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Impact of Digital Payment System on the Efficiency of the Nigerian Banking Sector

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ABSTRACT

In this paper we examine the contribution of digital payment system on the efficiency of the banking sector in Nigeria. Quarterly data covering 2009-2018 were generated from Central Bank of Nigeria (CBN) Statistical Bulletin and World Bank database. We employ the Ordinary Least Square (OLS) regression, after testing for the properties of time series using Augmented Dickey-Fuller (ADF) and Philip-Peron (PP) test of stationarity. Engle and Granger test for co-integration were conducted to determine the existence of long run relationship. The speed of adjustment was determined using the Error Correction Model (ECM). The result of the study shows that digital payments proxied by Automated Teller Machine (ATM) transactions, Point of Sales (POS) transactions, Mobile Payment (MP) transactions and Web Payment (WP) Transactions has negative and significant impact on bank efficiency proxied by bank overhead cost both in the long and short run. The effect of digital payment on total cost as a ratio of income varies according to the variable used to proxy digital payment. Our finding also reveals that digital payment contributes positively to noninterest income, return on equity, and return on assets of banks in Nigeria. The result suggests that a well-developed digital payment system in Nigeria will improve banking sector performance hence the overall performance of the economy. We therefore recommend that Nigerian banks should formulate policies that will enhance accessibility of the available digital payment platforms by all users of financial services in Nigeria so as to increase the volume and the value of their transaction and as well strive to explore other new digital payment systems.

1. Introduction

Empirical evidence has been provided in support of financial sector led economic growth in underdeveloped, developing, emerging and developed economies of the world (Bist and Bista, 2018, Gautam, 2014; Kharel & Pokhrel, 2012; Timsina, 2014). In Nigeria Particularly, various studies have investigated the contribution of Financial sector to economic growth with a general consensus that financial sector drives economic growth (Odeniran and Udeaja 2010; Nzotta and Okereke 2009; Agu and Chukwu 2008). According to Mustapha (2018) the banking sector significantly drivers the activities in the financial sector of the Nigerian economy. And so, the efficiency of the banking sector is crucial to financial sector development. The emergence of the digital payment systems significantly altered the entire financial architecture in Nigeria. The adoption of financial innovation is gradually replacing the traditional payment system in Nigeria. The speed at which the digital payment system is replacing the traditional payment methods like notes, coin, cheques, and bank draft suggests the acceptability of this financial innovation by both the financial service providers and the users of financial services.

The introduction of cashless policy by the Central Bank of Nigeria (CBN) in 2012 popularized the digital payment options. The CBN did not only direct all the banks to implement the guideline but also imposed charges on cash withdrawal above a certain threshold. This policy according to Mustapha (2018) will result to improved efficiency of the Nigerian banking sector on one hand, and the overall economy. In compliance with this policy, various digital payment systems were introduced; prominent among them are Automated Teller Machine (ATM), Point of Sales (POS) technology, Mobile money transfer/Mobile Payment (MP), and Web payment (WP) technology. The volume and value of digital payment system in Nigeria have continued to increase significantly from its inception in 2009 to 2018.

This study therefore, seeks to investigate the effect of digital payment systems on the efficiency of the Nigerian banking sector. The novelty provided by this study is that we employed efficiency of banking sector in Nigeria while others studies focused on performance. To achieve the objective of this paper, we arranged the paper into five different sections. Immediately following this introduction section is section 2 which presents the literature reviews, while section 3 is the methodology. Section 4 and 5 consists of discussions of the findings and conclusions respectively.

2. Literature review

2.1 Adoption of Electronic Payment Channels in Nigeria

The electronic payment instruments consist of the ATM, POS, mobile money and internet banking, among others. Payment activities on these channels are sponsored by deposit money banks in Nigeria with support from FinTech companies such as Visa international, Master Card Incorporation, Interswitch company etc. End users use the card to facilitate transactions on ATM and POS terminals. The adoption was quite impressive, as it grew from inception. Kolawole et al (2018) state that cultural uncertainty avoidance are activities that reduce ambiguity and are such perceived to be valuable. Veiga et al (2011) proclaimed that electronic payment platforms provide this kind of service for commercial banking end users through their numerous services. Nigeria's payment channel transaction approaches an all-time record of N86.1 trillion in 2017 as reported by the CBN. This is an approximately 32% rise above the total transaction value in 2016 (N65.1 trillion). The report supported the choice of electronic payment channels, as it pointed out clearly that the major electronic payment channels adopted by end users in 2017 were POS, mobile money, ATM and online banking.

2.1.1 Theory of innovation diffusion

In 1962, Rogers E.M developed the Diffusion of Innovation (DOI) theory. He argued that over time, an innovation or a product gains momentum and spread through a specific population or social system. The outcome of the diffusion process is that as people integrate effectively in a social system, they tend to adopt new idea, behavior and or product. The concept of adoption according to him deals with the willingness of a person to do something different from what ordinary he or she would not have.

However, in a given social system, adoption of new idea, behavior or product (i.e "innovation) don't happen simultaneously, instead it is a process whereby certain people are more apt to adopt the innovation than other. Studies have shown that people who are quick to adopt new innovation have different characteristics than people who adopt an innovation later (Lanzolla and Suarez 2012; Chiesa and Frattini 2011; Whalley and Curwen, 2015). The theory presupposes that when a firm is promoting an innovation to a particular target audience, it is pertinent to understand the specific characteristics of the target population that will make or mar the adoption of a new innovation.

The theory identified five adopter categories, and stressed that while majority of the population tends to fall within the middle category, there is need to understand the characteristics of the target population. The five adopter categories comprises of Innovators; Early Adopters, Early Majority, Late Majority and Laggards. Innovators are the categories of people who are the first to try any new innovation. They are venturesome and interested in new ideas. This people are ever willing to take risk and are often the first to develop new ideas. Early Adopters comprises of people who represent the opinion leaders. They enjoy leadership roles and are very much comfortable to adopt new ideas since they already know it is coming. These groups of individuals do not necessarily need too much information to convince them to adopt new innovation.

On the other hand the Early Majority is the categories of people who are rarely leaders, but they do adopt new ideas before the average person. They basically need evidence to convince them to adopt innovation. The key strategies that will work for these categories of people include success story of the innovative product, and evidence of the effectiveness of the innovative product. The next categories are Late Majority, these are people who are skeptical of change and will only adopt a new innovation after it has been tried by the majority of the people. The strategies to apple to this population include

information on how many other people have tried the new innovation and have successfully adopted it. The last categories are the Laggards, which comprises of people who are bound by tradition and are very conservative. They are very skeptical to any change and are the most difficult group to get to adopt new innovation.

However, a close look at the trend of growth of financial innovation in Nigeria reveals that the diffusion theory is upheld. The level of acceptance of this innovative product have continued to grow every year suggesting that more of late majority adopters are dragged into the net of digital payment system.

2.1.2 Empirical Review

The emergence of information and communication technology has significantly altered the supply chain of financial services industries globally. In Nigeria, the tradition payment system has consistently decreased given why to the innovative digital payment system which has become one of the most significant payment options in the Nigeria financial service industry. Various researches have empirically investigated the effect of digital payment system on the performance of banking industry in deferent economies of the world. In Nigeria, little is known as to the effect of digital payment system on the efficiency of the banking industry. We report the empirical findings of some researchers who examined the effect of payment systems on the performance of the banking industries across different economies of the world. Harelimana (2018) in a study of the role of electronic payment system on the financial institution in Rwanda found that electronic payment system explains 68.6% of the variations in the performance of Equity Bank in the country. The result further indicates that electronic payment leads to reduction in expenditure of Equity Bank by 21.9% for the period under investigation. Ajayi (2014) investigated the effect of cashless monetary policy on the Nigerian banking industry and report that the policy positively affects the development of the Nigerian banking industries. He noted further that the implementation of the policy will reduce the level of queue in the banking hall, hence improves customer's satisfaction, and reduces the bank overhead cost. The report however indicates that high rate of cybercrime, high level of illiteracy and inadequate technological infrastructure are some of the hindrances to the effective operation and implementation of the policy. According to Malaguti (2015) digital payment system will improve the financial inclusion of an economy depending on the existing institutional framework in the country and its social and economic context.

Ardizzi et al. (2019) examined the effect of innovation on cost efficiency of the banking industry in Italy using parametric and non-parametric estimation techniques. Their result provided empirical evidence that failed to support innovation-led bank efficiency. Employing a dataset for the period of 2006-2010, they could not find clear cost efficiency enhancing due to diffusion of ATM. Similarly, diffusion of electronic payment we reported to exert significant effect on cost inefficiency reduction. Haynes and Thompson (2000) in a panel study of the UK building society find a positive effect of ATM adoption on the productivity effect using augmented production function. They suggested that ATM adoption has a larger productivity gains over non-adoption.

According to Ou et al (2009) ATM diffusion is associated with lower values of operating cost ratio and asset management ratio which are proxies of cost inefficiency of the Taiwan banking system. Meanwhile the author identified lack of control for bank specific characteristics, the incomplete nature of the sample, as well as the lack of result on actual savings in operating coat due to IT investment as major limitations of their studies. Rabiu et al (2019) investigated the effect of E-banking on the operational efficiency of the Nigerian banking sector focusing on Diamond Bank Nigeria plc. Using a survey approach, the result indicates that E-banking proxied by internet banking and mobile money positively contributes to operating efficiency of Diamond Bank Plc, Bauchi branch. This study however, is localized to not only Diamond Bank plc but to branches of the bank in Bauchi State which is not a significant sample to draw a conclusion on the effect of E-banking on the Nigerian banking industry. In another related study, Mustapha (2018) traced the effect of E-payment technology on the performance of the Nigerian banking sector proxing bank performance with sortino index and concluded that ATM diffusion significantly hurts banks performance in Nigeria. This result suggests that the cost of building ATM location and the acquisition cost of the machines contributes significantly in reducing the level of performance of the Nigerian banking sector. The author equally reported a positive and significant effect of POS, Mobile money and web payment on the performance of the Nigerian Banking sector.

Kashif et al (2016) examined the effect of cashless banking on the performance of the banking sectors in Pakistan and report that ATM has a negative and significant effect on banking sector proxied by Return on Equity. Their reported also indicate that POS and mobile money has a positive and significant effect on the profitability of banking sectors proxied by ROE. According to Ene and Itah (2014) mobile banking operation in Nigeria contributes negatively to the performance of the Nigerian banking sector proxied by annual profit. This result according to them is attributable to the increasing number of

unsuccessful transaction which hampers the effective use of the payment option by many bank customers. The result relied on accounting profit as a measure of performance which many authors have argued that it is not the most effective measure of firm performance. Osazevbaru and Yomere (2015), found a positive and significant effect between mobile money transfers and bank profit as well as the development of the banking sector.

Meanwhile, online payment (Web Payment) has been considered in relation to banking sector performance and mixed result was reported. One strand of literature reports a positive relationship between web payment and bank performance (Osazevbaru et al 2014; Uchechukwu et al. 2017; and Ajayi (2014), while the other group report a negative relationship between web payment and bank performance (Ene and Itah 2014 and Armey et al. 2014). In other related studies, Akara and Asekome (2018) examined the effect of cashless policy and commercial banks' profitability in Nigeria and found that POS has a positive effect on the performance of the Nigerian banking sector. Corroborating the result, Yomere and Osazevbaru (2015) also reported that POS has a positive impact on the performance of the Nigerian banking sector.

The result of Uchechukwu et al (2017) equally suggested that the cost of building ATM negatively affect the performance of the Nigerian banking sector. Taiwo and Agwu (2017) opined that the adoption of e-banking in the Nigerian financial system contributes significantly to improved efficiency of banking operations in Nigeria. Hossain et al. (2015) in a study of Bangladesh banking industry noted that the adoption of online banking in the country gave raise to increased customers' diversity, and as well improved the quality of the banks clients. In Jordan, Khrawish and Al-Sa'di (2011) investigated the effect of e-banking on the profitability of the banking sector for the period of 2000-2009 and reports that e-banking is not a significant determinant of bank bank performance.

Adaenewe et al. (2013) opined that e-banking adoption has significantly improved banking sector performance in Nigeria proxied by return on equity. Similarly, e-banking have been shown to have a positive and significant effect on customers' satisfactions (John and Rotimi, 2014; Hoseini and Dangoliani, 2015). Abubakar (2014) also noted that e-banking has a positive and significant effect on total bank deposits in Nigeria.

Meanwhile various researchers have examined the effect of electronic banking on the performance of the banking industry across different continent in the world. Despite the number of research in this study area, very few looked at the effect of digital payment system on the efficiency of the banking sector with respect to overhead cost reduction which is the novelty provided by this study. Similarly, we examine the effect of digital payment system on the performance of the Nigerian banking sector using both return on equity (ROE) and return on assets (ROA).

3. Methodology

This study evaluated the effect of digital payment system on the efficiency of the Nigerian banking sector. To achieve the objectives of this study we employ Ordinary Least Square (OLS) estimation techniques on the dataset generated from Central Bank of Nigeria Bulletin 2018 and global financial development database covering a period of 2009q1 to 2018q4. The dependent variable represents the bank efficiency variable while the independent variable represents all the proxies for digital payment. We employed the most popularly used digital payment systems reported by the CBN among them are: Automated Teller Machine (ATM), Point-of-Sale terminals (POS), mobile money payment (MP) and web payment (WP). Similarly, we employed various bank characteristic variables to proxy for the efficiency of the Nigerian banking sector among which are the bank overhead cost as a percentage of total assets (OC), bank non-interest income as a percentage of total income, bank total cost as a ratio of income (TC), bank return on assets (ROA) and Bank Return on Equity (ROE). The bank efficiency variables were all sourced from the global financial development database.

3.1 Model Specification

We specify a multiple regression model which is estimated using OLS estimation techniques.

$$Y = \propto + \mu_i \aleph + \delta_i \tau + \varepsilon_t \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where Y is the regressand (dependent Variables), $\aleph$ is the vector of all the proxies for digital payment variables, and τ captures the control variables included in the model. $\propto$ is the intercept/constant term and μ_i is the coefficient of the proxies for digital payment while δ_i is the coefficient of the control variables.

To achieve the specific objectives of this study, we explicitly specified the modes as follows taking the natural logarithm the variables to smoothen them:

$$lnOC = \sigma_0 + \sigma_1 lnATM + \sigma_2 lnPOS + \sigma_3 lnMP + \sigma_4 lnWP + \sigma_5 lnCHQ + \sigma_6 lnTA + \varepsilon_t \ldots\ldots (2)$$

From equation 2 we theoretically expect $\sigma_1, \sigma_2, \sigma_3, \sigma_4, \sigma_5 \; and \; \sigma_6 < 0$

$$lnTC = \alpha_0 + \sigma_1 lnATM + \alpha_2 lnPOS + \alpha_3 lnMP + \alpha_4 lnWP + \alpha_5 lnCHQ + \alpha_6 lnTA + \varepsilon_t \ldots . (3)$$

Similarly, from equation 3 we expect $\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5 \; and \; \alpha_6 < 0$

$$lnROA = \delta_0 + \delta_1 lnATM + \delta_2 lnPOS + \delta_3 lnMP + \delta_4 lnWP + \delta_5 lnCHQ + \delta_6 lnTA + \varepsilon_t \ldots . (4)$$

Our theoretical expectation from equation 4 is that $\delta_1, \delta_2, \delta_3, \delta_4, \delta_5 \; and \; \delta_6 > 0$

$$lnROE = \beta_0 + \beta_1 lnATM + \beta_2 lnPOS + \beta_3 lnMP + \beta_4 lnWP + \beta_5 lnCHQ + \beta_6 lnTA + \varepsilon_t \ldots . (5)$$

The *a priori* expectation from equation 5 is that $\beta_1, \beta_2, \beta_3, \beta_4, \beta_5 \; and \; \beta_6 > 0$

$$lnNII = \rho_0 + \rho_1 lnATM + \rho_2 lnPOS + \rho_3 lnMP + \rho_4 lnWP + \rho_5 lnCHQ + \rho_6 lnTA + \varepsilon_t \ldots . (6)$$

Similarly, *a priori* expectation from equation 6 is that $\rho_1, \rho_2, \rho_3, \rho_4, \rho_5 \; and \; \rho_6 > 0$

Where OC is the Overhead cost; TC is the total cost; ROA is the return on Assets; ROE is the return on equity; NII is the non-interest income; ATM is the Value of ATM transactions; POS is the Value of POS transactions; MP is the Value of Mobile Payment transactions; WP is the Value of Web/online payment transactions; CHQ is the value of cheque transactions and TA is the total Assets of the bank. Note that cheque and total assets were included in the model as control variables.

3.2 Techniques of Data Analysis

We began the analysis by first testing for the properties of time series using Augmented Dickey Fuller (ADF) and Philip Peron (PP) test for stationarity. This is necessary in other to isolate the order of integration in all the variables under consideration. Having satisfied the stationarity conditions, we tested for the existence of co-integration in the model using Engle and Granger test for co-integration which is considered most appropriate since we do not have a system equation which is the strength of the Johansen and Jusinus test for co-integration. The existence of a long run relationship among the variables under consideration necessitates the inclusion of the error correction mechanism in the model to adjust for the deviation in the long run equilibrium. To validate the predictive power of the model, we tested for the serial autocorrelation, Heteroscedastisity and the normality of the model.

4. Result of Data Analysis

Test for Stationarity

The result of the stationarity test presented in table 4.1 indicates that all the variables are integrated of order one I(1). This however suggests that there is no unit root in the variable under consideration.

Table 4.1 Unit Root test

	ADF		PP		STATIONARITY
	T-Stat	Prob.	T-Stat	Prob.	
ATM	-3.96769	0.0194	-3.62129	0.0423	I(1)
POS	-3.65338	0.0395	20.57595	0.0000	I(1)
MP	-4.55448	0.0009	5.131688	0.0000	I(1)
WP	-9.64351	0.0000	5.037768	0.0000	I(1)
CHQ	-6.3128	0.0000	-7.55188	0.0000	I(1)
TA	-3.6329	0.03761	-5.88911	0.0001	I(1)
OC	-3.91154	0.0221	-3.9381	0.0204	I(1)
NII	-3.54428	0.0452	-4.23497	0.021	I(1)
ROE	-4.00915	0.0207	-5.05094	0.0013	I(1)
ROA	-3.33389	0.0228	-5.56719	0.0003	I(1)
TC	-2.64167	0.0416	-2.02505	0.0425	I(1)

Source: Authors computation from eviews

The result of Augmented Dickey Fuller test for stationarity produced a consistent result with that of Philip-Peron indicating that all the variables are I (1), which implies that both the mean, the variance and the covariance of the variables are constant over time. In other words, the series is said to be time invariant.

Result of Co-integration test

The result of the Engle and Granger test for co-integration as presented in table 4.2 indicates that the variables in each of the five single equations employed in this study exhibits a long run relationship. The Engle and Granger test for co-integration is a single equation test for long run relationship that makes use of the residual of the estimated regression to determine the existence of a long run relationship among series in a single equation. Unlike the Johansen test for co-integration that implements a system equation in testing for co-integration, Engle and Granger is applicable in a single equation.

Table 4.2 Engle and Granger test for Co-integration

	No Intercept and Trend		Intercept and Trend		Intercept only	
	T-STAT	**PROB**	**T-STAT**	**PROB**	**T-STAT**	**PROB**
ECM_OC	-4.6526	0.0000	-4.61428	0.0040	-4.6127	0.0007
ECM_TC	-3.89703	0.0562	-3.29996	0.0850	-3.368641	0.0201
ECM_ROA	-4.11686	0.0002	-3.92772	0.0266	-4.025835	0.0052
ECM_ROE	-4.15546	0.0002	-3.96199	0.0248	-4.063372	0.0047
ECM-NII	-3.17233	0.0028	-3.70222	0.0428	-3.703556	0.0112

Source: Authors computation from Eviews

Result of the Long run regression analysis

The result of the long run analysis presented in table 4.3 indicates that all the proxies of digital payment system (ATM, POS, MP, and WP) has a negative and significant effect on the overhead cost (OC) of the Nigerian baking sector. This however suggests that digital payment system reduces the overhead cost incurred by Nigerian banks. Meanwhile, digital payment system provides opportunity for banks to transfer huge sum of money electronically enabling them to avoid all the cost associated with moving physical cash from one location to another. It all leads to reduction in the number of bank staffs as most customers tend to perform most of their banking transactions without interfacing with a bank staff hence, reducing the banks personnel cost.

Table 4.3 Long Run result

variables	**OC**	**TC**	**ROA**	**ROE**	**NII**
ATM	-0.000425**	0.113414***	4.6964***	4.836748***	1.21496**
	[0.018769]	[0.018769]	[1.140503]	[1.242245]	[0.434299]
POS	-0.00470***	0.084713*	0.8047***	0.894152***	0.353336***
	[0.001184]	[0.046425]	[0.259287]	[0.282417]	[0.098735]
MP	-0.01713***	-0.041128*	2.69513***	2.863105***	0.154659
	[0.002176]	[0.023994]	[0.509005]	[0.554412]	[0.193827]
WP	-0.03823***	-0.123381***	0.33828*	0.385475*	0.060886
	[0.004364]	[0.026944]	[0.174875]	[0.190475]	[0.066592]
CHQ	2.94**	0.007076	0.82794***	0.910438***	-0.2192***
	[1.43]	[0.024902]	[0.1620]	[0.176497]	[0.061705]
TA	0.236	0.149652	0.290068	0.337994	0.10882
	[0.552]	[0.103151]	[0.226766]	[0.246996]	[0.086352]
R2	0.98	0.93	0.98	0.98	0.95
Adj.R2	0.97	0.92	0.97	0.97	0.94
F-Stat	176.1	77	125.84	119.86	252.91
Pro(F-Stat)	0.00	0.00	0.00	0.00	0.00

Source: Authors computation from Eviews

This result however is consistent with the findings of John and Rotimi, (2014); Hoseini and Dangoliani, (2015) and Abubakar (2014). The result also indicates that the traditional payment system (Cheque) which was included in the model as a control variable increases the overhead cost of banks in Nigeria significantly. In other words, the increasing cost of printing cheques which is always high than the intrinsic value of the paper as well as the rigorous clearing processes associated with cheque usage increases the overhead cost of banks in Nigeria. Similarly, total access was also controlled for and the result indicates that accumulation of tangible assets increases the overhead cost of banks in Nigeria.

Our result also showed digital payment system had varied effect on bank total cost which is one of the proxies of banking sector efficiency. For instance, we found that ATM increases the total cost of Nigerian Banks for the period under investigation. This however, points to the increasing cost associated with installation of an ATM in a particular physical location. This result corroborates the result of Ene and Itah (2014) and Armey et al. (2014) who also reported that digital payment systems negatively affect bank performance. However, the result of the long run regression analysis indicates that web payment and mobile money are significant determinants in improving the efficiency of the banks sector proxied by total cost. Similar to ATM, we also find POS to increase the overall cost of the Nigerian banking sector. This according to Ou et al (2009) is attributed to the increasing cost of providing POS and ATM to users. On like mobile payment in which the customer bears the cost of the phone with which to perform the transactions, POS and ATM are born by the financial institutions that have to make it available to their customers for effective dissemination of financial services. We also find that traditional payment system and total assets which were included in the model as control variables contributed positively to banks total cost.

In line with many other studies we included performance variables (ROE, ROA and NII) as proxies for banking sector efficiency in Nigeria. The result form our long run regression indicates that all the variables used as proxies for digital payment has a positive effect on ROE and ROA. This suggests that as the value of transactions increases all things being equal, the return to equity holders as well as return on assets employed by the bank will also increase significantly. Our findings are consistent with the result of Haynes and Thompson (2000), Harelimana (2018), Malaguti (2015) Ardizzi et al. (2019) who in studies from various economies of the world reported a positive relationship between digital payment system and banking sector performance in Nigeria. The result differs slightly for noninterest income (NII), though all the proxies for digital payment are positively associated with NII only ATM and POS are statistically significant. The result of the long run regression also showed that traditional payment method (cheque) which was a negative effect on NII for the period under study, while total assets is a positive but not significant.

Meanwhile, R^2 and Adjusted R^2 indicate that not less than 90% of the variations in the dependent variable are explained by the independent variables included in the models. This however suggests that the line of best fit is properly fitted. The F-stat and the probability of F-stat reveals that the independent variables included in the model when taken together significantly affect the proxies of banking sector efficiency.

The Result of the Short Run Regression Analysis

The short run regression result presented in table 4.4 reveals similar result with the long run result. All the proxies of digital infrastructure have negative and significant effect on bank overhead cost which is a proxy for banking sector efficiency. We also found that in the short run traditional payment system and total assets reduces overhead cost though not significantly. The negative coefficient of ECM indicates that the speed of adjustment from the short run disequilibrium to long run equilibrium is very high and significant, suggesting that deviations from the short run equilibrium will be corrected in the long run. The result of the ECM model is consistent in all the models estimated in this model.

Table 4.4 Short Run Regression Result

Variables	ΔOC	ΔTC	ΔROA	ΔROE	ΔNII
ΔATM	-0.000983***	-0.082003***	4.292203***	4.490860***	0.768310***
	[0.000178]	[0.018483]	[0.652588]	[0.710719]	[0.182118]
ΔPOS	-0.002104**	0.069698**	0.269736	0.293866	-0.115387*
	[0.000970]	[0.031903]	[0.187810]	[0.205225]	[0.055222]
ΔMP	-0.008914***	-	1.657809***	1.754076***	0.289979***

		0.039997***			
	[0.001705]	[0.014009]	[0.244344]	[0.266754]	[0.078617]
ΔWP	-0.026262***	0.089660***	0.612466***	0.675909***	-0.008996
	[0.002785]	[0.016230]	[0.105621]	[0.115248]	[0.032012]
ΔCHQ	-2.66000	0.002758	0.268291*	0.308403*	-0.039958
	[6.9043]	[0.009797]	[0.132070]	[0.144255]	[0.034434]
ΔTA	-2.5236	-0.020919	0.123553	0.158693	-0.078520**
	[1.8652]	[0.039835]	[0.099816]	[0.109798]	[0.026684]
ECM(-1)	-0.208467**	0.90814***	-0.503895**	-0.509529**	-0.355040**
	[0.08778]	[0.16366]	[0.180330]	[0.180587]	[0.153454]

Source: Authors computation from Eviews

We found from the short run result that digital payment positively impacts banking sector performance variables (ROA, ROE and NII) though some are statistically not significant. Contrary to other proxies of digital payment, only POS and WP negatively affect noninterest income of the Nigerian banks in the short run.

Result of Post Diagnostic test

Table 4.5 Post Diagnostic test

	Breusch-Godfrey Serial Correlation LM Test:		**Breusch-Pagan-Godfrey test for Heteroskedasticity**		**Normality Test**	
	Obs*R-squa	Prob. Chi-Squa	Obs*R-squa	Prob. Chi-Squar	Jarque-Be	Prob. Chi-Squar
MODEL_OC	1.97503	0.3214	7.387484	0.249	1.4614	0.481549
MODEL_TC	4.055004	0.6692	8.99134	0.1078	0.951612	0.621384
MODEL_ROA	4.56113	0.103	7.293264	0.5053	0.160628	0.922826
MODEL_ROE	4.580365	0.1012	7.255877	0.5093	0.150567	0.927481
MODEL_NII	5.992088	0.295	11.99668	0.1514	1.152807	0.561916

Source: Authors computation from Eviews

The test for normality using Jarque-Bera test statistics indicates that the variables are normally distributed with a probability values greater than 0.05. The result of the Breusch-Pagan-Godfry heteroskedaticity test with a probability values greater than 0.05, indicates the acceptance of null hypothesis which states that the variables in the model are homoscedastic. Breusch-Godfray serial correlation using LM test indicates that there is no serial correlation in the model. In other words, the models are free from autocorrelation.

5. Conclusion

In this study we investigated the effect of digital payment system on the efficiency of the Nigerian banking sector. We found that digital payment system is a significant determinant of banking sector efficiency in Nigeria. Digital payment system improves the banks return on equity and return on assets as indicated in the positive coefficient of the proxies for digital payment systems. The increasing commission that banks earn from digital payment transactions has also contributed to increase in the noninterest income for the banking sector. The efficiency of the banking sector is enhanced when it delivers the same financial services to the satisfaction of their customers at a reduced overhead cost. Our result therefore indicates that digital payment system significantly decreases banks overhead cost. We therefore recommend that more financial innovation that will enhance the use of this digital payment option should be introduced. Banks should also develop more financial products which is accessible through digital payment platforms so as to improve their efficiency and performance.

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