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# Impact of Digital Finance Technologies on Agricbusiness Development in Nigeria

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**Abstract**
*This study investigates the impact of digital finance technologies on agribusiness in Nigeria between 2001 and 2019. The design adopted for this study was ex-post-facto, and elicited data used for analysis was from the Central Bank Statistical Bulletin. Following extensive empirical and theoretical reviews, a model was formulated. Credit to the Nigerian agric sector was used as a proxy for agribusiness (the dependent variable). In contrast, the various digital finance technology platforms such as point of sales payment system, mobile money payment system, and automated teller machine payment system are used as a proxy for digital finance technologies (independent variables). For data analysis, the Auto-Regressive Distributed Lag (ARDL) model was deployed while diagnostic tools such as the test of Normality, Serial correlation, Autocorrelation test, Ramsey reset test, and Heteroskedasticity test were applied. The tests confirmed the validity and reliability of the model employed. Inferential results suggested that both point-of-sales payment and mobile money payment systems had a positive impact on agribusinesses in Nigeria, while the automated teller machine payment system had a negative impact on agric businesses in Nigeria. The study recommended that financial inclusiveness in the rural and agricultural-dominated areas in Nigeria should be encouraged to sustain the positive impact digital finance technologies has on Nigerian agribusiness.*

**Key-words:** Digital Finance, Agribusiness, Point of Sales, Automated Teller Machine, Mobile Money, Payment Systems and Credit to Agric Sector.

## 1. Introduction

### 1.1 Background to the Study

It is crucial for a country like Nigeria, which is almost totally dependent on oil and gas as its primary revenue source, to seek alternative revenue sources and diversify the economy from oil and

gas dependence. Agriculture can be a veritable revenue source to Nigeria if an enabling business environment, necessary support, grants, and other assistance are provided. A possible solution could be the widespread utilization of digital financing technologies in facilitating agribusiness development in Nigeria.

Digital financial services (DFS) provide an avenue to save, access credit facilities and other financial services via several digital mediums such as mobile phones, computers, credit and debit cards, and many others. Digital financial services (DFS) are thus instruments that can help resolve issues in the Agribusiness value chain, especially in rural areas where banks and other financial institutions lack. Digital financial services are delivered through electronic platforms, primarily dependent on internet access, and can potentially eliminate banking hall visits. Utilizing these services involves using computers, cards of different types, point-of-sale (POS) devices, automated teller machines (ATMs), internet transfers, and linking individuals and businesses for transactions via a digitalized channel that makes payments and receipts easier, quick, and accessible. Critical operators in providing digitalized services include mobile network operators, banks/financial institutions, regulators, agents, financial technology providers, chains of retailers, and clients. (Asian Development Bank, 2016).

The reason for jettisoning these rural communities by financial intermediaries could be as a result of the high cost of taking their services there given the high cost of facilities, human capital, and other relevant infrastructure, coupled with low patronage and lack of incentives to provide products capable of serving farmers and rural communities. Digital finance technologies thus provide an avenue where financial services are accessed without necessarily visiting a bank physically. With the increased use of digital finance technologies, farmers can access several banking services in proximity. Using digital financial services would translate to higher sales for farmers and may, in the long run, enhance productivity and a boost to agribusiness development.

### 1.2 Statement of the Problem

Digital finance is critical to the digitalization of the financial system here in Nigeria, with a significant number of advantages ranging from financial inclusion and amenity in carrying out financial transactions to the security of these transactions in a digital rostrum that would cap off economic development of the economy.

One significant problem plaguing agric-related businesses is insufficient funding and lack of financial and credit facilities, especially in the more rural areas where agriculture is carried out in

commercial quantity. With the evolution of technology in the financial system, transactions related to banking activities such as payments, withdrawals, funding, loans, and advances have metamorphosed into a digital platform. It is challenging for rural-based farmers to access these services because of the lack of financial inclusiveness in rural areas. Banks and financial services providers dwell mainly in the urban areas and transact there. Very few of these agents venture into the rural areas to carry out their financial services. This is the challenge faced by agribusiness owners in the rural part of Nigeria. From the preceding, it is imperative to evaluate the impact that digital finance has on agribusinesses in Nigeria owing to the challenges highlighted above and proffer remedies to these problems. Another spectrum of the problem affiliated with digital finance is that digital financial services providers are profit-seeking corporations that utilize digital finance platforms to boost their efficiency and increase their avenue to achieving opportunities that are profitable for businesses that are associated with the provision of digital finance services.

Furthermore, corporate providers deploy serious marketing strategies to entice customers that are between high and middle-income categories to make use of new or already existing digital finance facilities. Conscious effort is made with the high-end users. In contrast, a less aggressive marketing approach is used to coax low-income and poor customers, mainly when such users are essentially unable to pay associated fees. The deliberate lack of enthusiasm leads to lower financial involvement in poor and low-income customers. This attitude is understandable as the benefits to digital finance providers are slightly more with high-and-middle income cadre customers than with low-income customers.

Also, digital finance provision can be prejudiced against lower-income groups as digital finance providers, based on their internal risk analysis, may choose to discontinue providing high-end digital financial to rural communities deemed high risk given the inadequacy of infrastructure supports such services in the first place. The result is a reduction in the degree of financial inclusion.

### 1.3 Objectives of the Study

This research has the primary objective of investigating the impact of digital finance technologies on agribusiness in Nigeria. The specific goals are:

1. To examine the impact of point-of-sale payment system (PPS) on credit to the agric sector in Nigeria.

2. To ascertain the impact of mobile money payment system (MPS) on credit to the agric sector in Nigeria.

3. To investigate the impact of automated teller machine payment system (APS) on credit to the agric sector in Nigeria.

### 1.4 Research Hypotheses

1. H01: Point of Sales Payment System has no significant impact on credit to Nigeria's agric sector.
2. H02: There is no significant impact of the Mobile Money Payment System on credit to Nigeria's agric sector.
3. H03: Automated Teller Machine Payment System has no significant impact on credit to the agric sector in Nigeria.

## 2. Review of Related Literature

### 2.1 Concepts of Digital Finance

According to Manyika, Lund, Singer, White & Berry 2016, the term digital finance may be referred to as financial service(s) conveyed through the use of mediums such as personal computers, mobile phones, the internet, or bank cards affiliated to a dependable digital payment system. Some theorists define digital finance as "financial services carried out via the internet, mobile phones or cards" Gomber, Koch & Siering (2017) proffer that digital finance covers many new businesses that are finance related, software that are finance-related, products that are finance-related and several avenues to which customers communicate and interact - enhanced by Financial Technology (FinTech) companies and creative providers financial services. Essentially digital finance provides the means through which individuals can secure overdrafts, make cash payments, revenue collection via digital payments. As stated previously, digital finance almost always requires the use of the internet, personal computer, or mobile phones.

#### 2.1.1 Innovations in Digital Payments

There are four significant novelties in digital payments.

1. Wrappers are used to create a digital area to link up with traditional payment systems such as bank accounts or credit cards. Nontraditional payment systems are then provided by agents such as Google Wallet and Apple Pay players who serve as internet mediators.

2. Mobile money systems are used to generate both inflows and outflows. A system provider's books or smart cards can be credited and subsequently used to aid online payments or payments made through mobile phones. A typical example is M-Pesa, run by Safaricom. Mobile systems not only offer lower fees than traditional payment systems, but they are also easier to use and do not necessarily require a bank account.

3. Credits and local digital currencies are conventional units of account designed to elevate spending in a local economy or as a means of exchange. They are particularly useful in international high-tech environments such as computer games as they make international transactions easier to manage.

4. Digital currencies, not linked to any specific nation, are innovative and serve as both a currency and a payment mechanism. Consequently, transactions get recorded in publicly visible ledgers. Digital currencies, including Bitcoin, are classified as cryptocurrencies because the cryptographic approach enables the validation of all transactions securely. (Bank of England 2018; https://blockchain.info; company reports).

### 2.1.2 Benefits of Digital Finance

#### 2.1.2.1 Digital Finance Promotes Financial Inclusion

More than 2 billion people across the world do not access financial services (Africa Agriculture Status Report 2017). The high number of unbanked persons across developing nations is estimated to be about 59% and 50% of men and women, respectively. It appears that not accessing banking services has adverse effects on smaller businesses dependent on informal financial services as the means through which public transfers or remuneration are received.

With digital payment systems, barriers that hinder access to financial services are reduced or, where possible, eradicated. When deployed appropriately, digital payment systems can permeate most environments and saturate the population more rapidly.

The benefits of Digital payments include the efficient reduction of costs to recipients. In an investigation (Africa Agriculture Status Report 2017). Digital payments speed up delivery, an essential feature in emergencies such as natural disasters. Digital payments are also relatively more secure than the physical movement of cash, a common feature in many developing countries. (World Bank, Findex database).

## 2.2 Theoretical Review

This study anchors on the financial innovations theory but still attempts to discuss a few approaches relevant to digital finance technologies.

### 2.2.1 Theory of Financial Innovations

The theory of financial innovations, propounded by Silber (1983), focuses on the opinion that money-related businesses' expansion benefits are the sole reason for financial innovations (Li and Zeng, 2010). The theory articulates that inherent weaknesses of the money-related business sector and aberrant data, high office expenses, and exchange costs are just some of the factors driving innovations (Błach, 2011). Consequently, financial innovations may arise from new resolutions or simply conventional means through which the latest developments are proposed. One positive is the promotion of firms' liquidity (Ionescu, 2012).

According to the theory, the motivating force behind financial system innovation is that it leads to better economic performance. Indeed, financial innovations inspire new production techniques, creating better return rates, boosting the country's economy in general and technological solutions. Thus, the theory suggests that innovativeness enhances a firm's competitive edge, given its potential to increase investors' returns (Błach, 2011). Innovation is a tool used to manage, solve and transfer the entire extra load. Financial entities' resulting growth follows improved allocation and efficiency and eventually reduces financial and administrative costs over time (Sekhar, 2013).

Financial innovations also enable financial markets liquidity, thereby ensuring proper distribution of resources to areas of lack and improving prospects' availability (Błach, 2011). Ultimately, financial inclusion deepening is a direct effect of financial innovations. The theory of financial innovations states that some barriers, including external handicaps, assist corporations in looking for their objective, which gives rise to an increase in a firm's revenues (Li & Zeng, 2010). Commercial banks thus come up with productive ways to encourage people to increase their profits over time. The emerging innovative financial inclusion models, through which mobile and other digital financial services are aiding the closing of gaps in the widespread use of financial instruments in these countries (Omwansa & Waema, 2014).

### 2.2.2 Technology Acceptance Model

This model, proposed by Davis (1986), focuses on the attitude needed to drive the zeal and competence to use new technology (Monyoncho, 2015). Technology Acceptance Model (TAM) therefore deals with discernment and not necessarily the extent of a system's actual usage. The model thus proffers that either of two things - Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) occurs anytime a prospective customer views a new technological gadget (Lule, Omwansa & Waema,2012). PEOU refers to the level of difficulty in deploying a device or technique. If prospective users perceive a high degree of difficulty, use would be understandably lower. Easier to use systems are preferred and will encourage high utilization rates. A second factor – perceived usefulness refers to the utility of a new system. It then follows that if an individual considers a system is directly impacting either short or long-term performance, such a system is deemed useful (Mojtahed, Nunes & Peng, 2011).

The TAM thus ascertained that a system's actual use is inspired by each user's behavioral proclivities and is further inspired by how individuals view the plan. The theory proffers that the adoption of new technology is related to its simplicity and effectiveness (Lim & Ting, 2012). TAM notes that the consumer's intentions influence the willingness to accept new technology in the first place (Mojtahed, Nunes & Peng, 2011). The theory agrees that advancements lead to improvements of states of mind which in the long run will result in system usage conduct (Lim & Ting, 2012). TAM goes further to probe individuals' attitudes towards a particular system (Lule, Omwansa & Waema, 2012). It clarifies why clients may consider or refuse to use what is deemed an improvement. TAM is thus essential both as a proactive strategy used to evaluate the likelihood of accepting a specific innovation by individuals and associations (Mojtahed, Nunes & Peng, 2011). TAM is often used to understand how digital financial services explain consumer behavior variations, especially connected digital financial services (Lim & Ting, 2012).

## 2.3 Empirical Review

Ugwuanyi, Efanga, and Anene (2020) probed digital finance's influence on the supply of money in Nigeria between the years 2008 and 2019. The study employed Auto-Regressive Distributed Lag (ARDL) Model to analyse data for the purpose of drawing inference. The unit root test was the diagnostic tool applied, and the results revealed that the variables were a combination (IO) and (I1). As such, the reason for employing the estimation technique mentioned above The

ARDL Model result disclosed that deficit finance had a positive influence on the money supply in Nigeria.

## 3. Research Design

The ex-post facto research design was adopted. Secondary data were readily available for collection. Data is annualized time-series and is preferred because the study period covers 19 years. An effort was made to ensure the data set was not impaired by unit root. For this reason, we tested for stationarity of the series by employing the Augmented Dickey-Fuller (ADF).

### 3.1 Source of Data Collection

Data for this study are elicited from the Central Bank of Nigeria Statistical Bulletin of 2019 underpayment systems. The study period covers 2001 through 2019.

### 3.2 Method of Data Analysis

This study used descriptive statistics, correlation analysis, and Auto-Regressive Distributed Lag (ARDL) Model in testing the hypothesis of the study. For analysis, we used the E-view 9.0 econometric statistical software package.

### 3.3 Model Specification

This research adopted the economic model used by Ugwuanyi et al. (2020) that empirically investigated the impact of digital finance on Nigeria's money supply from 2009 to 2018. The econometric model of this study, reviewed in the preceding section, is specified below:

$$\Delta MSPt = \beta 0+\beta 1\ \Delta MSPt\text{-}1+ \beta 2\ \Delta\ APS\ t\text{-}1+ \beta 3\Delta\ PPS\ t\text{-}1+ \beta 4\Delta\ WPS\ t\text{-}1+y +ECMt\text{-}1 \quad (1)$$

Where:

MSP= Money Supply

APS = Automated Teller Machine Payment System

PPS = Point of Sales Payment System

WPS = Web Payment System

$\varepsilon t$ = Stochastic Error Term;

β0= Intercept for Estimation.

β1 – β3 = Coefficient of Independent Variables

Δ = change

∑ = summation

P = Optimal lag

However, this study adapted the earlier model by replacing Money Supply (MSP) with Credit to Agric Sector (CAS) in Nigeria as the regress and. Additionally, the Web Payment System (WPS) was replaced with Mobile Money Payment System (MPS). Also, this study adopted a double log model. These were done to give this model variation from its adapted model and make this study more original.

The econometric model for this study is specified as:

$$LOGCAS=\beta0+\beta1LOGPPS+\beta2LOGMPS+\beta3LOGAPS+\varepsilon i \quad (2)$$

Where; CAS = Credit to Agric Sector

MPS = Mobile Money Payment System

LOG = Logarithm

Other acronyms in the model remain as explained above.

### 3.4 A Priori Expectation

All the independent variables are expected to have a positive relationship with the independent variables in the model.

## 4. Data Analysis and Interpretation of Results

### 4.1 Pre-estimation test result (Unit Root Test)

Table 4.1 - Unit Root Test

| Variables | Augmented Dickey-Fuller test statistic | Probability Value | ADF Critical at 5% | Inference |
|---|---|---|---|---|
| CAS | -4.912724 | -3.052169 | 0.0013 | I(1) |
| PPS | -3.246407 | 0.0337 | -3.040391 | I(0) |
| MPS | -3.911175 | 0.0090 | -3.040391 | I(0) |
| APS | -5.107795 | 0.0009 | -3.052169 | I(1) |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

The unit root test from table 4.1 above shows that the stationarity of the variables was a combination of I(1) and I(0). The appropriate estimation technique to employ for inference is the Auto Regressive Distributed Lag (ARDL) Model.

**4.2 Descriptive Statistics**

Table 4.2 - Descriptive statistics

| | CAS | APS | PPS | MPS |
|---|---|---|---|---|
| Mean | 261.7234 | 2757.099 | 756.2593 | 802.8119 |
| Median | 149.5789 | 1699.160 | 633.8100 | 442.3538 |
| Maximum | 680.0330 | 6512.600 | 3204.760 | 4371.550 |
| Minimum | 48.56150 | 399.7100 | 399.7100 | 1.270000 |
| Std. Dev. | 211.3001 | 1994.063 | 818.4310 | 1039.474 |
| Skewness | 0.531950 | 0.938234 | 1.806391 | 2.266733 |
| Kurtosis | 1.819165 | 2.494852 | 5.810395 | 8.349600 |
| Jarque-Bera | 1.999954 | 2.989575 | 16.58583 | 38.92667 |
| Probability | 0.367888 | 0.224296 | 0.000250 | 0.000000 |
| Sum | 4972.745 | 52384.88 | 14368.93 | 15253.43 |
| Sum Sq. Dev. | 803658.9 | 71573205 | 12056926 | 19449103 |
| Observations | 19 | 19 | 19 | 19 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

Table 4.2 describes the variables employed for this study. The descriptive statistics results show that the mean of Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System and Mobile Money Payment System was N261.7234 billion, N2757.099 billion, N756.2593billion, and N802.8119billion respectively. The minimum of the Credit to Agric Sector variables, Automated Teller Machine Payment System, Point of Sales Payment System, and Mobile Money Payment System were N48.5615billion, N399.7100billion, N399.7100billion, and N1.270000, respectively. In contrast, their maximum was N680.0330billion, N6512.600billion, N3204.760billion, and N4371.550 for Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System and Mobile Money Payment System respectively. The standard deviation of N211.3001, N1994.063, N818.4310, and N1039.474 for Credit to Agric Sector, Automated Teller Machine Payment System, Point of Sales Payment System and Mobile Money Payment System respectively shows that deviations from the averages of these variables were not static but tended to vary from time to time. The table further reveals that all the variables skewed a little to the right.

Kurtosis measures the peakedness or flatness of the distribution of a series, with the kurtosis of a normal distribution being 3. A value greater than three suggests that the distribution is peaked or leptokurtic relative to the normal. Conversely, if less than three shows that the distribution is flat or platykurtic relative to the normal. Table 4.2 further reveals that CAS and APS with Kurtosis values of 1.819165 and 2.494852 are fat or platykurtic. While PPS and MPS with Kurtosis values of 5.810395 and 8.349600 respectively are peak or leptokurtic.

Jarque-Bera (JB) tests whether the series is normally distributed or not. The test statistic measures the skewness and kurtosis of the series with those from a normal distribution. In JB statistic, the null hypothesis states that the distribution is normal and rejected at a 5% level of significance. The analysis results presented in Table 4.2 above, CAS and APS with Jarque-Bera statistic of 1.999954 and 2.989575respectively with Probabilities of 0.367888 and 0.224296 are accepted as being a normal distribution since their p-values are greater than 5% level of significance. In comparison, the other variables are not generally distributed since their p-values are less than a 5% level of significance. The years under consideration was 19, hence the number of observation being 19.

### 4.3 Correlation Analysis

Table 4.3 - Correlation Matrix

| | CAS | PPS | APS | MPS |
|---|---|---|---|---|
| CAS | 1.000000 | | | |
| PPS | 0.339318 | 1.000000 | | |
| APS | -0.182170 | 0.756022 | 1.000000 | |
| MPS | 0.449407 | 0.927601 | 0.613394 | 1.000000 |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

From the result of correlation analysis in table 4.3 above, all the variables were positively correlated amongst themselves except CAS, which negatively correlated with APS.

**4.4 Inferential Result**

Table 4.4 - Results of ARDL Model

| Variable | Coefficient | Std. Error | t-Statistic | Prob.* |
|---|---|---|---|---|
| | | | | |
| | | | | |
| LOG(CAS(-1)) | 0.419651 | 0.204459 | 2.052491 | 0.0647 |
| LOG(PPS(-1)) | 0.646562 | 0.254569 | 2.539832 | 0.0275 |
| LOG(MPS) | 0.093630 | 0.174069 | 0.537889 | 0.6014 |
| LOG(APS(-1)) | -0.622924 | 0.294090 | -2.118143 | 0.0578 |
| C | 5.189335 | 2.294719 | 2.261425 | 0.0450 |
| | | | | |
| | | | | |
| R-squared | 0.948864 | Mean dependent var | | 5.244844 |
| Adjusted R-squared | 0.920972 | S.D. dependent var | | 0.940754 |
| S.E. of regression | 0.264464 | Akaike info criterion | | 0.463074 |
| Sum squared resid | 0.769350 | Schwarz criterion | | 0.809330 |
| Log likelihood | 2.832331 | Hannan-Quinn criter. | | 0.510818 |
| F-statistic | 34.01909 | Durbin-Watson stat | | 2.980441 |
| Prob(F-statistic) | 0.000002 | | | |
| | | | | |
| | | | | |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

The result in table 4.4 above revealed that the R-squared was approximately 95%, which means that the independent variables appropriately accounted for about 95% variations in the dependent variable. In comparison, the remaining 5% may be attributed to variables not included in the model. Put differently, digital finance indicators accounted for about 95% changes in credit to the agric sector in Nigeria, while the remaining 5% could be attributed to stochastic variables.

The result revealed that all the independent variables had positive except APS, which negatively impacted CAS. A percentage increase in PPS would bring about a 64 percent increase in CAS. In comparison, a percentage increase in MPS would bring about a 9 percent increase in CAS. Conversely, a percentage increase in APS would bring about a 62 percent decrease in CAS.

The result further revealed that the overall model was a good fit as the f-statistic value of 34.01909 and its corresponding p-value of 0.000 confirms that the model is significant at a 5% level of significance. Durbin Watson Statistic of 2.9 showed that auto-correlation was minimized since its value of 2.9 is close to the region of 2.

### 4.5 Diagnostic Tests

### 4.5.1: Test for Auto Correlation

Table 4.5.1 - Correlogram Q-statistic

| Q-statistic probabilities adjusted for 1 dynamic regressor | | | | | | |
|---|---|---|---|---|---|---|
| Autocorrelation | Partial Correlation | | AC | PAC | Q-Stat | Prob* |
| ****\| . \| | ****\| . \| | 1 | -0.496 | -0.496 | 5.2090 | 0.022 |
| . \|* . \| | . *\| . \| | 2 | 0.106 | -0.185 | 5.4626 | 0.065 |
| . \|* . \| | . \|* . \| | 3 | 0.120 | 0.124 | 5.8090 | 0.121 |
| .**\| . \| | . *\| . \| | 4 | -0.266 | -0.174 | 7.6326 | 0.106 |
| . \|* . \| | . *\| . \| | 5 | 0.105 | -0.163 | 7.9369 | 0.160 |
| . *\| . \| | .**\| . \| | 6 | -0.170 | -0.291 | 8.8007 | 0.185 |
| . \|* . \| | . *\| . \| | 7 | 0.093 | -0.101 | 9.0853 | 0.247 |
| . \| . \| | . \| . \| | 8 | 0.028 | 0.001 | 9.1134 | 0.333 |
| . \| . \| | . \| . \| | 9 | -0.013 | 0.025 | 9.1197 | 0.426 |
| . \| . \| | . *\| . \| | 10 | -0.037 | -0.201 | 9.1822 | 0.515 |
| . \| . \| | . *\| . \| | 11 | 0.033 | -0.164 | 9.2396 | 0.600 |
| . \| . \| | . \| . \| | 12 | 0.055 | 0.031 | 9.4239 | 0.666 |
| *Probabilities may not be valid for this equation specification. | | | | | | |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

The result of Correlogram Q-Statistic in table 4.5.1 above suggests that the variables are free from auto-correlation since the correlogram Q- Stat. table indicates that all p-values were >5%.

### 4.5.2: Test for Heteroskedasticity

Table 4.5.2 - Test for Heteroskedasticity

| Heteroskedasticity Test: Breusch-Pagan-Godfrey | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| F-statistic | 1.279215 | Prob. F(6,11) | | 0.3417 |
| Obs*R-squared | 7.397756 | Prob. Chi-Square(6) | | 0.2856 |
| Scaled explained SS | 5.393654 | Prob. Chi-Square(6) | | 0.4944 |
| | | | | |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

Table 4.5.2 above suggests that the variables are free from the Heteroskedasticity problem since F-stat's p-values and Obs*R-squared of 0.3417 and 0.2856 respectively are > 5% significance level.

### 4.5.3: Test for Serial Correlation

Table 4.5.3 - Serial Correlation

| Breusch-Godfrey Serial Correlation LM Test: | | | | |
|---|---|---|---|---|
| | | | | |
| | | | | |
| F-statistic | 4.064227 | Prob. F(2,9) | | 0.0553 |
| Obs*R-squared | 8.542054 | Prob. Chi-Square(2) | | 0.0140 |
| | | | | |
| | | | | |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

The Breusch-Godfrey Serial Correlation LM Test table above shows that the probability value of 0.0553 for the F-statistic is statistically insignificant at a 5% level of significance. Hence, the null hypothesis that there is serial correlation in the model is rejected. Thus, the model is said to be free from serial correlation.

### 4.5.4: Stability Diagnostic Test

Table 4.5.4 - Ramsey RESET Test

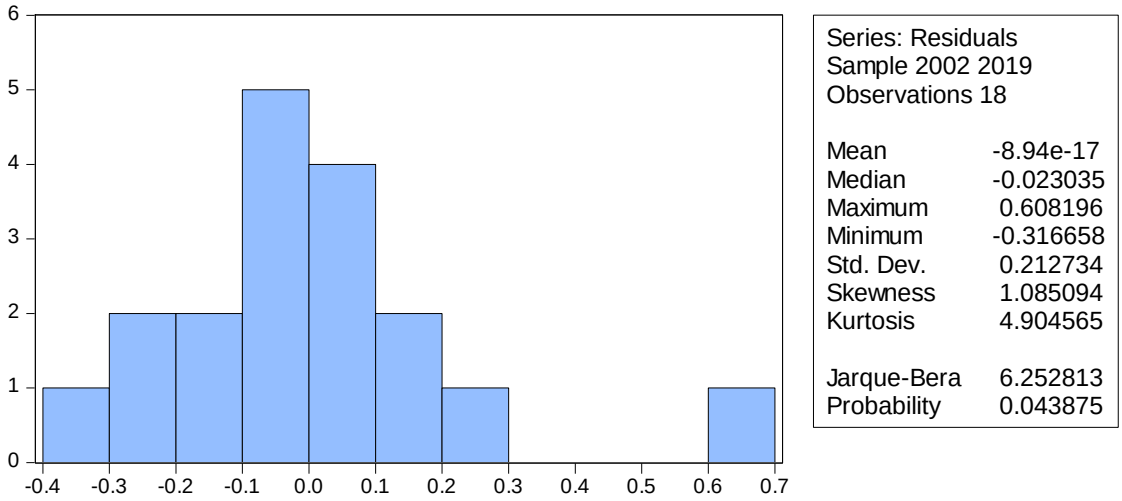
| Equation: UNTITLED | | | | |
|---|---|---|---|---|
| Specification: LOG(CREDIT_TO_AGRIC__SEC_ ) LOG(CREDIT_TO_AGR | | | | |
| IC__SEC_(-1)) LOG(POS) LOG(POS(-1)) LOG(MOBIE_MONEY) | | | | |
| LOG(ATM) LOG(ATM(-1)) C | | | | |
| Omitted Variables: Squares of fitted values | | | | |
| | | | | |
| | | | | |
| | Value | df | Probability | |
| t-statistic | 1.498214 | 10 | 0.1650 | |
| F-statistic | 2.244646 | (1, 10) | 0.1650 | |
| | | | | |

***Source: Authors' analysis using e-view 9 output with data in Appendix***

From the Ramsey reset test result in table 4.5.4 above, the t-statistic of 1.498214 and its corresponding p-value of 0.1650 suggest that the model is correctly specified, so the linear specification's null hypothesis is not rejected at 5% level of significance since the p-value is >5%.

### 4.5.5 Test of Normality

Figure 4.5.5 - Normality Chart




***Source: Authors' analysis using e-view 9 output with data in Appendix***

From the normality diagram in the figure above and the Jarque-Bera value of 6.25 and its corresponding p-value of 4.3%, which is <5% significant level, reveals that the data are not normally distributed.

### 4.6: Test of Hypotheses

### 4.6.1 Test of Hypothesis One

H01: Point of Sales Payment System has no significant impact on credit to Nigeria's agric sector.

Since the p-value of company income tax (PPS) of 0.0275 (2.75%) is <5% level of significance, the null hypothesis that Point of Sales Payment System has no significant impact on credit to the agric sector in Nigeria is rejected. (See table 4.4).

### 4.6.2 Test of Hypothesis Two

H02: There is no significant impact of the Mobile Money Payment System on credit to Nigeria's agric sector.

Since the p-value for the Mobile Money Payment System (MPS) of 0.6014 (60%) is >5% significant level, the null hypothesis is not rejected. Therefore, the null hypothesis that there is no significant impact of the Mobile Money Payment System on credit to the agric sector in Nigeria is accepted. (See table 4.4).

### 4.6.3 Test of Hypothesis Three

H03: Automated Teller Machine Payment System has no significant impact on credit to Nigeria's agric sector.

Since the p-value for Automated Teller Machine Payment System (APS) of 0.0578 (5.8%) is >5% significant level, the null hypothesis is not rejected. Therefore, the null hypothesis that Automated Teller Machine Payment System has no significant impact on credit to the agric sector in Nigeria is accepted. (See table 4.4).

### 4.7 A priori Expectation Result

The result is evaluated based on economic theories and literature in line with what is applicable worldwide.

Table 4.7 - A priori Expectation

| Variables | Expected Signs | Actual Signs | Remark |
|---|---|---|---|
| PPS | Positive ( + ) | Positive ( + ) | Conform |
| MPS | Positive ( + ) | Positive ( + ) | Conform |
| APS | Positive ( + ) | Negative ( - ) | Do not Conform |

***Source: Authors' Analysis***

### 4.8 Discussion of Findings

This study set out to investigate the impact of digital finance technologies on agric business in Nigeria between 2001 and 2019. Data analysis suggests the following inferences: Point of Sales

Payment System had a positive and significant impact on credit to the agric sector in Nigeria. Mobile Money Payment System had a positive and insignificant impact on credit to the agric sector in Nigeria. In contrast, Automated Teller Machine Payment System had a negative and negligible impact on credit to the agric sector in Nigeria.

Point of Sales Payment System having a positive and significant impact on credit to agric sector shows that point of sales payment channels contributed significantly to the growth of agric business in Nigeria. However, Mobile Money Payment System also contributed substantially to the enhancement of agric business in Nigeria; its impact was not significant. Like the central bank of Nigeria, monetary authorities in Nigeria need to develop regulatory policies that would encourage mobile money payment systems to transact as far as agric business is concerned.

Conversely, Automated Teller Machine Payment System had a negative and insignificant impact on credit to Nigeria's agric sector. This may be attributed to a lack of usage or motivation towards this payment channel when it comes to financial transactions in agric businesses in Nigeria. It is important to note that the Automated Teller Machine Payment System's impact on agric business in Nigeria conforms to the correlation analysis in table 4.3, which reported a negative impact of Automated Teller Machine Payment System on credit the agric sector in Nigeria. Both the Mobile Money Payment System and Point of Sales Payment System conformed to a priori expectations in 3.5. Still, the result of the Automated Teller Machine Payment System did not fit. This study's findings agree with some past studies on this subject matter earlier reviewed, such as; Ugwuanyi et al. (2020) and Monyoncho (2015).

## 5. Summary of Findings

The findings elicited from this study are summarized thus:

1. Point of Sales Payment System had a positive and significant impact on credit to the agric sector in Nigeria.

2. Mobile Money Payment System had a positive yet insignificant impact on credit to Nigeria's agric sector.

3. Among the three independent variables, Automated Teller Machine Payment System recorded the only negative impact on credit to Nigeria's agric sector.

## 6. Conclusion

This study was undertaken to analyze digital finance technologies' impact on agribusiness in Nigeria between 2001 and 2019. This study employed credit to the agric sector as a proxy for agribusiness in Nigeria, while the various digital finance technology payment systems in Nigeria such as point of sales payment system, mobile money payment system, and automated teller machine payment system were employed as independent variables. The ARDL model results revealed that the point of sales payment system had a significant and positive impact on agribusiness in Nigeria. Simultaneously, the mobile money payment system also positively impacted agribusiness in Nigeria, and its impact was insignificant. However, automated teller machine payment systems had negative, negligible implications for agribusiness in Nigeria. If the Nigerian government and monetary authorities are serious about agribusiness development, further awareness and sensitization exercises are needed. Incentivization should encourage more agribusinesses in Nigeria to use these payment channels, especially in the rural areas where agriculture remains a significant source of sustenance.

## 7. Recommendations

1. From the ARDL model results, the sales payment system's point positively impacted agribusiness in Nigeria. This is so that point of sales vendors is scattered all over the rural and urban areas in Nigeria and aids in bringing bank services to the people, especially people in the rural areas and agribusiness-dominated areas. Banks need to issue out more point of sales licenses to vendors and encourage vendors in the rural areas since they bring banking close to their doorsteps and enhance financial inclusiveness in such areas.

2. In the same vein, the Central Bank of Nigeria should create more awareness on mobile money payment system use, if possible, issue out incentives for transactions through this platform. This is evident in the positive yet insignificant impact that the mobile money payment system had on agric business in Nigeria. If incentives are offered, and awareness is created, the mobile money payment system would significantly impact agribusiness in the long run.

3. Automated teller machine payment system had a negative and insignificant impact on agribusiness in Nigeria. As stated earlier, this could be due to the lack of usage of this payment channel or the unavailability of this payment channel in rural areas where most farmers reside. This study thus advocates for more financial inclusiveness in the rural and agricultural-dominated regions of Nigeria.

## 8. Suggestion for Further Study

Given the current disposition to encourage agribusinesses in Nigeria, there is a need to research the impact of digital finance technologies utilizing different proxies for agribusiness in Nigeria. Proxies such as the level of engagement in agribusiness development in Nigeria, registration of agribusiness firms with corporate affairs commission, and proportion of agriculture gross domestic product (GDP) in total GDP may provide a deeper understanding of how digital finance technologies impact agribusinesses in Nigeria.

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## APPENDIX

**Data Utilized for Inference**

| YEAR | ATM | POS | MOBIE MONEY | CREDIT TO AGRIC. SEC. |
|---|---|---|---|---|
| 2001 | 548.60 | 11.03 | 1.27 | 55.85 |
| 2002 | 399.71 | 12.72 | 6.65 | 59.85 |
| 2003 | 1,561.74 | 31.02 | 18.98 | 62.10 |
| 2004 | 1,984.66 | 48.01 | 31.51 | 67.74 |
| 2005 | 2,828.94 | 161.02 | 142.80 | 48.56 |
| 2006 | 3,679.88 | 312.07 | 346.47 | 49.39 |
| 2007 | 3,970.25 | 448.51 | 442.35 | 149.58 |
| 2008 | 4,988.13 | 759.00 | 756.90 | 106.35 |
| 2009 | 6,437.59 | 1,409.81 | 1,102.00 | 135.70 |
| 2010 | 6,480.09 | 2,383.11 | 1,830.70 | 128.41 |
| 2011 | 1,568.95 | 474.73 | 329.12 | 255.21 |
| 2012 | 1,603.17 | 543.63 | 410.57 | 316.36 |
| 2013 | 1,591.01 | 650.41 | 498.08 | 343.70 |
| 2014 | 1,716.96 | 714.35 | 592.94 | 478.91 |
| 2015 | 6,512.60 | 3,204.76 | 4,371.55 | 449.31 |
| 2016 | 1,539.26 | 633.81 | 100.69 | 525.95 |
| 2017 | 1,699.16 | 749.82 | 1,155.64 | 503.08 |
| 2018 | 1,622.93 | 856.86 | 1,428.12 | 556.67 |
| 2019 | 1,651.25 | 964.27 | 1,687.10 | 680.03 |

**Source: Central Bank of Nigeria statistical Bulletin of 2019**