

## Empirical Assessment of the Effects of Financial Technology on Economic Growth in Nigeria

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### **Abstract**

*The last one decade has witnessed tremendous innovations and breakthrough of technology in the financial sector across the globe and Nigeria is not left out yet studies in the literature focusing on Nigeria is relatively scarce. The paper assessed the effect of financial technology on economic growth in Nigeria spanning a data period of 2000-2022. The gross domestic product, a proxy for economic growth, is made as a function of automated teller machine, point-on-sale, web online payments, mobile transfers and national electronic fund transfers. The data were sourced from the Central Bank of Nigeria statistical bulletin and World Bank data basis. The restricted error correction model was utilized by the study and findings indicated evidence of long run relationship between economic growth and fintech variables. Accordingly, the study found that both in the short run and long run economic growth is significant and positively responsive to changes in automated teller machine, point-on-sale and mobile transfer channels contrary to significant and negative response to changes in web online payments and NEF transfers in Nigeria. Therefore, the study recommended among other things that government may consider acceleration in the growth of financial technology by making policy that ensures that more ATMs are deployed to previously excluded areas like rural communities with a view to boosting financial inclusion and economic growth. Also, fintech firms should ensure that activities of POS operators are regulated to prevent frauds to ensure financial re-engineering thereby enhancing economic growth. Finally, effort should be intensified by relevant authorities to develop the infrastructures sector with a view to making the use of smart phones affordable thereby allowing for more transactions in mobile and web online payment platforms in Nigeria.*

**Keyword:** Financial Technology, Economic Growth, ECM, Nigeria.

**JEL:** O32, O47.

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## 1. Introduction

Prior to the advent of financial technology also known as fintech, a predominantly number of unbanked adults abound in Africa where a significant proportion of this number lives in Nigeria. This is while Latif (2020) submitted that an estimated number of about 1.7 billion adults have no bank account. However, this situation was addressed following the advent of the internet and mobile phones where opportunities are for the unbanked to engage in financial services provided by the emerging technology. Available statistics show that 58% or 765 million people in sub-Saharan Africans (SSAs) are said to have registered mobile accounts that they now used for payment, lending and remittances platforms (Ndung'u, 2019; Odeleye & Oyeneye, 2022). It must be stressed that the development of mobile phones from simple beginning of text messaging and provision of mobile money accounts metamorphosed into more complex development of apps (Chen, *et al.*, 2022; Song & Appiah-Otoo, 2022; Yoon, *et al.*, 2023). These further resulted in access to credit, cross border transfers, remittances and issuance of digital currency which have facilitated and transformed the structure of the financial industry in Africa in general and Nigeria in particular.

In Nigeria as in many emerging economies, fintech has evolved basically in two phases. There is the aspect of the innovations which could be described as digital currencies popularly referred to as cryptocurrencies. It is a peer-to-peer system that enables anyone to send and receive payments anywhere in the world (Deng, *et al.*, 2019). The other aspect of the Fintech solutions operates through the traditional bricks and mortars banking halls which involve transferring local currency such as the naira and other international currencies like the US Dollar, Canadian Dollar, British Pound Sterling and so on ((Isabetli-Fidan, & Guz, 2023; Bu, *et al.*, 2023). It is this aspect of the financial solutions that is being considered by this paper. In this regards, fintech innovations in the financial space in Nigeria takes the form of automated teller machine (ATM) which was introduced into the Nigerian financial system around 2008 and the rest such as mobile transfer, web payment, Unstructured Supplementary Service Data (USSD) Codes and Point of Sales (POS) among others followed. According to various issues of available statistics from the CBN the value of ATM transactions stood ₦548.6 billion in 2009 but declined to ₦399.7 billion or -27.1% in 2010. Meanwhile, the growth rate of ATM transactions anchored at 7.9% in 2015, 0.5% in 2019 and 53.8% in 2022. Similarly, POS transactions amounted to ₦11.03 billion in 2009 and increased to ₦12.7 billion or 15.5% in 2010 reaching all-time high of 771.4% in 2021 and a record low of -12.4% in 2020. In the case of mobile banking transactions, a total of ₦1.3 billion was recorded in 2009 which rose to ₦6.7 billion representing a growth rate of 415.4% in 2010. Thereafter, the growth performance of mobile transactions continued to decline as it stood at 71.1% in 2015 and a negative growth of -13.2% in 2022.

Despite impressive penetration of Fintech into the financial market, the contributions made to economic growth has been a subject of mixed results as growth has been rather inconsistent for most of the time especially from 2002 when mobile technology data transfer was gradually being entrenched following the introduction of GSM mobile services. This period saw the advent of MTN and Airtel and were later followed by Glo mobile and 9mobile. Accordingly, growth became historically characterized by oscillations in both positive and negative directions which became most evidence from 2016. For instance, the GDP growth rate in Nigeria stood at 5.0% in

2000, increased to 5.9% in 2002 and further increased geometrically to 15.3% in 2003 but saw gradual decline thereafter as it stood at 9.3% in 2004. It recorded average growth of about 6.0% between 2005 and 2014 and by 2016 the growth of the economy declined to -1.6%. It witnessed average growth of 1.7% between 2017-2019 and again declined to -1.8% in 2020. However, the economic growth rate oscillated to 3.3% in 2022 (CBN, 2022).

The key argument in the literature therefore is that the technology is relatively new and as such it is not yet clear of the magnitude of its contribution to the rate of economic performance in Nigeria most especially as existing literatures in this regard are dominated by Chinese and Indian authors while similar investigations using Nigeria's data is being scarcely pursued. Meanwhile, the literature has documented mixed outcomes on the relationship between Fintech and economic growth. Thus, there were studies that found positive relationship and they include Zhang, *et al.*, (2019), Kammoun, *et al.*, (2020), Sadigov, *et al.*, (2020), Chen, *et al.*, (2022), Yoon, *et al.*, (2023) and Zuo (2023) among others. On the contrary, the studies with negative outcomes include Odeleye and Oyeneye (2022), Song and Appiah-Otoo (2022) and Mashamba and Gani (2023). Therefore, the studies of the effect of fintech on growth in Nigeria is inconclusive and is the reason why the current study is germane.

### **Statement of the Problem**

Although, the emergence of fintech solutions in Nigeria has broadened the financial horizon, yet the rate of economic growth most especially in the last one decade has been rather sluggish and hindered by various challenges. According to the National Bureau of Statistics (NBS, 2022), Nigeria's real growth rate grew by a mere 3.4% in 2021, after contracting by 1.92% in 2020 due to the COVID-19 pandemic. This sluggish growth rate is far below the level required to support the country's burgeoning population and address pressing socio-economic issues such as poverty, unemployment and infrastructure deficits. Accordingly, the rate of growth remained underwhelming as the country continues to grapple with significant economic challenges with far reaching consequences such as stagnant economic growth which hinders job creation, exacerbating unemployment rates that stood at 33.3% as of the fourth quarter of 2020 (NBS, 2022). Furthermore, sluggish growth hampers the government's ability to generate revenue, limiting its capacity to invest in critical infrastructure, education and healthcare – essential components for sustainable development.

### **Objectives of the Study**

The specific objectives of the study are:

- i. To examine the effect of ATM transactions on economic growth in Nigeria.
- ii. To analyse the effect of POS terminal on economic growth in Nigeria.
- iii. To determine the impact of Web banking on economic growth in Nigeria.
- iv. To evaluate the effect of mobile banking on economic growth in Nigeria.

## 2. Literature Review and Conceptual Clarifications

### Financial Technology

The emergence of financial technology is not new which dates back to over five decades ago in that it was mentioned for the first time by the vice-president of the Hanover Industrial Trust Corporation in 1972 when he defined fintech as a combination of computer technology, bank expertise and modern management technology. To the Financial Stability Board (2021), Fintech is conceptualized as innovation technologically activated aimed at fast tracking financial services with the purpose of building a new business models, applications or products that can cause tremendous changes in the provisions of financial services across markets and institutions. It is therefore a domain of technology institutions developed mainly for the financial institution with the purpose of altering the traditional way financial services are conducted (Isabetli-Fidan, &Guz, 2023). The use of Fintech applications is meant to provide financial services to customers at a relatively lower cost, faster, more flexible, better and personalized products through innovation (Yazici, 2019). These array of applications by Fintech enhance the welfare of the customers in that the technological solutions are moving in a manner that revolutionize the business world across every horizon from top to bottom. According to Song and Appiah-Otoo (2022), fintech is an amalgamation of finance and information technology whose use is facilitated by the internet. Likewise, it refers to undertaking of payment and settlement, networking channels, risk management as well as resource allocation functions (Xu, 2017; Appiah-Otoo & Song, 2021).

### Economic Growth

The literature is replete with copious definitions of economic growth. To some authors, it is an expansion of a country's gross domestic product or outputs thereby resulting in increases in economic activities (Zhang, *et al.*, 2019; Chen, *et al.*, 2022; Yoon, *et al.*, 2023; Zuo, 2023). For instance, if the social rate of return on investment exceeds the private return, then borrowing or expenditure policies can raise the growth rate and the level of utilities (Cornelius, *et al.*, 2016). Economic growth can be defined as the increase or improvement in the inflation-adjusted market value of the goods and services produced by an economy over time. Statisticians conventionally measure such growth as the rate of increase in the real gross domestic product or real GDP (Olayungbo & Olayemi, 2018). In the view of Nobel Prize winner Romer (1994), economic growth occurs whenever people take resources and rearrange them in ways that are more valuable. It is the process by which a nation's wealth increases over time. Although, the term is often used in discussions of short-term economic performance, in the context of economic theory it generally refers to an increase in wealth over an extended period. The process of growth encompasses transformation which does not matter whether the economy is already modern and industrialized or the economy is at earlier stage of development, what one finds is that the process of growth is uneven and unbalanced. Essentially, economic growth has provided insight into why country grows at different rates over times. This influences government in her choice of tax rates, expenditure levels, choice of technology to attract and borrowing that will influence the growth rates. Therefore, economic growth is an increase in the production of goods and services over a specific period. To make it accurate, the measurement must remove the effects of

inflation.

## **Theoretical Review**

### **Modernization Theory**

Propounded by David McClelland in 1961, a social psychology, the theory evolves to stir up western economies to embark on institutions and nation buildings after the Second World War for the purpose of modernization (Agbo, 2005). The theory opines that societies are differ in terms of social and technological advancement. According to the theory, the transfer of information and technology that is straightforward, simple and context-free and which does not obstruct cultural and social norms already established in developing countries is all the development required (Herkenrath & Bornschie, 2003). The belief on this ideology makes the proponents of modernization theory to suggest that introduction of innovation is predicated on knowledge acquired through education, institutions and development of infrastructures and other economic establishments for the purpose of mobilizing capital.

### **Endogenous Growth Theory**

This new growth theory developed by Romer (1994) drops two central assumptions of the Solow neoclassical model, (i) that technological change is exogenous, and (ii) that the same technological opportunities are available in all countries. In addition, the assumption of decreasing returns to a narrow concept of capital (including only physical capital) is replaced by the assumption of constant returns to a broad measure of capital (including human capital, infrastructure, education and technological innovations). New growth models treat technology and knowledge as economic goods in an attempt to understand the determinants of long term growth based on learning-by-doing or investment in human capital and new technologies. Contrary to the standard neoclassical models, there are invention costs in the creation of new technology, and there are adoption costs associated in particular with creating the human capital required to use a new technology.

## **Empirical Review**

There is large volume of studies in the extant literature on the relationship between fintech and economic growth with concentration in Asian countries while very few studies were conducted in Africa and Nigeria. Accordingly, using different models mixed findings were reported. Thus in a more recent study, Tchidi and Zhang (2024) assessed the effect of fintech innovations on economic development in Benin Republic. The used of questionnaires was adopted by the study with emphasis on bank customers and residents of some rural areas. Using a sample size of 357 respondents and a regression technique, the study found evidence of positive and significant effect of fintech on economic development in Benin Republic. Further, the study also found that interaction of financial inclusion with fintech exerted significant positive effect on economic development. The study therefore affirmed that financial inclusion serves as major channel by which financial technology influences economic development and recommending the making policy that will foster fintech innovations aimed at sustainable economic development. Cevik

(2024) appraised the impact of fintech on economic growth covering 198 countries spanning the period of 2012-2020. The study employed a dynamic modelling approach and a cross-country data by utilizing direct measures of fintech to deal with problems associated with endogeneity. The study observes that the magnitude and statistical significance of fintech on real growth depend on the type of instruments between digital lending and digital capital raising. To this end, the study found that while digital lending had significant positive effect on economic growth, digital capital raising exerted statistical insignificant effect but found that overall impact of fintech including all instruments is positive and statistically significant on growth.

Furthermore, Bu, *et al.*, (2023) assessed the effect of financial technology on real economic growth in China. A threshold regression model was adopted by the study and findings showed that fintech had significant positive effect on real economic growth in China. The study observed double threshold effect in that growth is restrained in the early development of fintech but later begin to show positive effect on growth with continuous improvement in the technology. Zuo (2023) used panel data on fixed-effect model covering the period 2011-2020 to assess the extent of contribution fintech to economic development in China. The study used gross domestic product as a function of fintech index, ratio of fiscal expenditure to GDP, ratio of industrial output to GDP, workforce level, educational level and urbanization level. Employing fixed effect panel data technique, the study found that fintech had positive significant effect on growth and development in China. The study further observed that fintech contribution to growth is relatively more pronounced in eastern region and that different levels of fintech have different effects on economic development. In a similar but different study, Baker, *et al.*, (2023) used data covering the period of 2012-2020 to investigate the effect of financial technologies on the financial performance of the banking sector in Jordan and United Arab Emirates. The study which employed data of commercial banks quoted on the floors of Amman Stock Exchange and Abu Dhabi Securities Exchange also utilized a sample size of 115 questionnaires. Using OLS multiple linear regression technique, the study found that fintech had positive significant effect on total deposit and net profits of deposit money banks in Jordan and UAE respectively. It was suggested by the study of the need by banks to adopt inclusive strategies aimed at attaining sustainable development.

In India, Nenavath and Mishra (2023) documented the impact of financial technology and green finance on economic growth spanning a data period of 2010-2021. A panel regression technique with two-step generalized method of moments to assess the relationship among the underlying variables of various states in India. Accordingly, the study found a statistical significant positive effect of financial technology and green finance on economic growth in India during the period of review. The study recommended on the need to strengthen the application of fintech in order to stimulate growth in the States of India. Samuel, *et al.*, (2023) assessed the extent at which financial technology affects economic growth in Nigeria with quarterly data from 2008Q1-2020Q4. Accordingly, the study found significant positive effect of fintech on economic growth in Nigeria. The implementation of regulatory and supervisory frameworks to address the usage, availability and penetration of fintech was recommended by the study. Isabetli-Fidan and Guz (2023) submitted that the recent innovation in technology most especially the internet has arisen widespread application of Fintech in revolutionizing financial services such insurance services,

asset management and most importantly payment services thereby affecting economic and social activities of people and institutions around the world. Their study employed cross-sectional panel causality and co-integration techniques covering the period of 2014Q1-2020Q4 to examine the existing relationship between Fintech and GDP in eight high income economies which include Canada, Australia, Germany, France, Israel, Singapore, United Kingdom and the United States. Accordingly, the findings indicated evidence of long run co-integration relationship between the two underlying variables. Also, the study observed presence of panel granger casualty of the variables for Germany in the short run. Likewise, the study further found that investment in Fintech had significant positive effect on GDP in seven countries with negative relationship being observed only in Singapore.

Meanwhile, Okon, *et al.*, (2023) scrutinized the effect of financial inclusion and financial technology on economic growth in Nigeria using data for the period, 2009Q1-2019Q4. The indicators of fintech employed in the study include web pay, automated teller machine, mobile banking and point of sale with GDP as indicator for growth. The autoregressive distributed lag model was employed by the study and findings indicated evidence of long run relationship between growth and fintech innovations. Specifically, the study found that whilst direct measures of fintech had positive significant effect on growth, impact of ATM on economic growth is negative and statistically significant. Mashamba and Gani (2023) assessed the degree and magnitude of fundings on economic growth in SSA economies covering the period of 2010-2020. The study utilized sample of 56 banks from 19 SSA countries and employed a covariance-based structural equation modeling /for the analysis. The findings from the study revealed that any disruption in fintech elicit increase in equity funding for the banking sector while the effects on long term debt financing and deposit is statistically insignificant. Also, the study found that the limited size of fintech in the banking sector exerted significant negative effect on economic growth in SSA economies. Likewise, no significant evidence of the impact of Fintech affecting economic growth through the bank funding channel was established. It was suggested by the study for policy makers to constantly monitor the activities of fintech on economic growth through the financial system in the economies of SSAs. Yoon *et al.*, (2023) used data from 91 countries for the periods, 2014, 2017 and 2021 to examine how interaction of fintech with gross domestic product affects the performance of the banking sector. Likewise, effect of fintech development on banks' income mix as well as cost-to-income ratios was equally assessed. The study used 'made or received a digital payment' (percentage of the population age 15 and above) as a proxy for fintech innovation while net interest margin and return on assets constituted banks' performance metrics. The multiple regression technique was employed by the study and findings revealed that fintech had significant positive effect on banks' performance most especially emerging economies. Also, the study found a significant negative effect of fintech on the cost-to-income ratio in about 75% of developing countries while exerting significant increase on most developed countries.

Odeleye and Oyeneye (2022) used the technique of ARDL model on data spanning 2009-2019 to assess the effect of Fintech on financial inclusion in Nigeria. The study used total private demand deposit as a proxy for financial inclusion and was made as function of point of sales, automatic teller machine, web payment, mobile money payment as well as GSM data

subscription while including income growth and interest rate as control variables. Accordingly, findings in the long run indicated a significant positive effect of web payment on financial inclusion. However, in the short run ATM and POS transactions had significant negative effect on financial inclusion as against positive and significant influence of mobile payment and web transfer. The study recommended radical collaboration of stakeholders in the Fintech financial services sector. In a similar study, Chen, *et al.*, (2022) appraised the effect of fintech on digital economy covering the period, 2008-2018 in China. The study which relied on the CRITIC method incorporated 31 provinces in China using digital economy development indices. The study found that the development of the Chinese digital economy can be attributed to the emergence of FinTech by weakening the financial decentralization of local governments and promoting technological innovation. Also, the study found that FinTech exerted significant positive effect on the regulation of resources by local financial authority through promoting the development of the digital economy.

In the meantime, Song and Appiah-Otoo (2022) appraised to what extent financial technology has contributed to economic growth in China spanning data period of 2011-2017. Specifically, the study considered effect of fintech on the insurance and credit sectors as well as third-party payment in both provincial and regional economic growth in China. Using the instrumental variable technique on a generalized method of moments, the study found that fintech through effect on third-party payment, insurance and credit had positive significant impact on economic growth in China in the period of review. However, it was discovered by the study that a unidirectional causality existed running from credit and third-party payment to economic growth while between the later and insurance a bidirectional causality was observed. The study suggested major reforms encompassing various institutions aimed at promoting healthy development of fintech in the Chinese economy. Inusa *et al.*, (2022) assessed the extent of the impact of financial technology on economic recovery from the covid-19 in Nigeria. The study used a survey of 415 customers of the banking sector and employed PLS-SEM for contemporaneous analysis. The study found significant positive effect of fintech on transaction efficiency and national development. The study recommended policy direction that will enable fintech to thrive thereby enhancing national development.

### 3.0 Methodology

The study adopts the error correction model predicated on the endogenous growth theory developed by Romer (1994) that shows the relationship between output and factor inputs as follows:

$$Y = AL^{\beta} K^{\alpha} \quad (1)$$

Where: Y = total productivity, K = capital input, L = labour input and A = total factor productivity (TFP) while  $\alpha$  and  $\beta$  are the output elasticities of capital and labour respectively. However, for the purpose of this study K and L in the model were dropped and A takes the form:

$$Y_t = f(\varpi) \quad (2)$$



In equation 2,  $\varpi$  is the vector of the explanatory variables expanded to accommodate financial technology variables chosen for the study.

### Sources of Data

The data cover the period from 2000-2022 which were culled mainly from the Central Bank of Nigeria statistical bulletin and the World Bank Data Bases.

### Model Specification

The study adopts a model in line with the works of Odeleye and Oyeneeye (2022), Nenavath and Mishra (2023) as well as Okon, *et al.*, (2023) after some modications in the assessment of the effect of financial technology on economic growth in Nigeria as follows.

$$GDP = f(ATM, POS, WEB, MBT) \quad (3)$$

The log stochastic term of equation 3 becomes:

$$GDP_t = \alpha_0 + \alpha_1 \ln ATM_t + \alpha_2 \ln POS_t + \alpha_3 \ln WEB_t + \alpha_4 \ln MBT_t + \mu_t \quad (4)$$

Where: GDP = gross domestic product at 2010 constant price, ATM = automated teller machine, POS = point-on-sale, WEB = web payments, MBT = mobile transfers while  $\alpha_0, \alpha_1-\alpha_4$  are constant and coefficients to be estimated respective. A positive relationship is expected between all five fintech variables and economic growth. Accordingly, the error correction term of equation 4 is estimated as follows:

$$\begin{aligned} \ln GDP_t = & \alpha_0 + \sum_{i=1}^k \alpha_{1i} \Delta \ln GDP_{t-1} + \sum_{i=1}^k \alpha_{2i} \Delta \ln ATM_{t-1} + \sum_{i=1}^k \alpha_{3i} \Delta \ln POS_{t-1} + \sum_{i=1}^k \alpha_{4i} \Delta \ln WEB_{t-1} + \\ & + \sum_{i=1}^k \alpha_{5i} \Delta \ln MBT_{t-1} + \lambda ECT_{t-1} \end{aligned} \quad (5)$$

Where:  $\lambda$  is a parameter which measures the speed of adjustment to the equilibrium level after a shock. The sign of the ECT must be negative and significant to ensure that long-run equilibrium exists between the variables. Additionally, the fully modified least squares (FMOLS) are used for the estimations of the long run.

## 4. Presentation and Discussion of Results

**Table 1: Stationarity Test**

Augmented Dickey Fuller (ADF) Test				Phillips-Perron (PP) Test		
Variable	Level	First Diff	Order	Level	First Diff	Order
LGDP	-2.75	-3.95	1	-3.44	-4.88.	1
LATM	-2.23	-4.85	1	-2.23	-4.56	1
LPOS	-2.78	-4.51	1	-2.73	-4.86	1
LWEB	-3.52	-5.32	1	-3.57	-5.71	1

LMBT	-0.27	-5.17	1	-1.47	-13.12	1
C.V. = 5%	-3.82	-3.87		-3.82	-3.88	

Source: Authors Computation Using Eview 12.0, 2024

Table 1 contains the unit root tests using trend and intercept at 5% level of significance for the Augmented Dickey-Fuller (ADF) and the Phillips-Perron (PP) tests. The tests revealed that the GDP and all five explanatory variables achieved stationarity at first order differencing for both the ADF and the PP tests. In what follows, the Johansen co-integration test is presented in Table 2 and there are evidence of long run relationship between economic growth rate and technology variables namely automated teller machine, point-on-sale, web payments, mobile transfers and national electronic transfer funds. The tests indicated that both the trace and max-eigen values exceeded the 5% level of significance suggesting presence of long run relationship between the dependent and the explanatory variables.

**Table 2: Johansen co-integration test**

<b>Trace Statistic</b>			
Hypothesized no of CE (s)	Eigen value	Tracee stat	5%
None*	0.99	336.78	95.75
At Most 1*	0.98	196.04	69.81
At Most 2*	0.94	101.56	47.85
<b>Max-eigen statistics</b>			
Hypothesized no of CE (s)	Eigen value	Max-eigen sta	5%
None*	0.99	140.70	40.07
At Most 1*	0.98	94.48	33.87
At Most 2*	0.94	59.78	27.8

\*denotes rejection of the hypothesis at the 5% level

Source: Authors Computation Using Eview 12.0, 2024

**Long Run Estimation Results**

Table 3 contains the long run model estimation using the FMOLS. The positive constant indicated that in the absence of fintech variables, economic growth is positive which may be because other determinants of growth exist besides fintech solutions. The R<sup>2</sup> which is relatively robust showed that the explanatory variables account for 89% variation in economic growth in the long run.

**Table 3: Long run model estimation**

**Method: FMOLS**

**Dependent variable: LGDP**

Variable	Coefficient	Std error	t-statistic	Probability
Constant	10.79	0.05	203.88	0.00
LATM	0.02	0.01	2.05	0.06
LPOS	0.02	0.01	2.76	0.01
LWEB	-0.03	0.00	-6.55	0.00
LMBT	0.03	0.00	10.61	0.00

R<sup>2</sup> = 0.89, R<sup>-2</sup> = 0.89

Source: Authours Computation Using Eview 12.0, 2024

The model revealed that all four independent variables are statistically significant in explaining economic growth in the long run. This implies that changes in any of the fintech variables affected economic growth as well. However, while impact of automated teller machine, point-of-sale terminals and mobile banking exerted positive influence on economic growth, the influence of web online payments was negative on growth. For instance, a 1% increase in ATM transaction values increases growth by 0.02% while a similar one-unit increase in web online transfers led to reduction in economic growth by 0.03% during the period under review.

**Table 4: Short run model estimation**

**Method: Least Square**

**Dependent variable:  $\Delta$ LGDP**

Variable	Coefficient	Std error0.06	t-statistic	Probability
Constant	0.03	0.01	4.12	0.00
$\Delta$ LGDP(-2)	-0.96	0.57	-1.69	0.11
$\Delta$ LATM	0.06	0.02	2.75	0.02
$\Delta$ LPOS(-1)	0.05	0.01	3.12	0.00
$\Delta$ LWEB	-0.03	0.01	-2.67	0.02
$\Delta$ LMBT(-2)	0.05	0.02	3.15	0.00
ECM(-1)	-0.17	0.04	-3.92	0.00

$R^2 = 0.55$ , DW = 1.87, F-Sat = 2.11

Source: Source: Authours Computation Using Eview 12.0, 2024

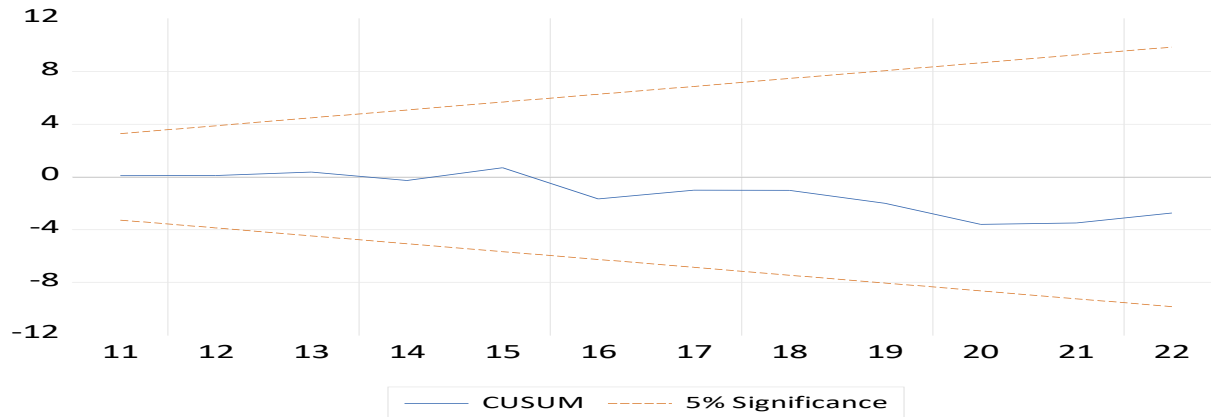
**Table 5: Summary of Diagnostic tests**

Test	F-stat	Prob	Decision
Jarque-Bera (Normality) test	3.68	0.15	Normally Distributed
Serial Correlation test	0.10	0.90	No serial correlation
ARCH test	36.85	0.14	No heteroscedasticity
Ramsey Reset test	1.16	0.30	No misspecification

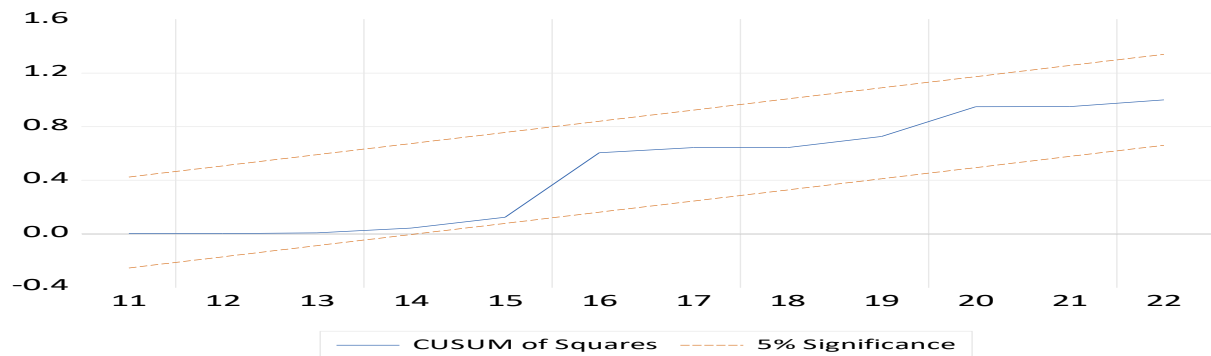
Source: Authours Computation Using Eview 12.0, 2024

The short run error correction model is presented in Table 4 while batteries of diagnostic tests were contained in Table 5. The tests revealed that the model passes the diagnostic tests and is satisfactory in that the null hypotheses could not be rejected at the required confidence level. Meanwhile, the  $R^2$  of 0.55 showed that financial technological innovations account for 55% variation in economic growth in the short run while the F statistic indicated that the model is statistically significant. Also, the DW statistic revealed that the model is free from serial correlation. Similarly, the evaluation of model stability using the CUSUM and the CUSUMSq tests showed that the model is stable as the blue line lie between the two critical bounds as displayed in Figs 1 and 2. Specifically, the short run results mimic the long run findings in that automated teller machine, point-on-sale terminals and mobile transfers had significant positive impact on economic growth as against the negatively induced effect of web online payments.

**Fig 1: Stability (CUSUM) Test**



**Fig 2: Stability (CUSUMS) Test**



For instance, a 1% increase in ATM transactions led to an increase in economic growth by 0.06% but a similar 1% increase in WEB decreases economic growth by 0.03% in the period under consideration. Meanwhile, the ECM which reflects the speed of adjustment between the short run and the long run due to disequilibrium carries the usual negative sign and is statistically significant. This is what is expected if there is co-integration between the dependent variables and the regressors. Observably, the ECM has 17% speed of adjustment to correct any disequilibrium whenever it occurs. Several studies such as Odeleye and Oyeneye (2022), Tarkom, et al., (2022), Bu, et al., (2023), Baker, et al., (2023) and Okon, et al., (2023) had earlier reached similar findings.

## 5. Conclusion and Recommendations

The study examined to what extent financial technology has affected economic growth in Nigeria. The study observed that although advent of fintech in the mid-2000s helped to widen the scope of technological innovations in the financial sectors. Notwithstanding, these innovations are not commensurate with the sluggish rate of economic growth over the years. The variable of financial technology is disaggregated into automated teller machine, point-on-sale, web online payments, mobile transfers and national electronic fund transfers. The error correction model was employed on data covering the period, 2000-2022. Accordingly, the study found that both in

the long run and short run automated teller machine, point-on-sale as well as mobile payment channels significantly and positively affected economic growth in the period under review. Meanwhile, the study also found that economic growth is significant and negatively responsive to changes in web online payments platform in Nigeria.

In what appears as coincidence, both the short run and long run findings had similar effects on growth. For instance, it was discovered by the study that automated teller machine, point-on-sale and mobile transfers had significant positive influence on growth. This is not surprising as these three technological solutions are the most patronized in Nigeria. Although, the rate of growth from the early 2000s started to pick after the country exited the last military rule, economic growth became relatively more robust most especially from about 2009 following the emergence of fintech innovations into the Nigerian financial market. For instance, the GDP growth rate which stood at 5.0% in 2000 increased to 9.1% in 2010.

On the contrary, mobile transfers exerted negative effect on economic growth. It must be stressed that these two financial solutions do not enjoy much patronage as otherfintech variables and may have account for the negative relationship. This may be predicated on the fact that smart phones are required whose usage exclude significant numbers of of the population especially at the beginning when fintech was just making inroad into the Nigerian financial space. Also, transactions through these platforms require flows of network which has been major concern with the telecommunication sector in Nigeria. Furthermore, the use of these transaction channels is done mostly through the banks involving bulk transfers thereby excluding larger number of bank customers.

From the findings therefore, it can be deduced that the speedy growth of most economies in recent times can be attributed to the technological innovation taking place in the financial sector. For instance, the world economy including Nigeria could have probably collapsed during the covid-19 pandemic where movement of humans and goods were limited to control the spread of the deadly disease. With financial technologies which awaken technological re-engineering in the sector, mobile transfers reached the peak as trade went on seamlessly and people could order for and get their goods way billed to them after confirming payments.

On the bases of the findings, the paper recommended that government may consider acceleration in the growth of financial technology by making policy that ensures that more ATMs are deployed to previously excluded areas like the rural communities with a view to boosting financial inclusion and economic growth. Also, fintech firms should ensure that activities of POS operators are regulated to prevent frauds and ensures financial re-engineering thereby enhancing economic growth. Furthermore, effort should be intensified by policy makers to develop the infrastructural sectors with a view to making the use of smart phones affordable thereby allowing for more transactions in mobile and web online payment platforms. Similarly, there should be improvement in fintech that will allow corporate organization to utilized NEFT payment channel for quick disbursement of funds to staff and beneficiaries without delay. Finally, there should be more even spread of technological development by making available access to network flows thereby bridging the financial exclusion gaps in Nigeria.

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