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Financial Technology, Financial Inclusion and its Effect on Economic Performance in Delta State

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ABSTRACT
The study scrutinized the extent to which financial technology affects farmers' income in Delta State Nigeria, using two local government areas, namely Ethiopia West and Ethiope East Local Government Areas. The study argued that although emergence of fintech in the mid-2000s resulted in drastic innovations in the financial sector yet economic performance over the last one decade, most especially among rural dwellers, has been rather sluggish. A sample of 1200 respondents were distributed by the study with an average of 600 questionnaires each to a local government. The questionnaires were designed to cover the components of fintech such as ATMS, POS, web payments and mobile transfers. In addition, farmers' income was used as dependent variable. Employing OLS technique, the study found that POS and mobile payments exerted significant positive effect on farmers' income while effect of ATMs and web payments is negative with ATMs statistically significant. The study recommended that government may consider mandating network providers to ensure availability of network in the rural areas.
Keywords: Financial Technology, Rural Dwellers, Income, Multiple Regression.

1. INTRODUCTION

Financial technology also known as fintech has been seen as key driver of technological innovation in the global financial sector and the degree by which it contributes to economic growth has generated scholarly research from scholars in the extant literature (Mashamba & Gani, 2023; Lamba *et al*., 2025). There has been a significant number of unbanked adults in Africa and a quantum of this number lives in Nigeria. According to Latif (2020), 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 (Odeleye & Oyeneye, 2022; Idris & Dzugwahi, 2025). It must be stressed that the development of mobile phones from simple beginning of text messaging and provision of mobile money accounts metamorphosed to the more complex development of apps through which access to credit, cross border transfers, remittances and issuance of digital currency. This facilitated and transformed the structure of the financial industry in Africa in general and Nigeria in particular (Ashoro *et al*., 2024).

In Nigeria as in many emerging economies, fintech has evolved basically in two phases namely digital currencies popularly referred to as cryptocurrencies which is a peer-to-peer system that enables anyone to send and receive payments anywhere around the world (Deng *et al*., 2019). This exists as digital entries to an online database for specific transactions recorded in ledger whenever cryptocurrency funds are transferred. The technologies run on a distributed public ledger called the block chain which is a record of all transactions updated and held by currency holders. The coins used in the crypto transactions are mined to generate units of cryptocurrency. The other aspect of the Fintech solutions operates through transferring local currency such as the naira and other international currencies like the US Dollar, Euro, Canadian Dollar, British Pound Sterling and so on.

Looking at the growth of Fintech performance in Nigeria, it can be generally observed that the first most pronounced of the innovation solution is 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 POS among others followed. For instance, according to 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. 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 sluggish for some time most especially from 2002 when mobile technology data transfer was gradually being entrenched following the introduction of GSM mobile services.

The advent of fintech is believe to deepen financial inclusion thereby facilitating trade and other economic transactions, but the fact that effective network communication and the use of smart phones are required have precluded larger part of the population from the benefits that the technological financial solutions offer. The gap between the urban settlers and rural dwellers who engaged in financial solution becomes even wider as most people in the rural areas have no access to smart phones and often no network thereby making the dream of achieving financial inclusiveness a mirage. Similarly, most studies in the field used secondary data to investigate the relationship that exist between fintech and economic growth (Haddad & Hornuf, 2018; Song & Appiah-Otoo, 2022; Odeleye & Oyeneye, 2022; Mashamba & Gani, 2023). Thus, these studies have excluded the those who live in the rural areas. In addition, as the technology is relatively new in Nigeria it has not been fully ascertained the extent of contribution of fintech to the country's economic progress most especially as existing literatures are dominated by Chinese and Indian writers (Kammoun, *et al*., 2020; Chen *et al*., 2022; Yoon *et al*., 2023; Zuo; 2023). Also, similar investigation using data from Nigeria is scarcely pursued. This is couple with the fact that, although, the use of financial technology has become very popular in emerging markets over the last one decade, it is still unclear as to how much it contributes to high-quality growth in Nigeria.

It is based on this realization that the study is germane to assess the effect of fintech on economic performance of rural dwellers in Delta State. Conclusively, the rest of the paper is clear. Section two presents a brief review of related literature while the method of data analysis is outline in section three. Whilst section four presents the findings, conclusion and recommendations were presented in section five.

2. LITERATURE REVIEW

The emergence of the technology is not new which dates back to over five decades ago when 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. 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 enhances 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). Zeidy (2021) defined financial technology as a new technology that seeks to improve and automate the delivery and use of financial services. At its core, fintech is utilized to help companies, business owners and consumers better manage their financial operations, processes and lives by utilizing specialized software and algorithms that are used on computers and more importantly increasing use of smartphones. To Xianrong (2017), fintech is the integration of finance and technology using internet finance and financial internet. On the other hand, Shusong and Haifeng (2016) saw fintech as the application of science and technology to the financial sector aimed at reducing costs thereby improving the efficiency of the industry to serve the public. Fintech therefore can be seen as the creation of new financial products, business models and technological applications in which financial market, financial institutions and financial services have major roles to play. In this study some of the financial applications that constitute financial technology shaping the financial sector include the ATMs, POS, Web online transfer, mobile transfer and NEF transfers.

From the empirical space, large volume of empirical studies exists 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. Using different models, mixed findings were recorded ranging from positive or negative relationship with some studies significant while others statistically insignificant. Thus, n China, Lv and Xiong (2022) employed provincial panel data covering the period 2011-2018 to assess the impact of fintech on corporate investment, accordingly, the study reported that fintech positively and significantly improved corporate investment efficiency in China. This implies that the development of regional fintech promotes corporate investment efficiency in China. 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.

Ishioro (2022) argued that access to finance and financial services of deposit money banks enhanced financial inclusion in many economies. His study explored the role of DMBs-based financial inclusion on growth and employed diverse estimation techniques in the validation of the models. the study found that GDP per capita is a determinant of ATM penetration, ownership and usage in Nigeria in the short-run. Likewise, the study further found that ATM penetration, ownership and usage granger-caused GDP per capita as well as spread of bank branches network in the long-run. Meanwhile, the study also observed that the spread of bank branches network granger-caused ATM GDP per capita in the short-run. 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.

Meanwhile, 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. 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. In a related study, Zuo (2023) used panel data on fixed-effect model covering the period 2011-2020 to assess the contribution of 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 different states in India. Accordingly, the study found a statistically 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. Likewise, 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. Ogbonna *et al*., (2023) examined the effect of financial technology on financial inclusion in Nigeria covering the period 2010-2020. The study made financial inclusion as a function of automated teller machine transactions, electronic mobile banking transactions, point of sale terminals transactions and internet banking transactions. Employing parsimonious error correction model, findings revealed that ATM, internet banking and mobile banking exerted insignificant effect on financial inclusion while POS had significantly influence on financial inclusion in Nigeria. The study recommended that deposit money banks should work on the challenges that hinder the successful operation of financial technology most especially in the rural areas in Nigeria.

In a related study, 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. In a study on SSA, Mashamba and Gani (2023) assessed the degree and magnitude of fundings on economic growth 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 detected. It was suggested by the study that there is need for policy makers to constantly monitor the activities of fintech on economic growth through the financial system in the economies of SSAs.

In a 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 recommended making policy that will foster fintech innovations aimed at sustainable economic development. Ashoro *et al*., (2024) scrutinized the effect of financial inclusion on agricultural productivity in Delta State, Nigeria. The study observed that effect of financial inclusion is visibly felt in agricultural areas such as cassava farming, oil palm production, rice cultivation, poultry, fisheries and aquaculture, agribusiness and processing and agricultural diversity. The impacts are also obvious in food security, poverty reduction, women's empowerment, market access and value chain integration, risk mitigation, access to agricultural inputs, income diversification and increased agricultural productivity. The study concluded that financial inclusion in agriculture in Delta State is a cornerstone for the state's economic development and the well-being of its citizens and recommended that emphasize should be on strengthening financial education system with priority on agriculture.

Likewise, 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. Apere and Uche (2024) examined the effect of financial inclusion on economic performance in Nigeria using data for the period 2009Q1-2021Q4. Utilizing ARDL technique findings demonstrated that although the quantity of USSD, POS and ATM transactions increased economic performance the effect was statistically insignificant suggesting that these factors did not have a major impact on economic performance. The study recommended that policy makers and regulators should ensure that banks exert enough effort to adhere to the policies, rules and laws that oversee their business operations.

In a more recent study, Idris and Dzugwahi (2025) examined the impact of financial technology on economic growth in Nigeria. The study employed real gross domestic product as a function of mobile money transactions, automated teller machine and point-of-sale transactions. Utilizing the Autoregressive Distributed Lag model, the study found that mobile money transaction, ATM and POS transactions exhibited negative effect on economic growth in Nigeria in the period of review. The study noted that while FinTech enhances financial inclusion, its long-term impact on economic growth remains inconclusive, warranting further investigation. Lamba *et al*., (2025) examined the effect of financial inclusion on economic growth in Nigeria covering the period, 1992-2022. The ARDL model was employed and the study found that a 1% increase in financial inclusion decreases economic growth by 5.14%. The study concluded that financial inclusion has a positive effect in promoting economic growth in Nigeria for the period under review. It recommended that government and policymakers may wish to reassess the current financial inclusion strategies in order to prioritize productivity enhancing sectors such as agriculture, manufacturing and technology. Akpotor and Amughoro (2025) documented a study on the effect of fintech on financial deepening and financial inclusion in Nigeria covering the period, 2009-2021. The measures of fintech include ATM, POS, web pay and mobile pay were used as explanatory variables while the dependent variables include ratio of private sector credit to GDP in model1, ratio of savings to GDP in model 2, small and medium enterprise credit in model 3, rural deposit in model 4 as well as rural loan and advances in model 5. The OLS technique was employed for the study and findings indicated that among other things, fintech through POS had significant positive effect on financial deepening in Nigeria.

3. METHODOLOGY

The study employed survey research design in data collection process carried out in the rural communities of Oghara in Ethiopia West Local Government and Kokori in Ethiope East Local Government Area of Delta State. A sample of 1200 questionnaires was designed and distributed to respondents in an average of 600 samples per local government out of a total population of approximately 2 million people. Basically, the study aggregated the classified data and employed multiple regression technique of estimation. In using the econometrics approach, the probit regression model famous for addressing issues in primary data was relied upon. The econometric model tells us the extent of the effect of fintech on the income of rural dwellers. This is estimated as follows:

$$Y = \beta_0 + \beta_1 ATM + \beta_2 POS + \beta_3 MOT + \beta_4 WEB + \varepsilon$$

Where:

Y = farmer's' income, ATM = automated teller machine, POS = point-on-sale, MOT = mobile, online transfer as well as WEB = Web payment. Also, β0 is the constant, β1-β4 are coefficients to be estimated while ε is the error term.

4.0 PRESENTATION AND ANALYSIS OF RESULTS

Table 1: Regression Results

Dependent variable: Y

Variable	Coefficient	Std error	t-statistic	Probability
Constant	0.19	0.08	2.38	0.05
ATM	-0.12	0.04	-3.00	0.01
POS	0.23	0.06	3.83	0.00
WEB	-0.05	0.03	-1.67	0.13
MBT	0.07	0.02	3.50	0.00
R^2 = 0.93, DW = 2.00, F-stat = 4.12				

Source: Author's computation using Eview 12.0

Table 1 contains the results of the estimation techniques which reveals a robust goodness of fit that suggests that financial technology accounts for 93% variations in farmers' income. Likewise, the model reveals absence of seria correlation which also shows that it is statistically significant. A critical evaluation of the results showed that POS and mobile banking had significant positive effect on income while ATM and web payment exerted negative impact with only ATM statistically significant. For instance, a 1% increase in POS and mobile banking transactions increase farmer's income by 0.23% and 0.07% respectively. On the contrary, income is significant and negatively responsive to changes in ATM by 0.12% but insignificantly responsive to changes in web payment. Odeleye and Oyeneye (2022), Zuo (2023), Okon *et al*., (2023) and Tchidi and Zhang (2024), Akpotor and Amughoro (2025), Lamba *et al*., (2025) have earlier reached similar findings.

5. CONCLUSION AND RECOMMENDATION

The study investigated the relationship between financial technology, financial inclusion and economic performance in Nigeria with focus on two local governments in Delta State. The study argued that although financial technology has expanded the financial space but the essence to which it has affected income of rural dwellers has not been documented in the literature. A total of 1200 samples were drawn from both local governments at an average of 600 samples each. The raw data were filtered, classified and analyzed using multiple regression technique. The dependent variable is income which was modeled as a function of ATM, POS, mobile banking and web payments. Accordingly, the study found that POS and mobile banking exerted positive effect on income while influence of ATM and web payment is negative.

The findings therefore confirmed the a priori expectations of the study. This suggests that effect of fintech on incomes of rural dwellers is statistically negative. This implies that increase in fintech usage such as ATM and web payments had adverse effect on farmers' income. This is because majority of rural dwellers cannot afford smartphones necessary for the application of the technological financial solutions. Also, most part of the rural communities have no network while for some other parts poor network is a reoccurring decimal. This is why application of financial innovations in the rural areas is next to zero. Therefore, it is recommended that government and appropriate authority endeavour to identify factors that hinder financial technology such as high cost of smart phones, poor networks and illiteracy among others for possible removal.

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