hours a day) it accrues continual productivity for the bank. It offers retail banking services to customers at their offices/homes as an alternative to going to the bank branch/ATM. This saves customers time and gives more convenience for higher productivity.

Okoye and Raymond (2013) define internet banking as electronic transfers which can be affected via the internet on PCs, laptops and other devices. They added that customers that subscribe to internet banking can do a wide range of transactions. Internet banking involves transacting banking business over the World Wide Web (WWW) either in the bank branch or outside a bank branch (Chijioke & Nwala, 2014). All that a customer needs are an internet connection and a computer device. Payment cards as a card that uniquely identifies the card holder that is used in transacting business on the internet, ATM machine and POS terminal. They further posited that cards can be debit or credit cards. Debit cards are mostly used on local ATM machine, and they offer instant value while credit cards can be used internationally because of their wider acceptance on local and international networks. Research by Siyanbola (2013) discovered that cards are more widely used on ATM machines than POS terminals.

There are three card schemes in operation, the international schemes of MasterCard and Visa, alongside other domestic card schemes such as Verve, Genesis and Freedom cards. Any organization offering payment switching services must, by policy, connect to the Nigeria Central Switch to ensure full interoperability across different schemes. ATMs were introduced first to function as cash dispensing machines. However, due to advancements in technology, ATMs can provide a wide range of services, such as making deposits, funds transfers between two or more accounts and bill payments. Banks tend to utilize this electronic banking device, as all others for competitive advantage. ATMs also save customers time in service delivery as alternative to queuing in bank halls, customers can invest such timesaver into other productive activities. ATMs are a cost- efficient way of yielding higher productivity as they achieve higher productivity per period than human tellers (an average of about 6,400 transactions per month for ATMs compared to 4,300 for human tellers (Rose, 1999). Furthermore, as the ATMs continue when human tellers stop, there is continual productivity for the banks even after banking hours.

NIBSS payment is a payment scheme that offers real-time inter-bank account-to-account electronic funds transfers. The scheme, operated by NIBSS and offered by all major banks in Nigeria, has met with overwhelming approval from the user community as witnessed by the impressive adoption rate. NIP allows the payer to confirm the account

holder name before sending funds. It uses the central switch to pass the payment instructions real-time to beneficiary bank which applies funds on receipt. An Electronic Funds Transfer at the Point of Sale is an on-line system that allows customers to transfer funds instantaneously from their bank accounts to merchant accounts when making purchases (at purchase points). A POS uses a debit card to activate an Electronic Fund Transfer Process. Increased banking productivity results from the use of EFTPOS to service customers shopping payment requirements instead of clerical duties in handling cheques and cash withdrawals for shopping. Furthermore, the system continues after banking hours, hence continual productivity for the bank even after banking hours. It also saves customers time and energy in getting to bank branches or ATMs for cash withdrawals which can be harnessed into other productive activities. As the importance of innovation in developing countries increases, so does the need for research on the subject.

2.3 Empirical Review

The study of Okoro (2014) on electronic payment channels on intermediation efficiency employed the ordinary least square multiple regression using the ATM, POST and MOT as the measures for electronic payment channels. The time spanned the period 2006 to 2011. All the variables except the point of sale (POST) were statistically relevant for enhanced and efficient intermediation. Odior and Fadiya (2012) also conducted research titled cashless banking challenges, benefits and policy realities in Nigeria. The study focused on the analyses of whether there is an enhancement or deteriorating effects of cashless policy in Nigeria. The study intended to reveal the benefits or otherwise difficulties posed on the economy. Using descriptive analysis, they concluded that the emergence of electronic money had a decreasing effect on the domestic currency. Also, cashless banking enhanced competition among banks in Nigeria.

Siyanbola (2013) in his study titled, cashless banking and economic growth in Nigeria assessed the merit and demerits of cashless banking, the means of cashless policy application and the problem of cashless policy. Questionnaires were administered on the sampled respondents to obtain data. Chi-square analytical technique was utilized to analyze the data. Findings revealed that the mode and quality of payments utilized in the banking sub-sector enhances the economic performance in Nigeria.

Goh (2012) examined whether information technology drives banking industry profit. The study applied the panel data technique using 68 banks in the United States for over 20 years. It was discovered that IT enhanced bank profitability in the United States. Kumar (2011) studied the impact of ICT on banking efficiently in Nigeria employing a survey of 13 banks. Based on the CAMEL banking and transactional logarithmic faction of the banks, it was revealed that the officially valets obtained through the CAMEL banking system were higher during the post-adoption era ton before adoption and escheated that as 1per cent increase in ICT capital on average lends to 0.9185 naira increases in but output past ICT adoption era.

Okoro (2014) studied e-payment channels on shareholders' value measured by the earnings per share of the Nigerian banking sector. The study employed the vector error correction model technique to estimate quarterly data collected on the variables for the period 2010 to 2018. It was discovered that automated teller machine was negative in the first three lags but positive at the fourth lagged period. Also, it was revealed that the initial usage of point of sales in the first year reduced the earnings per share of banks, at the second and third years, it had enhancement effects on earnings per share but decreased the earnings per share of banks in the fourth year. Furthermore, web-based transaction had a significant positive effect on earnings per share of banks in Nigeria in the first and second lagged periods but became negative in the third and fourth lagged periods. The study recommended that banks should extend the coverage of ATM terminals to the rural areas as this is relevant to enhance the level of financial inclusion and by extension boost the earnings of its shareholders in Nigeria.

Drucker (2013) examined the impact of financial innovations specifically internet banking on banks performance. The study also sought to understand whether among banks offering internet banking, those that have offered it for a relatively long time outperformed those that only recently began to offer it. Using data on financial performance of 82 scheduled commercial banks, during the period of 1998-2007, the univariate analysis results from multiple regression indicated that experienced internet banks are larger banks and have better operating efficiency ratios and rely less on traditional source of financing. The multiple regression results revealed that the profitability and experience in offering of internet banking does not have any significant association. In the Indian banking context, experience in financial innovations by offering internet banking does not have any impact on banks' performance.

Jashim (2010) conducted a study to investigate the effects of technological innovations on the financial performance of the commercial banks in Kenya. The study used a descriptive survey. The population of the study comprised commercial banks in Kenya. The study used both primary and secondary data. The study used both quantitative and qualitative data. The study concluded that the banks had employed various technological innovations like ATM, mobile phone, internet banking services. The study also concluded that technological innovation had led to improved financial performance of commercial bank in Kenya through licensed bank sales, profits increment and return on equity. The study recommended that for banks to be highly competitive', they need

to employ modern technological innovations.

Korir (2014) sought to establish the effect of financial innovations on financial performance of commercial banks in Kenya. Regression and correlation analysis was used to analyze the relationship between the dependent and the independent variable of the study. The study findings revealed a strong relationship between financial innovations and financial performance. The study concluded that financial innovation positively affected financial performance. Berger (2003) examined technological progress and its effects in the banking industry using data collected from the banking industry in the United States over the period 1967 to 2001. The author employed multiple regression model, and the findings revealed that improvements in costs of lending capacity due to improvements in "back – office" technologies, as well as consumer benefits from improved "front office" technologies suggests significant overall productivity increases in terms of improved quality and variety of banking services.

Malhotra and Singh (2009) examined the implications of internet banking on the Indian banking industry using information drawn from a survey of 85 scheduled commercial banks' websites, during the period June 2007, by applying multiple linear regression model. Results revealed however, that profitability in the banking industry while offering internet banking does not have any significant association with their overall performance.

3. Research Methodology

This study adopted the ex-post facto research design to collect data and analyse the study's variables since the variables are after facts. Time-series quarterly data were collected on the variables from the CBN statistical bulletin from 2012 to 2021 on financial technology innovation transaction channels such as ATM, POST, internet technology and mobile technology and used against economic growth. This study is predicated on the structure suggested by Hicks and Niehans (1983) transaction cost innovation theory which argues that the need for organizations to reduce transaction cost while at the same time increasing the economic value or earnings necessitated the development and adoption of financial technology. Therefore, the relationship suggested by this theory can be expressed functionally thus:

$$RGDP = f(FT) \quad \text{Eqn. (1)}$$

Where:

RGDP = Real GDP

FTI = Financial Technology

This study however, decomposed financial technology to include Automated Teller Machine (ATM), Point of Sale Terminal (POST), Mobile technology (MOT) and Internet technology (INT). Considering this, the decomposed function is then stated thus:

$$RGDP = f(ATM, POST, MOT, INT) \quad \text{Eqn. (2)}$$

Where surrogates are as explained above.

The econometric model from this functional equation was given below:

$$RGDP = \beta_0 + \beta_1 ATM + \beta_2 POST + \beta_3 MOT + \beta_4 INT + e_t \quad \text{Eqn. (3)}$$

β_0 = Regression constant

$\beta_1 - \beta_4$= Regression parameters/coefficients

The expectations around the signs of the exogeneous variables could be stated as, $\beta_1 - \beta_4 > 0$.

3.1 Estimation Techniques

The study employed descriptive statistics to examine the structure of the time series using descriptive-analytical tools such as simple tables, graphs and percentages. The numerical representation will show the mean, maximum, minimum, skewness, kurtosis and the probability of Jarque-Berra statistics for the secondary data. The study also employed the Augmented Dickey-Fuller (ADF) unit root test to examine whether the time series will be stationary or otherwise. Applying the Augmented Dickey-Fuller (ADF) tests all the variables were integrated at order I (1). A bond test was also conducted, and the result showed that the variables were cointegrated. Consequently, the study estimated both short-run (ARDL) and long-run (VECM) model. The ARDL (p q) model is generalized thus:

$$Y_t = y_{0i} + \sum_{i-1}^{p} \partial_i \, y_{t-1} + \sum_{i-0}^{q} b_i \, x_{t-1} + \varepsilon_t \quad \text{Eqn. (4)}$$

Where:

Y_t = vector

X_t = Regressors

$\partial$and b = coefficient

y_{0i}= constant term

P and q = optimal lag order

ε_t= Stochastic error term

To perform the bounds test for co-integration, the conditional ARDL model was specified thus:

$$\Delta \text{RGDP}_t = a_0 + b_1 \text{RGDP}_{1t-i} + b_2 inATM_{t-i} + b_3 inPOST_{t-i} + b_4 inMOT_{t-i} + b_4 inINT_{t-i} \sum_{i=1}^{p} a_1 \Delta \text{RGDP}_{t-1} + \sum_{i=1}^{q} a_2 \Delta inATM_{t-i} + \sum_{i=1}^{q} a_3 \Delta inPOST_{t-i} + \sum_{i=1}^{q} a_4 \Delta inMOT_{t-i} + \sum_{i=1}^{q} a_4 \Delta inINT_{t-i} + e_{1t} \ldots\ldots \text{Eqn. (5)}$$

Since there is co-integration in the bound test, the error correction model (ECM) representation was specified thus:

$$\Delta \text{RGDP}_t = a_0 + \sum_{i=1}^{p} a_1 \Delta \text{RGDP}_{t-1} + \sum_{i=1}^{q} a_2 \Delta inATM_{t-i} + \sum_{i=1}^{q} a_3 \Delta inPOST_{t-i} + \sum_{i=1}^{q} a_4 \Delta inMOT_{t-i} + \sum_{i=1}^{q} a_4 \Delta inINT_{t-i} + \lambda ECT_{t-1} + e_{1t} \ldots\ldots \text{Eqn. (6)}$$

It is expedient to state that the parameters and variable retain their meanings as has been discussed above.

4. Results and Findings

Table 1. Phillips-Perron (PP) unit root test

Variables	At Level	At 1st Difference	Order of integration
LRGDP	-2.0984	-9.2759	I(1)
LATM	-2.4979	-8.0448	I(1)
LPOST	1.8723	-8.2058	I(1)
LMOT	-3.1897	-7.1538	I(1)
L INT	-1.6056	-6.3503	I(1)
TEST OF CRITICAL VALUES:			
1%= -3.596616			
5%= -2.933158			
10%= -2.604867			

Source: E-views 10.0 statistical software.

4.1 Phillips-Perron (PP) Unit Root Test

Table 1 below shows regression for the purpose of clarifying the result for the Phillips-Perron (PP) test class of unit root test. It was found that none of the variables of the study exhibited unit root process at various critical levels mostly at one, five and ten per cent level of significance was stationary at levels. In other words, all other variables were found to be non-stationary at their levels, at such, their null hypotheses of the presence of unit root cannot be rejected. However, these variables (RGDP, ATM, POST, MOT, INT) became stationary at their first differences, hence; their null hypotheses can be rejected.

4.2 ARDL Lag Order Selection Criteria

The next step after lag selection is the ARDL bounds test approach of co-integration, as adopted by Pesarant et. al. (2001) was in order to determine if there is a long-run relationship between the financial technology and financial deepening. The test is to estimate the ARDL model specified with the selected optimum lag length selection criterion as shown in Table 2. In this study, the Akaike Information Criterion (AIC) is the selected criterion, that is, at four (4)lags.

Table 2. VAR Lag order selection criteria

Endogenous variables: RGDP ATM POST MOT INT						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-70.42509	NA	2.99e-05	3.771255	3.982365	3.847585
1	114.2371	313.9257	1.03e-08	-4.211854	-2.945194*	-3.753870
2	133.5475	28.00008	1.46e-08	-3.927374	-1.605165	-3.087736
3	158.6989	30.18167	1.70e-08	-3.934943	-0.557185	-2.713653
4	221.8679	60.01061*	3.57e-09*	-5.843397*	-1.410088	-4.240452*

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Source: E-views 10.0 statistical software.

Table 3. ARDL F-bounds test

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	5.170612	10%	2.2	3.09
K	4	5%	2.56	3.49
		2.5%	2.88	3.87
		1%	3.29	4.37
Actual Sample Size	41		Finite Sample: n=45	
		10%	2.402	3.345
		5%	2.85	3.905
		1%	3.892	5.173
			Finite Sample: n=40	
		10%	2.427	3.395
		5%	2.893	4
		1%	3.967	5.455

Source: E-views 10.0 statistical software.

4.3 ARDL F-Bound Testing Approach

The ARDL approach to co-integration as first developed by Pesaran and Pesaran (1997), Pesaran and Shin (1999) and Pesaran, Shin and Smith (2001) has been applied with the help of unrestricted vector error correction model. The aim is to investigate the long run and the short run relationship between financial technology and financial deepening in Nigeria. The ARDL technique has several advantages over the other co-integration methods. ARDL approach can be adopted irrespective of whether underlying variables are purely I(0), I(1) or mutually co-integrated. ARDL has estimated better small sample properties. Therefore, the F-test through the Wald test (bound test) is conducted to check how the joint significance of the coefficients specified in the model is. The Wald test is performed by imposing restrictions on the estimated long-run coefficients of FINTECH (ATM, POST INT, MOT) and economic growth in Nigeria.

From Table 3, ARDL F-bound test tabulated lower and upper bound are selected based on one per cent, five per cent, and ten per cent significance level. However, this study is based on the conventional five per cent significance level, hence, the result in the Table 3 revealed that financial technology variables (ATM, POST, MOT, INT) are jointly co-integrated with the dependent variable, RGDP, hence, long-run relationship exist. The calculated F-statistic is 5.17 at five per cent significance level was found to be greater than corresponding the ARDL lower (2.56) and upper (3.49) critical bound values. The value revealed that there is an evidence of long-run co-integration between FINTECH variables (ATM, POST, MOT, INT) and economic growth in Nigeria.

Table 4. ARDL cointegrating and long run form

Dependent Variable: LRGDP
Selected Model: ARDL (1, 3, 0, 1, 0)

EC = LRGDP - (1.4933*LATM + 0.0023*LMOT + 1.1829*LPOST +0.0879*LINT -22.2980)

Long Run Coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LATM	1.493297	0.428985	3.481002	0.0015
LMOT	0.002311	0.602671	0.003835	0.9970
LPOST	1.182888	0.622535	1.900115	0.0668
LINT	0.087870	0.134173	0.654898	0.5174
C	-22.297974	5.770117	-3.864388	0.0005

Source: E-views 10.0 statistical software.

4.4 ARDL Long Run Form Estimates

With reference to the unit root test order of integrations 'I(1)', this study seeks to confirm the assertion that there is a possibility of a long run cointegration between /among the variable of the same unique order of integrations. Based on the ARDL bound test result, it is concluded that there is a long run relationship among the variables in the model. Given the result above, there is a need to estimate the long run coefficients. The long run coefficient measures the long run effect of the independent variables on the dependent variable.

From the ARDL long run form in Table 4, long run estimates showed that the independent variables (LATM, LPOST, LMOT, LINT) have a joint significant negative effect on financial deepening in the long run. This means that an increase in these variables will have a significant negative effect with changes in financial deepening in the long run. All things being equal, RGDP will decrease by 22.29 per cent as a result of increase in financial technology in the long run, ceteris paribus. However, in the long run, ATM will have a significant effect on RGDP in Nigeria all things being equal. The relationship between mobile payment and the RGDP in Nigeria was found to be insignificant in the long run. Similarly, there exist an insignificant long run relationship between point of sales and the RGDP in Nigeria. Lastly, Internet has an insignificant effect on RGDP in Nigeria in the long run.

Table 5. ARDL short run (error correction term (ECT)) result

Dependent Variable: LRGDP				
Method: ARDL				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (4 lags, automatic): LATM LMOT LPOST LINT				
Selected Model: ARDL (1, 3, 0, 1, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LRGDP(-1)	0.377626	0.146828	2.571900	0.0151
LATM	-0.532355	0.401322	-1.326502	0.1944
LATM(-1)	0.593297	0.354820	1.672108	0.1046
LATM(-2)	0.178739	0.359081	0.497770	0.6222
LATM(-3)	0.689707	0.332846	2.072149	0.0467
LMOT	0.001439	0.375032	0.003836	0.9970
LPOST	-0.148673	0.698046	-0.212984	0.8327
LPOST(-1)	0.884871	0.668949	1.322779	0.1956
LINT	0.054688	0.087936	0.621901	0.5386
C	-13.87768	5.435151	-2.553319	0.0158
R-squared	0.984737	Mean dependent var		15.40568
Adjusted R-squared	0.980306	S.D. dependent var		1.894283
S.E. of regression	0.265834	Akaike info criterion		0.396330
Sum squared resid	2.190699	Schwarz criterion		0.814275

Log likelihood	1.875225	Hannan-Quinn criter.	0.548523
F-statistic	222.2320	Durbin-Watson stat	2.185482
Prob(F-statistic)	0.000000		

*Note: p-values and any subsequent tests do not account for model selection.

Source: E-views 10.0 statistical software.

4.5 ARDL Short Run Estimates

The ARDL short-run estimates shown in Table 6 revealed that the value of the intercept which is -13.8776 revealed that RGDP in Nigeria will experience 13.87 per cent decrease when all other variables are held constant. The analysis further revealed that the R^2 (R-squared) which measures the overall goodness of fit of the entire ARDL model. This is represented with the R2 value of 0.9847 (98.47 per cent), approximately 98 per cent. This indicates that the independent variables (ATM, POST, MOT and INT) accounted for about 98 per cent variation in the independent variable (RGDP). In the same vein, the high value of F-statistics (222.23) showed that the overall model is statistically significant. The overall significance of the ARDL short-run model implies the joint significance of all explanatory variables in explaining the short-run changes in RGDP in Nigeria.

Further examination of the ARDL short-run estimates revealed that changes in the current period of ATM had a negative and insignificant relationship on RGDP in Nigeria. On the other hand, the previous lagged period, the previous two lagged period and the previous three lagged period of ATM had a positive effect on RGDP in Nigeria at their various corresponding values. However, only the previous three lagged period showed a significant relationship between ATM and RGDP in the short run in Nigeria all things being equal. The analysis also revealed that changes in the current period of POST also have a negative and an insignificant effect on RGDP in Nigeria in the short-run. The implication is that a percentage increase if POST will reduce RGDP in Nigeria by 0.14 per cent all things being equal. However, the previous lagged period effect between POST and RGDP in Nigeria was positive and insignificant in the short run all things being equal. In similar manner, changes in the current period of MOT had a positive and an insignificant impact on RGDP in Nigeria. The implication is that a percentage increase in MOB will increase RGDP in Nigeria by 0.0014 per cent in the short run all things being equal.

Lastly, changes in the current period of INT resulted in a positive and an insignificant relationship with RGDP in Nigeria. The implication is that a percentage increase in INT will increase RGDP in Nigeria by 0.05 per cent in the short run all things being equal.

4.6 ARDL Error Correction Regression (ECT)

The presence of a long run relationship amongst variables demands that the coefficient of the error correction term (ECT) to be negative and not lower than -2 (lies between 0 and -2) and statistically significant. The ECT reveals the speed of adjustment to restore equilibrium in the dynamic model in the short run. The ECT coefficient shows how quickly variables converge to equilibrium in the short run, and it should have a statistically significant coefficient with a negative sign. The ECT tells the speed with which our model returns to equilibrium in the short run following an exogenous shock in the long run. It should be negatively signed, indicating a move back towards equilibrium; a positive sign indicates movement away from equilibrium.

Table 6. ARDL error correction regression result

ARDL Error Correction Regression				
Dependent Variable: D(LRGDP)				
Selected Model: ARDL(1, 3, 0, 1, 0)				
ECM Regression				
Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LATM)	-0.532355	0.260826	-2.041033	0.0498
D(LATM(-1))	-0.868446	0.358939	-2.419484	0.0216
D(LATM(-2))	-0.689707	0.301533	-2.287334	0.0292
LMOT	0.001439	0.375032	0.003836	0.9970
D(LPOST)	-0.148673	0.513141	-0.289731	0.7740

LINT	0.054688	0.087936	0.621901	0.5386
CointEq(-1)*	-0.622374	0.103689	-6.002291	0.0000

Source: E-views 10.0 statistical software.

The result for the variables shows that the expected negative sign of error correction term (ECT) and was found to be highly significant. The highly significant ECT further confirms the existence of a stable and significant long run relationship. This confirms the existence of the long run significant relationship between FINTECH and RGDP in Nigeria with their various lags. The coefficient of ECT (-0.6223) as shown in Table 7 revealed that deviation away from the long run FINTECH is deemed corrected by 62.23 per cent by the following year all things being equal. Therefore, this study subjected the ARDL model and results to further post-test analysis in order to meet the condition of validity, stability and reliability.

Table 7. ARDL Wald coefficient restriction test for hypotheses

F-statistics calculated	F-Critical value	Corresponding probability	Remarks
ATM: C(2)=C(3)=C(4)=0 {11.44}	± 2.92	0.0227	Significant
MOT: C(5)=0 {4.29}	± 2.92	0.0467	Significant
POST: C(6)=C(7)=0 {0.02}	± 2.92	0.9761	Insignificant
INT: C(8)=0 {1.74}	± 2.92	0.1956	Insignificant

Source: E-view 10.0 Econometric Software.

5. Discussion of Findings

This study examined the impact of financial technology on economic growth in Nigeria. In order to achieve the stated objectives and hypotheses of the study, several empirical tests were employed and the following findings submitted. The overall result of the descriptive analysis showed the absence of outliers in the data. The JB values of all the variables of study except ATM and MOT and their corresponding probability of less than or equals to 0.05 confirms the normality of the series and suitability for generalization. The unit root test was engaged using the Phillips-Perron techniques. The results revealed that all the variables of interest in the study were not stationary at levels. However, the variables became stationary at first difference. However, the result ARDL bound test shows that electronic banking crime variables (ATM, POST, MOT, INT) are jointly co-integrated with the dependent variable, RGDP, hence, long-run relationship existed given the calculated F-statistic of 5.17. The value is greater than the lower and upper critical bound values which are 2.56 and 3.49 respectively. The value revealed that there is an evidence of long-run co-integration between FINTECH variables and RGDP in Nigeria.

Further analysis of the ARDL short-run estimates revealed that, changes in the current period of the volume of ATM has a negative and an insignificant impact on RGDP in Nigeria. The result also revealed that changes in the current period of the volume of MOT has a positive and an insignificant effect on RGDP in Nigeria; and is found to be in contrast with the findings of the Nigerian Deposit Insurance Corporation Further investigation of the results showed that the current period volume of INT has an insignificant and a positive impact on the current value of RGDP in Nigeria. Lastly, further findings showed that changes in the current of POS have an insignificant and a negative impact on RGDP in Nigeria.

6. Conclusion

Financial technology is becoming more relevant, mainly because of changing technologies. Banking industry that offers products that are adopted to the needs and wants of target customers and that market them faster and more efficiently than their competitors are in a better position to create a sustainable competitive advantage. In recent years, the concept of financial technology has risen rapidly around the world, which has aroused widespread concern in various countries and become a hot topic in the financial industry and the scientific and technological community. Technology is viewed as the act of creating and popularizing new financial instruments, institutions, and markets, which facilitates access to information, trading and means of payment. The financial sector is in the throes of a transformation caused by increasing globalization and deregulation. Financial innovations such as Automated Teller Machines (ATMs), phone banking, internet banking, debit cards, credit cards, agency banking and smart card applications are taking place at an overwhelmingly fast pace in the banking industry.

7. Recommendations

To make for the smooth implementation of the cashless system in Nigeria, the following measures are

recommended.

1) The significant effect of ATM should be reduced by way of introducing additional security in form biometric of security question before transactions are approved.
2) The negative effect of internet technology should be prevented by prompting the e-banking system to challenge the user to provide additional security questions or code generation with the physical device.
3) To militate against mobile technology crimes proliferations, there should be supports for another level of authorization by the user in addition to the initial login requirement, usually involving real-time generation of a code. This will generate confidence in the public regarding mobile technology.

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