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DIGITAL PAYMENT AND ECONOMIC GROWTH: EVIDENCE FROM NIGERIA (2009-2020)

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ABSTRACT

This study examines the impact of digital payment on gross domestic product in Nigeria. Quarterly time series data from first quarter of 2009 to the fourth quarter of 2020 were used. In this study, Gross Domestic Product (GDP), Value of Automated Teller Machine Payment (ATMV), Value of Point of Sale (POSV), Value of Mobile Application Payment (MAPV) Value of Instant Payment (NIPV) are proxies to measure digital payment in Nigerian economy. The data used were obtained from Central Bank of Nigeria Statistical Bulletin (2020). The Phillips-Perron test results showed that all the variables were stationary at first difference except MAPV and CPI which was integrated at level 1(0), this means the series, ATMV, POSV, NIPV, GDP and interest rate were integrated at order one I(1). The short run ARDL regression results revealed that the use of MAPV and POSV have positive and significant impact on gross domestic product in Nigeria. This positive impact is as a result of usage of digitalpayment transactions through technology acceptance and diffusion of innovation of cashless policy in Nigeria. The results also revealed that NIPV and ATMV have inverse and significant impact on Gross Domestic Product in Nigeria. The negative impact can be attributed to poor power, inadequate internet/machine infrastructures, delay in the reversal of failed bank transactions, non-availability of cash at ATM points. The study, therefore, recommended that government should develop a new school curriculum to include digital finance education, the Central Bank of Nigeria should conduct periodic spot check on ATM points, charges for internet services should be regulated from time to time by the appropriate regulatory body and law should be enacted to curb incident of internet fraud.

Keywords: Digital Payment, Digital Economy, Economic Growth, Sustainable Development, Nigeria.

1. Introduction

Trade often entails the exchange of products and services together with an equivalent abstract value, such as money, since barter was defeated in human history. Payment systems have existed ever since money was created as an abstract form of value representation. New and more abstract representations of value were added over time, according to the study. Electronic payment systems are the culmination of a related sequence of value transfer mechanisms that began with barter and progressed via banknotes, payment orders, checks, and eventually electronic cards. The majority of payments in Nigeria have been made in cash (Andrea, Udeh, Allison, 2022). Currency management has recently encountered a number of difficult issues, including the enormous hoarding of bank notes by the people, with statistics showing that over 85 percent of currency in circulation are outside the vaults of

banks. As at the end of September 2022, available data at the Central Bank of Nigeria (CBN) indicated that ₦2.73 trillion out of the ₦3.23 trillion currency in circulation, was outside the vaults of banks across the country (Emefiele, 2022).

Access to financial services was critical during the pandemic, especially for the people and those who need finance to sustain their business operation (Tay, Tai and Tan, 2022). The accelerated push toward digitizing financial services may be an unexpected benefit for digital financial payments given the disruption brought on by COVID-19. Digital banking, particularly mobile money, has proven to be the cornerstone of financial inclusion in developing nations for individuals who are isolated and financially impoverished (Tram, Lai, and Nauyem, 2021). The aftermath of the pandemic, is the fast rise in the demand for Fintech solutions by government, businesses and the general public. The number of digital payment platform (NEFT, NIP, M-Cash, e-bill pay, Remitta, NAPS, central pay and e-naira etc.). In Nigeria has increased tremendously because of the opportunities provided by the digital channels to promote global financial inclusion, accelerated economic growth and poverty reduction.

Digital financial payment is a broad concept which ensures ease access, availability, and usage of formal financial system in an economy using digital technologies (internet, mobile phones etc.). Digital payments have the potential to expand inclusive access to financial services. The global COVID-19 health crises and government responses, such as lockdowns restriction of economic activities, increased the contactless modes of payment and other digital financial services to minimize the danger of virus transmission via currency handling, thus providing new possibilities for potential digital financial inclusion adoption. Mobile money service, internet banking and other financial technology were used to easy small business and low-income families' livelihood (Asongu, Biekpe and Cassimon, 2021).

Prior to the pandemic, the Nigeria economy was unstable, as the country was dealing with nonCOVID-19 related problems such as; insecurity, falling global oil prices, trade restrictions, and public deficit issues, on top of longstanding development challenges like inadequate fiscal economic policies, high rate of unemployment and inflation. The government's regulatory attempts to prevent the spread of the virus exacerbated the country's already precarious economic situation. As a result, the gross domestic product (GDP) growth rate fell below 4% in early 2020, to 1.87 and -6.10 percent in the first and second quarters respectively, reflecting a drop by 0.23 and 8.22 percentage points below the 2.10 and 2.12 percent recorded in 2019, Q1and Q2. The economy eventually recovered by the third quarter of 2020, but was immediately sent into the tailspin by the end of the fourth quarter, when the country was hit by the second wave of the pandemic, which proved to be more lethal than the first. The total GDP in 2020 was reported at 432.29 billion from 448.12 billion in 2019. In the first quarter of 2021, GDP was recorded at 0.51%. The Q1 2021 growth was slower than 1.87% growth rate recorded in Q1 2020 but higher than 0.11% recorded in Q4 2020, indicating a gradual but steady growth (Chinyere and Aras, 2022).

In other to abate the economic recession recorded during the COVID-19 pandemic, the Central Bank of Nigeria (CBN) created a ₦50 billion targeted households and medium-sized

enterprises (SMEs) Facility, for hoteliers, airlines service, health care, merchants etc. These facilities were disbursed via electronic channels.

According to data made public by the Nigerian interbank settlement systems (NIBSS), the NIBSS quick payment network processed transactions totaling N33.2 trillion in August 2022. (NIP). The total value of e-payment transactions over the past eight months now stands at N238.7 trillion. The NIBSS data also reveals that the August 2022 milestone was the highest ever for an e-payment amount in a single month since the platform's launch. The increase in electronic transactions indicates that more Nigerians are adopting digital payment, says one expert. The value of e-payment, as documented, was a reflection of the increase in the volume of agreements within months, the NIBSS stated. In August, the NIP volume increased to 448 million, a 10.6% rise above the 405 million recorded. (NIBSS, 2022).

However, a large percentage of Nigerian's are still excluded from financial services. A survey carried out by Enhancing Financial Innovation and Access (EFInA, 2020) revealed that 38.1 million representing 35.9 percent of the adults in Nigeria were excluded from financial service. Out of the 64.1 percent that had access, 62.0 million (50.7%) derived their financial services from the formal financial institution, while 14.4 million representing 13.6 percent patronized the informal sector. This constitutes a sustainable development challenge to developing Nigeria.

Hence, this research work tends to examine the effect of point of sale, automated teller, point of sale, instant payment on economic growth. The purpose is to provide an overview of how digital financial ecosystem enhanced financial inclusion. To achieve this goal, this paper is divided into four sections, including this introduction, section two captures conceptual review, theoretical framework and review of empirical literature. Section three contains methodology and data analysis. Conclusions and recommendations are presented in section four.

2. Review of Literature and Conceptual Issues

Digital payment system refers to the automated processes of exchanging monetary values among parties in business transactions and transmitting the value over the information technology (ICT) networks (Harash, Timimi and Alsaadi, 2014). In Nigeria, digital payments use computers to transfer money from one party to another without any further physical labor beyond entering payment information (Udeghi and Hanzace, 2018). Digital payment systems have recently emerged as a convenient means of circulating money, particularly in underdeveloped nations like Nigeria where carrying cash is customary. A well-functioning digital payment system has been considered to have great importance on financial stability, monetary policy, and general economic activity in Nigeria, where electronic payment systems were the key starting point of her modern market economy (Aduda and Kingoo,2018). In the past, in 2002, the Central Bank of Nigeria (CBN) introduced a payment system that enabled digital payments. According to Andrea, Udeh, and Allison (2022) around this time, Nigeria Automated clearing system (NACS) was introduced as a veritable platform for development of electronic payment and to shorten clearing of cheques timeframe.

Also in 2003, Inter Switch introduced the Automated Teller Machine (ATM), which was followed by the deployment of Real Time Cross Settlement (RTGS) in 2006 and the migration

of the New Uniform Accounting System (NUBAN) in 2010. Thereafter, the Nigerian interbank settlement system offered instant payment service in early 2011. The Nigeria Interbank Settlement System (NIBSS) Instant Payments (NIP) is a mechanism for real-time interbank account-to-account electronic financial transfers that is based on account numbers online. It allows financial institutions to provide online real-time irrevocable funds transfer and bill payment services to customers based on bank account number through the channel. The maximum limit of ₦5million for individual and ₦10million transfer for corporate body are allowed on the platform. The Nigeria Interbank Settlement System (NIBSS) Electronic Funds Transfer (NEFT) is widely used by all banks to process inter-bank electronic funds transfer instructions for their respective customers. There is no limit (minimum or maximum) on NEFT payment (CBN 2013).

Furthermore, Central Bank Digital Currency (CBDC), the eNaira was launched in 2021. The eNaira is the Central Bank of Nigeria – issued digital currency that provides a unique form of money denominated in Naira. eNaira offers improved payment prospects in retail transactions when compared to cash payments because it acts as a store of value as well as a means of exchange. The eNaira will enhance financial inclusion by making financial services available to people of communities who do not have (enough) banking opportunity (http://enaira.gov.ng).

Digital Payment Tools/Channels

Mobile Banking Applications: - The mobile banking products provide basic banking services to customers from their mobile phones. It is an SMS driven platform which facilitates access to banking services using cell phones. The services available on the mobile banking product include mini statements and checking of account history, alerts on account activity, monitoring of term deposits, domestic and international fund transfer, cheque book and card requests, ATM location (Andrea, Udeh, Allison, 2022).

Automated Teller Machine (ATM): Automated Teller Machine (ATM) is an electronic banking device that allows the banking public to carry out financial transactions without the assistance of a bank teller (Edet, 2019). Any bank customer with a card (credit or debit card) can access an ATM as long as they are all on the same network.

Features of ATM service include cash withdrawals, cash deposits, balance inquiry, mini-statement request, and fund transfer etc.

The Point of Sale (POS) machines are electronic devices deployed at retail outlet to facilitate exchange of values between a merchant and a card holder (visa, verve, master etc.). It eliminates the numerous issues related to regular cash transactions. The POS are used to perform a variety of basic banking and financial transactions like payment for purchases, balance enquires, mini statement printing etc (Andrea, Udeh, and Allison, 2022).

Debit Cards: Debit card is a banking card enhanced with automated teller machine and point of sale (POS) features so that it can be used at merchant locations. Debit cards allow you to spend only what is in your bank account. It is a quick transaction between the merchant and your personal bank account. A debit card is linked to an individual's checking account, allowing funds to be withdrawn at the ATM and point of sale without writing a cheque (Yusuf, 2016). When using a debit card to pay for goods and services the purchase amount

is deducted from the cardholder's checking account. The types of debit card include online debit card and offline debit card. With offline debit card, debit is not made immediately (Ravikumar, Sureshi, Sriram and Rejesh, 2019). The benefits of using a debit card include making the payment process at the checkout counter quicker and more convenient, eliminating the need to carry a cheque book and a lot of cash, using it at locations where personal cheques are not accepted, and reducing the possibility of loss or theft of cash.

Prepaid Debit Cards: These are debit cards not usually linked to a customers' account. They must be funded before being used by cardholders. Prepaid debit cards are identified with such names like cash cards, value cards, and Naira cards etc. prepaid cards can be used as gift cards students ID cards, Government payment card, payroll card, Bursary card, insurance cards, travel cards etc. (Mamudu & Gayovwi, 2019).

Credit Cards: In contrast to a debit card, a credit card does not deduct funds from the user's account following each transaction. When a credit card is used, the issuer lends money to the consumer (or user) to be paid to the merchant. Using a credit card entitles the user to roll over their balance in exchange for paying interest. The cardholder, card issuing bank, merchant, acquiring bank, independent sales organization, merchant account, credit card association, transaction network, and affinity partner are the parties involved in a credit card transaction (Afaha, 2019).

Internet Banking: Barney and Clark (2007) assert that internet banking is an online platform through which customers of the bank can access their account and accomplish financial transactions using the internet. With internet banking customers can view account balance, transfer fund between sister accounts, transfer funds in favor of third parties.

Cash Withdrawal Limit

The Central Bank of Nigeria (CBN) has revised cash withdrawal limits as follows:

i. For both individuals and business organizations, the maximum weekly withdrawal limit for cash is N500,000 and N5,000,000, respectively.
ii. If a cash withdrawal is necessary for a compelling reason that exceeds the restrictions in (1) above, there will be a processing fee of 3% for private people and 5% for corporate organizations.
iii. While the existing restriction of N10 million on clearing checks still exists, third party checks over N100,000 are not acceptable for payment over the counter.

However, the Bank encouraged customers to use alternative channels (internet banking, mobile banking apps, USSD, cards/POS. eNaira, etc.) to conduct their banking transactions. The above regulations take effect nationwide from January 9, 2023. (Vanguard Newspaper). The updated cash-based transactions strategy in banks seeks to promote more electronic-based transactions while reducing the amount of actual cash (coins and notes) in circulation (payments for goods, services, transfers etc.). By offering more effective transaction choices and a wider reach, the strategy will promote financial inclusion and lower the cost of banking services (including the cost of credit). (CBN, 2012).

Theoretical Framework

These section analyses theories advanced to explain the relationship that exists between digital payment and the economic growth in Nigeria. The main theory explored in this area is the New Growth Theory.

New Growth Theory

The new growth theory was postulated by Paul Romer in 1989 and it assumes that economic growth arises from the unlimited wants and desires of humans. The theory argues that every individual's personal pursuit of profits will eventually increase the real gross domestic product per person (GDP per capita) (Hodagho, 2016). The new growth theory argues against the exogenous source of growth for the economy by emphasizing on the important of entrepreneurship, innovation, knowledge and technology as the main drivers of economic growth. The new growth theory views knowledge as an asset for growth that is not subject to diminishing returns, and that innovation and new technologies are formed or adopted from the desire for increased knowledge or human capital to achieve higher profits. One of the major challenges facing digital financial payment in Nigeria is the high cost of internet facilities, low financial literacy rate particularly among the rural dweller making banking and other financial services challenging for the operations. In addition, information and telecommunication knowledge is still low in the country, making access to digital financial services difficult. Inadequacy and inappropriateness of awareness campaign sometimes inhibit the level of understanding of financial transactions and the ability of the illiterate to take advantage of the possibilities in financial services. Critical to awareness, is the difference in the language of the target population and education. This reduces the effectiveness of communication. An uninformed population cannot effectively use digital financial service (Migap, Okwanya and Ojeka, 2015).

Human capital in the form of technical know-how and education is required for the use of many modern sophisticated digital payment platforms which represent information technology, it can therefore serve as a basis for this study as the three when intertwined lay the foundation for effective adoption of digital payment systems in Nigeria which will lead to increased consumption and subsequently improved economic growth in the long run.

3. Empirical Review

Afaha (2019) studied the relationship between electronic payment system and economic growth using monthly data covering the period of 2012 to 2017. The Autoregressive Distributed Lag Regression (ADLR) method was used in the analysis. The results indicated a significant positive relationship between electronic payment system and economic growth in terms of real gross domestic product (GDP).

Yusuf (2016) examined cash-less policy and economic growth in Nigeria over the period 2008 to 2015. Making use of the Ordinary Least Square (OLS) technique, the result showed that POS, web and mobile payments have a positive and significant impact on economic growth in Nigeria. The study concluded that the adoption of non-cash payment by customers will contributes to reduced inflation rate, increase in foreign direct investment, increase in government revenue and a fall in unemployment levels, all which contribute to the growth in Nigeria.

Ravikumar, Suresha, Sriram, and Rajesh (2019) studied the impact of digital payments on economic growth in India from the period of 2011 to 2019. The study used Ordinary Least Square (OLS) regression, Auto-Regressive Distribution Lag (ARDL) co-integration approach. The result indicated that digital payments impact economic growth significantly in the short-run but have no effect on economic growth in the long-run.

Mamudu and Gayovwi (2019) studied cashless policy and its impact on the Nigeria economy using quarterly time – series data over the period 2011 (Q1- Q4) to 2017 (Q1 – Q4). The variables used are Automated Teller Machine payment value (ATMV), Web/internet Transfers Payment Value (WTPV), Mobile Payment value (MPV), Point of Sale (POS) and Cheque Payment Value (CHEV). They used the Ordinary Least Square (OLS) regression technique, Johansen Co – integration test and Error correction model. The results showed the use of cashless policy instruments have a positive and significant impact on Gross Domestic Products in Nigeria. The Johansen cointegration test showed that a long run relationship exists between the variables while in the short run regression result also shows the use of these non-cash instruments have a significant and positive effect on Gross Domestic Product in Nigeria.

Nedozi and Omoregie (2019) investigated an empirical evaluation of different electronic payment channels in Nigeria, the data were analyzed using percentages. From the study, it was found that ATM dominated the penetration of e-payment in terms of volume in Nigeria from 2011 to First quarter of 2019. In terms of value National Electronic Fund Transfer (NEFT) dominated in 2012 and 2013 while Nigeria Inter-bank Settlement (NIP) dominated from 2014 to first quarter of 2019.

Tay, Tai and Tan (2022) examined the relationship between Digital Financial Inclusion and sustainable development. The study used five main databases, namely ProQuest, Scopus, Springer, Science and Emerald, to extract articles related to the revolution of digital inclusion among countries. The findings show that Asia countries embrace and improve digital finance inclusion to reduce poverty.

Andrea, Udeh, and Allison (2022) investigated the effect of e-payment systems on gross domestic product of Nigeria. The variables used are Automated Teller Machine (ATM), Point of Sale (POS), and Mobile Application Payment (MAP) on gross domestic product. The study adopted ex-post facto research design. As an analytical method, the Auto Regressive Distributed Lag Model (ARDL) was employed. The study found that Nigeria's economic growth is significantly impacted by the use of mobile applications, POS systems, and ATMs for payments.

Okifo and Igbunu (2015) investigated the impact of Nigeria's electronic payment system. The main focus of this study is on Nigeria's adoption of the E-payment system: Its economic advantages and difficulties. With the advent of the internet, electronic payments and transactions have experienced exponential development. Unencrypted credit card numbers may be sent across a network by consumers to make purchases of products and services, which did not offer much protection or privacy. But as customers became more mindful of their privacy and security a wide array of new secure network payment solutions have been

established, the report continued. The advantages of electronic payments are immeasurable since they will transform Nigeria into a society without currency and do away with uncertainty-related anxiety. Despite the difficulties that e-payments face, such as public acceptance, a lack of a standardized platform used by banks, a lack of adequate infrastructure, and security concerns, with the proper application of e-payment systems, corruption, which is a cancer in the government arena, will be comprehensively addressed.

The long-term causal impact of digital financial inclusion on economic growth in sub-Saharan Africa was explored by Thaddeus et al. in 2020. The study uses quarterly data from 2011 to 2017 and a sample of 22 sub-Saharan African nations. The indicators of digital financial inclusion were automated teller machines (ATM), the number of commercial banks branches (CBB), loan outstanding (LOS), mobile agent outlets (MOAO), and mobile money transactions. The dependent variable was economic growth as measured by GDP per capital (MOMO). The long run causal effect of digital financial inclusion was analyzed using the vector error correction model and granger causality test for causal and direction. The estimated results indicate that a long run causal relationship exists between digital financial inclusion and economic growth in Sub – Sahara Africa and the direction of causality is unidirectional running from economic growth to digital financial inclusion strongly associated with the progress and development of the Sub Sahara economic growth.

4. Data and Methodology

Sources of Data: Secondary source of data was used to empirically do analysis in this Study. The data were extracted from the Central Bank of Nigeria statistical bulletin 2021, covering the period of twelve years (12) from 2009q1 – 2020q4.

Method of Analysis: The study examines the causal relationship between digital payments and economic growth proxy with gross domestic product in Nigeria during the period of 2009q1 to 2020q4. In this study, (GDP) Gross Domestic Product (MAPV) Value of Mobile Application Payment, (ATMV) value of Automated Teller Machine, (POSV) Value of Point of Sale, (NIPV) Value of Instant Payment are proxies to measure digital payments in Nigeria. The real GDP data (GDP at market price) has been taken from the CBN database on the Nigeria Economy on a quarterly basis. Further, data on digital payments have been collected from CBN Statistical Bulletin where digital payments data are available yearly basis. However, the yearly data on digital payments are converted to quarterly data to conduct this study.

Model Specification: This research set out to examine the causal relationship between digital payment and economic growth. This relationship is designed on a linear regression model. An econometric model was built in line with the conceptual, theoretical and empirical literature reviewed to capture the relationship between digital payment and economic growth in Nigeria. The functional relationship and the resulting model in the implicit form is:

GDP = f (LNMAPV, LNATMV, LNPOSV, LNNIPV, LRA, CPI) (1)

Where:

GDP = Gross Domestic Product

LNMAPV = Log of Mobile Application Payment Value

VATM= Log of Automated Teller Machine Value
VPOS = Log of Point-of-Sale Value
VNIP = Log of Instant Payment Value
While the control of LRA and CPI, Interest rate and inflation rate respectively
Equation 1 above can be transformed into an econometric model in a form as follows:

$$LNGDP= \beta_0 + \beta_1 LNMAPV + \beta_2 LNATMV + \beta_3 LNPOSV + \beta_4 LNNIPV + \beta_5 LRA + \beta_6 CPI + \varepsilon \quad (2)$$

According to Green 2003, the generalized ARDL (p,q) model is shown as follows;

$$Y_t = \gamma_{0i} + \sum_{i=1}^{p} \delta_t Y_{t-i} + \sum_{i=0}^{q} \beta_i^I \; X_{t-i} + \varepsilon_{it} \ldots\ldots\ldots \quad (3)$$

Where γ a and ε_{it} are constant and vector of the error terms respectively, Y_i^I is vector and X_t^i are variables which are purely I(0) and I(1) or co-integrated ,p and q are optimal lag orders, where i = 1,..., k.
However, to perform the bound test which is necessary to ascertain the co-integration; the condition ARDL (p, q_1, q2 q_3,…q_7)
Where i =1, 2…7,
The model in equation (3) is specified explicitly in the ARDL model as follows

$$\Delta LNRGDP_t = \alpha_0 + \alpha_1 LNRGDP_{t-1} + \alpha_2 LNMAPV_{t-1} + \alpha_3 LNATMV_{t-1} + \alpha_4 LNPOSV_{t-1} + \alpha_5 LNNIPV + \alpha_6 LRA_{t-1} + \alpha_7 CPI_{t-1} + \sum_{i=1}^{p} \beta_{1i} \Delta LNRGDP_{t-i} + \sum_{i=0}^{q_1} \beta_{2i} \Delta LNMAPV_{t-1} + \sum_{i=0}^{q_2} \beta_{3i} \Delta LNATMV_{t-1} + \sum_{i=0}^{q_4} \beta_{4i} \Delta LNPOSV_{t-1} + \sum_{i=0}^{q_4} \beta_{5i} \Delta LNNIPV_{t-1} + \sum_{i=0}^{q_4} \beta_{6i} \Delta LRA_{t-1} + \sum_{i=0}^{q_5} \beta_{7i} \Delta INF_{t-i} + \varepsilon_t (4)$$

Where ε = Error Term and β_0, β_1, β_2, β_3, … , β_7 are parameters of the independent variables to be estimated during this Study that measures the short run relationships while $\alpha_1, \alpha_2 \alpha_3, \ldots \alpha_7$ are coefficient that measure long run relationship.
To test whether there is a long run equilibrium relationship between the variables; bounds test for co-integration was carried out as Pesaran et al (2001);
Hypothesis
H_0:α_1= α_2=α_3 = α_4= α_5 = α_6=α_7= 0. This emphasize there is no long run relationship among variables;
H_1:$\alpha_1 \neq \alpha_2 \neq \alpha_3 \neq \alpha_4 \neq \alpha_5 \neq \alpha_6 \neq \alpha_7 \neq 0$. This emphasize there is long run relationship among variables.

5. Regression Estimate and Discussion of Results

Unit Root Test: The study commenced its regression estimate by conducting the unit root test using the Augmented Dickey Fuller test. The stationarity of the dependent and independent variables is shown in Table 1.

Table 1: Unit Root Test using Phillips-Perron Test

	ADF Statistics at Level		ADF Statistics at First Difference		
Variables	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Order of Integration
LNRGDP	0.2449	0.2018	0.0000	-	I (1)
LNMAPV	0.0004	-	-	-	I (0)
LNATMV	0.4058	0.9764	0.0000	-	I (1)
LNPOSV	0.4923	0.9839	0.0000	-	I (1)
LNNIP	0.3362	0.5401	0.0000	-	I (1)
LRA	0.9665	0.9620	0.0002	-	I (1)
CPI	0.0001	-	-	-	I (0)

Source: ***Authors' computation (2022)***

The result of the PP test is given in **Tables 1** above which shows that Log of Real Gross Domestic Product, log of Automated Teller Machine Value, log of Point-of-Sale Value, log of Instant Payment Value and interest rate of the PP test were stationary at the first difference at 5% level of significance, while log of Mobile Application Payment and Consumer Price Index, are stationary at levels. As such, the appropriate estimation technique to employ for inference is the Auto-regressive Distributed Lag (ARDL) Model.

ARDL Bound Co-integration Test: In regards to the mixture of the stationarity tests result presented in table 1 above, the study carried out the co-integration test using the ARDL Bound Co-integration test and according to Pesaran and Shin (1999) and Pesaran, et al (2001). They provided two asymptotic critical values (lower and upper) bounds for testing the presence of co-integration when the regressors are purely I (0) or I (1). A lower value assumes the regressors are purely I (0) while an upper value assumes the regressors are purely I (1).

Table 2: Result of ARDL Bound Co-integration Test

Estimated Model	F-Statistics	Co-integration
F(LNRGDP, LNMAPV, LNATMV, LNPOSV, LNNIPV, LRA, CPI)	1.126268	No Co-integration

Critical Values	Lower Bound	Upper Bound
1%	3.15	4.43
5%	2.45	3.61

Source: Authors' computation (2022)

The result of the bound test for co-integration, alongside the critical values was presented in table 2. The result of the bounds test showed that the F-statistic value of 1.126268, which is lower than the lower bound (I (0)) and upper bound (I (1)) critical values of 2.45 and 3.61 at a 1% and 5% significance level respectively. Hence, we fail to reject the null hypothesis i.e., there exit no long-run relationship between the variables. So therefore, we proceed to run the ARDL model while the short run model specification is shown below;

Short –run Model Specification

$$\Delta LNRGDP_t = \alpha_0 + \sum_{i=1}^{p} \beta_{1i}\Delta LNRGDP_{t-i} + \sum_{i=0}^{q_1} \beta_{2i}\Delta LNMAPV_{t-1} + \sum_{i=0}^{q_2} \beta_{3i}\Delta LNATMV_{t-1} + \sum_{i=0}^{q_4} \beta_{4i}\Delta LNPOSV_{t-1} + \sum_{i=0}^{q_4} \beta_{5i}\Delta LNNIPV_{t-1} + \sum_{i=0}^{q_4} \beta_{6i}\Delta LRA_{t-1} + \sum_{i=0}^{q_5} \beta_{7i}\Delta INF_{t-i} + \varepsilon_t \quad (5)$$

The ARDL Result

ARDL approach is employed to find the short relationship between dependent variable (LNGDP) and independent variable namely (LNMAPV) Log of Mobile Application Payment Value, (LNVATM) Log of Automated Teller Machine Value, (LNVPOS) Log of Point-of-Sale Value, (LNNIPV) Log of Instant Payment Value. While the control variable of LRA and CPI, Interest rate and inflation rate respectively. The study presents the result of the short run ARDL regression estimates in the Table 3.

Table 3:ARDL Result

Selected Model: ARDL(1, 1, 1, 1, 0, 0, 0)

Dependent variable: LNGDP

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNGDP (-1)	0.833734	0.090891	9.172939	0
LNMAPV	0.056482	0.007042	8.020173	0
LNMAPV (-1)	-0.048384	0.007067	-6.84643	0
LNATMV	-0.030036	0.008717	-3.445663	0.0015
LNATMV (-1)	0.017766	0.008632	2.058145	0.0469
LNNIPV	-0.021672	0.005203	-4.165384	0.0002
LNNIPV (-1)	0.021055	0.004607	4.569925	0.0001
LNPOSV	0.008892	0.010864	0.818521	0.4184
LRA	-0.002062	0.002844	-0.725127	0.4731
CPI	-0.00045	0.001764	-0.255234	0.8
C	0.873626	0.494306	1.76738	0.0856
R-squared	0.996259	Mean dependent var		4.958598
Adjusted R-squared	0.995219	S.D. dependent var		0.158872
S.E. of regression	0.010985	Akaike info criterion		-5.983159
Sum squared resid	0.004344	Schwarz criterion		-5.550146
Log likelihood	151.6042	Hannan-Quinn criter.		-5.820213
F-statistic	958.6168	Durbin-Watson stat		2.221002
Prob(F-statistic)	0			

Source: Authors' computation (2022)

6. Discussion of Results

The result of the ARDL results shows that Mobile Application Payment Value has a positive and significant effect on the economic growth; hence a percentage increase in transaction carried out using mobile application payment will raise economic growth in a quarter by about 5 percent (%). A percentage increase in transaction carried out using point of sale will spontaneously increase economic growth by 0.08% in a quarter as indicated by Yusuf (2016), Ravikumar, Suresha, Sriram, & Rajesh (2019). but were statistically insignificant. In contradiction to Andrea, Udeh, and Allison, (2022) estimation outcomes that emphasize that

all proxies for digital financial payment system have significant effect on economic growth in Nigeria. The estimation for this study shows the transaction carried out using instant payment value have an inverse relationship with economic growth but was statistically significant. Thus, a percentage change in value of instant payment lead to 2 percent (%) decrease on economic growth in a quarter in Nigeria and a percentage increase in transaction carried out using automated teller machine will cause economic growth to decrease by 3 percent (%) in a quarter in Nigeria. This estimation was also statistically significant. The finding is not in consonance with Mamudu and Gayovwi (2019) and Andrea, Udeh, and Allison, (2022).

Diagnostic Test Statistic

To ensure the robustness of the regression estimate, some diagnostic tests (such as Breusch-Godfrey Serial Correlation LM Test and Heteroskedasticity Test Breusch-Pagan-Godfrey) were conducted. The Serial Correlation results showed that the probability value is greater than 5% significance level, indicating that the residuals from the estimates shows that there is no presence of serial correlation while the heteroskedasticity (Breusch-Pagan-Godfrey) also showed the absence of heteroskedasticity in the estimates. This is because the probability value is greater than 0.05. The results of the diagnostic tests showed the appropriateness of the regression estimates.

7. Conclusion

This study discussed the effect of mobile application payment value, automated teller machine value; point of sale value, instant payment value on economic growth in Nigeria was analyzed in this study from 2009q1 to 2020q4. This study is important because it shows the extent of how financial digital payment has been a determinant of economic growth that constitute to sustainable development. This study therefore, shows that the proxies for financial digital payment and economic growth have only short-run relationship. Based on the analyses undertaken in this study, some important facts were deduced from the study. Firstly, mobile application payment has a positive and statistically significant effect on economic growth which shows the extent of internet expansion. Secondly, point of sale has a positive but insignificant effect on economic growth. Instant payment has a negative and statistically significant effect on economic growth, which is the third fact. Lastly, automated teller machine also has a negative but statistically significant effect on economic growth in a manner which is not consistent with the economic expectation.

Policy Implications

Based on the findings of the study, the following recommendations for mobilizing and harnessing digital financial payment to enhance financial inclusion for sustainable growth and development are hereby presented.

Government and private organizations should systematically expand the necessary infrastructure by promoting the development of necessary technologies, recruiting experts and expanding high speed information network as this will foster a strong foundation for e-payment and the use of mobile phone application. The government should enact a law prohibiting the use of fraudulent POS machines. To this end, any agent discovered in an unwholesome act should be prosecuted accordingly. The Nigerian Communication Commission (NCC) should regulate web – based fees paid by POS operators. Financial

education should be incorporated into the school curriculum. The banks must perform more education and advertisement on electronic payments so that the Nigerian population will appreciate and use electronic products available. Also, the Central Bank of Nigeria should carry out routine spot check on Automated Teller Machines (ATM) points to ascertain the quality of fit bank notes loaded on the machine and also access the functionality of ATM machines. Deposit Money Banks should resolve Customers complains arising from failed transfer within two working days.

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