Innovations

Innovations in the payment system and financial inclusion in Nigeria

Eze, Charles Uzodinma*, Nnado, Celestine Ifeanyi, Eneh, Edith Nkiruka*** & Ebe, Emmanuel Ifeanyi******

*West African Examination Council (WAEC), Abakaliki, Nigeria
**Department of Accountancy, Enugu State University of Science and Technology Agbani, Nigeria
*** German Leprosy & TB Relief Association [DAHW/REDAID], Nigeria
****Department of Accounting, Michael Okpara University of Agriculture, Umudike, Nigeria
Corresponding Author: **Eze Charles Uzodinma**

Abstract

The controversies generated by the adoption of the cashless policy in Nigeria triggered the examination of the effect of innovations in the payment system on financial inclusion. The specific objectives of the study were to ascertain the effect of automated payment channel acceptance [apcac], fraud risk exposure of automated payment channels [freac], and fraud loss exposure of automated payment channels [fleac] on financial inclusion. The corruption perspective index was introduced as a control variable. Stepwise ordinary least square regression analysis was conducted using Stata 14.2. The dataset used span from 2009 to 2019, 11 years. The result revealed that automated payment channels acceptance has a significant positive effect on financial inclusion. Fraud risk and fraud loss exposures of the automated payment channels have a negative non-significant effect on financial inclusion. Based on these findings, the study recommends full implementation of a cashless policy because it is desirable.

Key Words: *1.Cashless Policy, 2.Automated Payment Channels, 3.Fraud Risk Exposure, 4.Fraud Loss Exposure and Financial Inclusion*

1.1 Background of the Study

One major objective of the introduction of the cashless policy in Nigeria was to drive financial inclusion by providing more efficient payment options and wider coverage (Enhancing Financial Innovation & Access [EFInA], 2013). Financial inclusion is a situation where the adult population has easy access and usage of a broad spectrum of formal financial services that meet their needs including but not limited to payments, savings, credit, and insurance and pension products at an affordable cost (Central Bank of Nigeria [CBN], 2012 cited in EFInA, 2013). It means that affordable and useful financial products and services that meet the needs of businesses and individuals are readily accessible and utilized. EFInA noted the World Bank's assertion that financial inclusion is critical to reducing poverty and boosting prosperity. It has been widely recognised across the globe among policymakers, researchers, and development-oriented agencies as a tool for economic development, particularly in the areas of poverty reduction, employment generation, wealth creation, and improving welfare and the general standard of living (Ehiriudu *et al.*, 2016; Abel *et al.*, 2018).

The CBN vision 2020 was targeted at reducing financial exclusion to 20% (Emefiele, 2019). The strategy introduced a range of coordinated interventions, such as Know Your Customer (KYC), agent banking and mobile money. Professionals had argued that one of the prerequisites for the development of a sustainable national economy is to encourage a payment system that is secure, convenient, and affordable through electronic channels. The Nigeria-South Africa Chamber of Commerce (NSACC, 2017) averred that a well-implemented e-payment system will foster the CBN efforts to deepen and modernize the payment system and break the conventional barriers hindering

financial inclusion for millions of Nigerians. Emefiele (2019) posited that a payment system that encourages the use of non-cash channels was desirable if the nation wishes to compete with the economy of developed countries. Supporting this argument, Christine Lagarde, managing director of the International Monetary Fund (IMF), says Nigeria could save as much as $9 billion (N3.24 trillion) by shifting government payments from cash to digital systems.

For this reason, the payment system has continued to evolve, keying into the rapidly changing information and communication technology (ICT) to meet the business and transactional needs of the stakeholders. Diverse contactless electronic, mobile and other digital payment channels have manifested and have reduced payment to merely the transfer of information from one party to another (Ochanya, 2016). Omotunde *et al.* (2013), and Princewell and Anuforo (2013) averred that implementing the cashless policy will assist in curbing the menace of corruption ravaging all sectors of the Nigeria economy. Studies such as Onuorah (2009), Omotunda *et al.,* (2013), Ajayi (2013), and Nwankwo *et al*., (2015) also posited that a cashless policy was expected to fuel financial inclusion partly because it will drive an efficient payment system and encourage broad acceptance of formal financial service platform. Meanwhile, a comparative examination of the studies conducted by EFiNA in 2008 and 2016 suggested that the strategies adopted in pursuit of financial inclusion in Nigeria as a vehicle for development yielded significantly positive results. According to the reports, the percentage of adults in Nigeria excluded from financial services dropped from 53.0% in 2008 to 41.6% in 2016 showing improved inclusiveness by 11.4% within the period.

But there are also issues of fraud risk and loss exposures associated with it. Data obtained from reports of the Financial Institution Training Centre (FITC) show that the number of fraud-reported cases in the automated channels has increased from 1,442 in 2009 to 45,107 in 2019 while the potential financial loss exposure decreased from 15.61 billion in 2009 to 5.16 billion in 2019. These conditions certainly discourage many citizens from buying into the advances of the policy, increases the resistance and further financial exclusion. Therefore, the relationship between payment system development and financial inclusion is still a subject of debate in Nigeria.

1.1 Statement of the Problem

The adoption of a cashless policy in Nigeria is a huge controversy in the last decade. The CBN had set a vision 2020 target to reduce financial exclusion in Nigeria to about 20%. With that mantra, the cashless policy was the vehicle envisaged to drive the objective. However, each time the CBN issued a directive to payment services providers; there will be lots of controversies from different spheres seeking the suspension of the directives. In the year 2012, there was resistance based on concerns related to infrastructural deficiency, poor regulatory framework and poor collaboration between regulators and players, information security challenges, illiteracy, lack of cybercriminal laws, and lack of customer education and awareness.

Between the years 2015 to 2019, stakeholders have continued to express conflicting views over the practicability and implications of the cashless policy, given the country's level of economic development. Prominent among the critics was the motion moved by the Chairman of the House Committee on Media and Public Affairs, Hon. Benjamin Kalu, which was unanimously adopted by the federal parliament in their plenary on Thursday, September 19, 2019, resulted in a resolution to urge the apex bank to immediately suspend the policy for lack of due consultation of banking stakeholders. For the general public, there has been this belief that Nigeria is yet to be ready for an absolute "cashless economy" for a lack of sufficient and well-functioning infrastructures, especially in rural areas, erratic internet service, and general illiteracy among the populace as well as the rising fraud risk exposure and financial losses.

Consequently, cash remained the traditional and most prevalent mode of payment especially in the informal sector and rural communities in Nigeria to date. This is correct given the size of retail and commercial activities transacted

primarily in cash. But, the CBN has insisted that Nigeria has recorded significant successes in providing alternative payment channels and payment system infrastructures between 2014 and to date. Hence, the recent directive in her letter to the Deposit Money Banks [DMBs] and Other Financial Institutions (Payment Services Banks [PSBs], Primary Mortgage Banks [PMBs] and Microfinance Banks [MFBs]) referenced BSD/DIR/PUB/LAB/015/069 and dated 6th December 2022.

By this letter, with effect from the 9th of January, 2023, over-the-counter (OTC) withdrawal limits for individuals and corporate entities have been pegged at one hundred thousand naira (₦100,000.00) and five hundred thousand naira (₦500,000.00) respectively per week; the limit of ATM withdrawal is pegged at Twenty thousand naira (₦20,000.00) per day and One hundred thousand naira (₦100,000.00) per week; ATMs will only dispense two hundred naira (₦200.00) and one hundred (₦100.00) naira notes; POS operators can only payout twenty thousand (₦20,000.00) per day; third party cheques shall not exceed fifty thousand naira (₦50,000.00) for OTC payments; withdrawal above the set limits would attract 5% charges and for bank customers with a legitimate need to withdraw up to five million naira (₦5,000, 000.00) and ten million naira (₦10,000,000.00) for individuals and corporate can do so only through the Banks' CEOs/MDs with the approval of the CBN, subject to 5% and 10% penalty charges respectively. All these measures are calculated attempts to diminish the prevailing cash-dominated mode of payment and control the humongous corrupt practices linked to it.

As usual, the debate has started. Some members of the senate have started seeking the suspension of the policy on account of the same issues cited over a decade ago such as payment systems infrastructural deficit, the unpreparedness of the citizens particularly the small and medium businesses, and lack of education and awareness of the users. In their view, most Nigerian businesses will collapse if the CBN sustains the action. Yet again, the CBN has succumbed to the pressure, increasing the weekly withdrawal limit to five hundred thousand (500,000.00) and five million (5,000,000.00) for individual and corporate bodies respectively in a circular number BSD/DIR/PUB/LAB/015/073 and dated December 21, 2022. However, in all these controversies, the most salient point has been neglected which is the effect of the adoption of automated payment channels on financial inclusion even with the resistance due to fraud risk and financial loss exposures. For this reason, it is imperative to empirically examine the effect of innovations in the payment system on financial inclusion in Nigeria.

1.3 Objectives of the Study

The main objective of this study is to examine the effect of innovations in the payment system on financial inclusion in Nigeria. However, the specific objectives are to:

i. Examine the effect of automated payment channel acceptance on financial inclusion in Nigeria.
ii. Ascertain the effect of the fraud risk exposure in the automated payment channels on financial inclusion in Nigeria.
iii. Assess the effect of the fraud loss exposure in the automated payment channels on financial inclusion in Nigeria.

2. Conceptual Literature Review

2.1.1 Automated Payment Channels Acceptance in Nigeria

The Committee on Payment and Settlement of the Bank for International Settlement (BIS) (2003) noted that the payment system encompasses a set of instruments, banking procedures and typically, interbank transfer systems that ensure the circulation of money". In recent times, the payment system has significantly shifted from cash to electronic means in most economies. Standardization has also encouraged the diffusion of some of these systems and networks across nations; therefore the payment system is evolving globally (Mark-Fajfar *et al.*, 2014). The evolution in the payment ecosystem in Nigeria is as rapid as the advances in information and communication technology (ICT) which also drives transformation in business procedures. Presently, several non-cash and non-

paper-based payment channels have evolved; according to the CBN statistics on the payment system, the payment channels include cheques, ATM, POS, Webpay, Mobil pay, NIP, NEFT, Mcash, E-Billspay, Remita, NAPs, and Central pay.

2.1.2 Fraud Risk Exposure

Fraud risk is the possibility of unforeseeable fraudulent threats by an individual or group which might result in unexpected loss of money, material or reputation. Fraud risk exposure is the degree of vulnerabilities of a system or an organization to be exposed to fraud risk. The vulnerabilities can be exploited by individuals or groups that have sufficient knowledge of the system, policies and procedures or have a varying degree of access to information systems [malicious insider threats] (Eze & Ikpor, 2017) or knowledgeable outsiders using sophisticated ICT-based techniques Fake Copy-Cat Web Sites, Phishing, Credit Card Fraud, Hacking software among others to harvest, elicit and gain unauthorized access and use of sensitive customers information and the system (Saulawa & Abubakar, 2014; Kanu & Nwadiubu, 2020 in Eze *et al*, 2022).

2.1.3 Fraud Loss Exposure

Fraud loss exposure is the actual losses with individuals, groups or organizations are exposed to by using an information system. The loss can be in the form of financial losses, due to theft, embezzlement, or other types of financial crime; reputational damage as a result of interruption, unauthorized disclosure and customer-sensitive data loss; or material losses which include the cost of management of fraudulent activities and remediation. However, the losses incurred from reputational damage and material costs are not always in the public domain but FITC reports on financial loss show that the fraud loss in all the automated channels amount to 4.68 billion and 1.55 billion in 2009 and 2019 respectively.

2.1.4 Corruption

Cash mode of payment is susceptible to fraud and corruption. A cashless policy has been noted to contribute significantly to the fight against corruption. This is because an automated system keeps an audit trail which increases the ease of tracing financial misconduct and fraudulent activities. Therefore, various automated in the payment system are expected to improve corruption perceptive index and foster financial inclusion.

2.1.5 Financial Inclusion

The World Bank 2014 Global Financial Development Reports defined financial inclusion as the percentage of the population who access and use financial services (Naccur *et al.*, 2015). It include ease of opening bank and mobile wallet accounts; saving money and earning interest; transferring money affordably and conveniently; moderated cost of bill payment and daily purchases; accessing loans at affordable interest rates; investment in securities, and saving on pension funds among others. Using this approach, the World Bank noted borrowers from commercial banks (per 1,000) adults; commercial banks branches (per 100,000) adults; bank nonperforming loan to total gross loans (%); bank capital to assets ratio (%); Automated teller machine (ATMs per 100,000 adults); account ownership at a financial institution or with a Mobil money service provider (% of the population from age 15years and above); domestic credit provided by financial sector (% of GDP); and account ownership at a financial institution or with a mobile service provider (% of population ages) among others.

2.2 Theoretical framework

The study is anchored on theoretically *the* ***Theory of Constraints (TOC).*** This theory posited that resistance is an essential and key element in any change process. TOC was propounded by Eliyahu M. Goldratt in 1990. Other

contributors to the theory include Dettmer, 1997; Kendall, 1998; Scheinkopf, 1999; Mabin, Forgeson and Green (2001); Gupta and Boyd 2008; and Simit, Gunay and Vayvay (2014). TOC categorized the causes of resistance to any change process into three namely: individual factors, group factors, and organizational factors (Mabin, Forgeson, and Green, 2001). TOC suggested that identification of these resistance factors in their various forms and carefully articulating them in the change strategies and action plans are key to the wholesome and successful integration of all stakeholders into the change.

However, other relevant theories include ***Technology Acceptance Theory (TAM) and Innovation Diffusion Theory (IDT)*** TAM was propounded by Fred Davis in 1985 to explain how/when users of information systems accept and use innovations in the system that will encourage economic growth. The TAM model suggested that users' behaviour and attitude, perceived usefulness (PU), and perceived ease-of-use (PEOU) are the most influential factors that affect innovations in an information system.

Innovation Diffusion Theory (IDT) was championed by Rogers (1962), innovations diffuse across boundaries and cultures with time. IDT assumed that factors influencing the diffusion of innovations across channels over time and among members of a social system include: innovation characteristics, individual user characteristics, adopter distribution over time, diffusion networks, innovativeness and adopter categories, and the individual adoption process. According to Rogers, innovation in its introductory stage is surrounded by uncertainties amongst adopters, thus the characteristic of the innovation itself and the diffusion network remain critical for the successful mobility of innovation across borders.

2.3 Empirical Review

A good number of scholars have examined issues related to changes in the payment system in Nigeria. For instance, Onuorah (2009) employed *ex-post facto* design to evaluate the impact of the automated clearing system on the performance of the Nigerian banking sector from 1997 to 2006 on a pre and post-basis. T-test statistics were used to test the hypotheses. The result revealed that the automated clearing system has a significant positive impact on the general payment system and recommends improving the efficiency of the automated clearing system. The study conducted by Omotunde *et al.* (2013) adopted an accidental sampling technique on 500 respondents and descriptive statistics to examine the impact of a cashless economy in Nigeria. Results revealed that the adoption of a cashless policy has significantly reduced the risk inherent with a cash-based payment system, robbery, and corruption, and has impacted positively on direct foreign investments and suggests the full adoption. Ajayi, (2014) used a structured questionnaire on 350 respondents from banks in Nigeria to examine the effect of the cashless policy on the Nigerian banking sector. Results revealed that a cashless policy brings efficiency to banking operations but noted poor infrastructure, security challenges, illiteracy, and others as major challenges confronting its implementation. Investigating the implementation of electronic payment systems in the insurance companies in Nigeria, Nwankwo *et al.*, (2015) found that electronic payment systems have significantly improved the service delivery of insurance companies in Nigeria. They also noted investment in electronic payment technologies; customers' and users' education and awareness as crucial to the implementation of a cashless policy.

Adeoti (2013) employed a random sampling survey approach to investigate the challenges to the effective point of sales (POS) terminal operation in Nigeria. The study sampled 500 POS operators in Lagos state and fathoms that epileptic power and network, insufficient number of POS terminals, a limited number of licensed POS merchants, and security of data across the communication channel pose significant threats and recommended drastic efforts to reduce excess cash flow in Nigeria. Bayero (2015) used multiple linear regression to examine the effects of the cashless policy on financial inclusion in Nigeria and found that users' perception, awareness, and infrastructure were strongly related to financial inclusion but the business model of financial service providers was not significantly related to financial inclusion. To identify the plausible challenges of implementation of cashless policy in Nigeria, Ehiriudu *et al.*, (2016) descriptively examined the impact of adopting electronic banking in Nigeria using the pilot

states for the introduction of cashless policy in 2012 (Lagos, Abuja, Abia, Anambra, and Port-Harcourt). The study submitted that electronic banking in Nigeria could be more beneficial and cost-saving but was hindered by insufficient and well-functioning infrastructure; illiteracy among the populace, inconsistent monetary and fiscal policy, and poor assessment of the effectiveness and efficiency of e-payment channels as well as security concerns pose serious threats among others.

The study conducted by Princewell and Anuforo (2013) to ascertain the impact of a policy shift to a cashless economy in Nigeria by sampling 650 respondents (Business, University Students, and civil servants) in Enugu and Anambra States revealed diverse opinions. While the majority holds that cashless policy should be encouraged because of its potential in curbing cash-related challenges, corruption, and fraud, others hold an opposing view regarding issues of information security threats, illiteracy, and infrastructural decay in Nigeria. Dzomira (2014) employed the survey design, descriptive statistics and factor analysis to evaluate the forms of cyber fraud risk exposure in the banking industry in Zimbabwe. The study found that a lack of cybercrime laws, knowledge, education, and awareness exposes banks to incessant electronic fraud. Kanu and Nwadiubu (2020) used descriptive design to examine the extent of white-collar crimes in the Nigerian banking sector. The results revealed that weak internal control, poor security governance and morally degraded society are chiefly responsible for fraud losses in Nigerian banks.

3.0 Methodology

3.1 Research Design

This study adopted the *Ex-post facto* design. The design is the most appropriate for establishing an association or behavioural relationship between variables involving past or historical events (Inaya & Isiko, 2016). As such, the nature of the data for this study is secondary data. Data were obtained from the CBN 2021 statistical bulletin on the financial sector, FITC annual reports and the World Bank's official website. Since these data were obtained from verifiable sources, validity and reliability are not in doubt. Due to the availability of data, the study covers from 2008 to 2019.

3.2 Population of the Study

The population is all adult individual, corporate entities and governmental agencies that own account with the Deposit Money Banks [DMBs] and Other Financial Institutions (Payment Services Banks [PSBs], Primary Mortgage Banks [PMBs] and Microfinance Banks [MFBs]). Since the study is using the national data from the CBN statistical bulletin, the sample is the same as the population of the study.

3.3 Model Specification

This study adopted and modified the model proposed in Anfofum and Olure-Bank (2018) as follows:

$$LCORR_t = \beta_0 + \beta_1 LOILR_t + \beta_2 LYR_t + \beta_3 LCPI_t + \beta_4 LOPEN_t + \beta_5 DU_t + \beta_6 LINDUST_t + \beta_7 LGR_t + u_t \quad \textit{Equ. 1}$$

Subsequently, the model was modified as below:

$$fininc_t = \beta_0 + \beta_1 apcac_t + u_t \quad \textit{Equ. 2}$$

$$fininc_t = \beta_0 + \beta_1 apcac_t + \beta_2 freac_t + u_t \quad \textit{Equ. 3}$$

$$fininc_t = \beta_0 + \beta_1 apcac_t + \beta_2 freac_t + \beta_3 fleac_t + u_t \quad \textit{Equ. 4}$$

$$fininc_t = \beta_0 + \beta_1 apcac_t + \beta_2 freac_t + \beta_3 fleac_t + \beta_4 cpi_t + u_t \quad \textit{Equ. 5}$$

Where:

FinInc =Financial inclusion (proxies by Depositors with Commercial Banks (per 1,000 adults)).

apcac = Automated payment channels acceptance (proxies by the total volume of transactions in all the automated channels).

freac = Fraud risk exposure of the automated payment channels (proxies by the total amount involved in fraud in all the automated channels

fleac = Fraud loss exposure of the automated payment channels (proxies by the actual amount of loss incurred in all the automated payment channels

cpi = Corruption perspective index (control variable).

The data were normalized using the ***standardized*** data normalization technique as follows:

$$X_{new} = \frac{X_{old} - Mean}{d}$$

Where: X_{new} is the Normalized Value; X_{old} is the Non-normalized value; ***Mean*** is the arithmetic average value of the series and ***d*** is the standard deviation of the series.

3.4 Method of Data Analysis

The study employed Ordinary Least Square Regression (OLS) techniques to analyze the data. Normality test and other specific multiple regression diagnostics tests such as autocorrelation, multicollinearity and heteroskedasticity were also conducted.

4.0 Results

4.1 Analysis of Data

Table 1: Descriptive Statistics

Variable	Obs	Mean	Median	Std. Dev.	SE	Min	Max
Finicl	11	721.29	653.20	221.95	66.92	464.45	1,127.40
Vap	11	908,365.90	526,310.10	930,247.10	280,480.00	63,963.66	3,002,789.00
Fre	11	9,419,006.00	7,534,382.00	4,482,801.00	1,351,615.00	3,180,921.00	17,500,000.00
Fle	11	2,286,166.00	1,495,383.00	2,048,019.00	617,501.00	218,493.90	7,240,980.00
Cpi	11	2.58	2.60	0.13	0.04	2.40	2.80

Source Stata 14.2 Output

To show better insight into the data, the raw (non-normalized) dataset was used to conduct the descriptive statistics. Table 1 shows the mean and media (strong measures of central tendency), the standard deviation (a measure of the degree of dispersion from the mean), the standard error of the mean [SE] (a measure of the difference between the population mean and the sample mean) and the Min and Max (the minimum and maximum values of the data) for the 11 years observations. Table 1 revealed extreme values in the volume of transactions in automated platforms (the

proxy for automated payment channel acceptance in Nigeria), the total amount involved in fraud (the proxy for fraud risk exposure of automated payment channels) and the total actual amount of fraud (the proxy for the fraud loss exposure of automated payment channels) which truncated the mean as observed in the large difference between mean and median; the large dispersion shown by the standard deviation and wide range revealed by the Min and Max value. Thus, the standard error suggests that the sample means of these variables are not approaching the population means. However, the closeness of the mean values and median values, and the smallness of the SE revealed that the sample means of financial inclusion and corruption perspective index are approaching the population means. Subsequently, the data is normalized using the technique as stated in section 3.3 for further analysis.

Table 2. Diagnostic Tests

	Normality Test			***Multicollinearity Test***		***Others***
Variable	***Skewness/Kurtosis ------joint ------***		***Shapiro-Wilk W test***	***VIF***	***1/VIF***	***Heteroskedasticity:***
	adj chi²(2)	***Prob>chi²***	***Prob>z***			*chi²(1) = 0.38*
finicl	1.29	0.5241	0.2614	2.56	0.389894	*Prob > chi² = 0.5386*
apcac	5.66	0.0591	0.0170	2.47	0.404146	***Ramsey RESET test:***
freac	1.09	0.5796	0.5410	1.50	0.665159	*F(3, 3) = 0.74*
fleac	7.68	0.0215	0.0138	1.46	0.684393	*Prob > F = 0.5953*
Cpi	1.04	0.5945	0.3202	***Mean VIF***	***2.00***	***Durbin-Watson = 2.50***

Source Stata 14.2 Output

Note, all abbreviations retain the same as described before. The Skewness/Kurtosis and Shapiro Wilk 'W' test tests the null hypothesis that the dataset is normally distributed. Given the outcome in Table 2, apart from the *apcac and fleac* (Shapiro-Wilk W [*Prob>z = 0.0170 & 0.0138 < 5%*]) on respective others are normally distributed as their *Prob>z > 5% = 0.2614, 0.5410 and 0.3202 for fininc, freak and 0.3202* respectively. Again, the variance inflation factors for the explanatory variables that test the multicollinearity in the dataset lie between ***1.46 and 2.56*** with the average of ***2.0*** indicating free from multicollinearity problems for values less than 5. Regarding the heteroskedasticity, the null hypothesis proposed a statistical constant variance model (homoscedastic), however, the result shows a ***Prob>chi2 =0.5386 > 0.05***. We, therefore, upheld the null hypothesis. For the Ramsey Reset tests, the null hypothesis states that the model has no omitted variables (underspecified). The result shows the results ***F (3, 3) = 0.74 and P-value (0.5953) significantly > 0.05*** implying no missing variables. Finally, The Durbin-Watson statistics of 2.50 closer to 2 than 4 indicated the absence of severe negative serial autocorrelation in the dataset.

Table 3. Stepwise OLS Regression

finicl	**Coef.**	**t**	**P>|t|**	**F**	**Prob > F**	**R-squared**	**MSE**
Model 1							
apcac	0.98549	9.98	0.000	99.58	0.0000	0.9171	0.30347
_cons	-0.00002	0.00	1.000				
Model 2							
apcac	0.89391	10.66	0.000	86.72	0.0000	0.9559	0.23477
freac	-0.21614	-2.65	0.029				
_cons	-0.00002	-0.00	1.000				

Model 3							
apcac	0.87125	9.74	0.000	56.04	0.0000	0.9600	0.23897
freac	-0.19854	-2.32	0.053				
fleac	-0.07233	-0.85	0.424				
_cons	-0.00002	0.00	1.000				
Model 4							
apcac	0.92731	11.71	0.000	61.99	0.0001	0.9764	0.19844
freac	-0.05357	-0.53	0.613				
fleac	-0.01649	-0.22	0.835				
Cpi	1.51449	2.04	0.088				
_cons	-3.91016	-2.04	0.088				

Source Stata 14.2 Output

Table 3 Stepwise Ordinary Least Square Regression analysis was used to test the above-stated hypothesis. The R-square suggested the percentage of variations in the dependent variables that can be explained by the predictors in each model. Thus, ***91.71% were explained in model 1; 95.59% in model 2; 96% in model 3 and 97.64% in model 4*** with the inclusion of the control variable. It also shows that predictors in all the models have statistically significant strengths in the prediction of the outcome variable with overall ***Prob < F = 0.0000***.

4.2 Tests of Hypotheses

H_0: Automated payment channel acceptance does not have any significant effect on financial inclusion in Nigeria.

H_1: Automated payment channel acceptance has a significant effect on financial inclusion in Nigeria.

As for the beta (β) coefficients, table 3 denotes that a unit change in automated payment channels acceptance increases financial inclusion by 0.98549, 0.89391, 0.87125, and 0.92731 units in the four models respectively. The decision rule follows the assertion in Gujarati and Porter (2009) which suggests accepting the alternate hypothesis (H_1) if the sign of the coefficient is either positive or negative, the modulus of the t-Statistic > 2.0 and the P-value of the t-Statistic < 0.05. Otherwise, accept the null (H_0) and reject (H_1). Since the P-values < 0.05 at 0.000 in the four models and t > |2| at 9.98, 10.68, 9.74 & 11.71 > 2 we reject the null hypothesis and conclude that the volume of transactions in automated payment platform has a significant positive effect on financial inclusion in Nigeria. The findings were in agreement with the findings of Onuorah (2009), Ometunde *et al*., (2013), Ajayi (2014), Nwankwo *et al*., (2015), and Owen and Pereira (2018).

H_0. The fraud risk exposure of the automated payment channels does not have any significant effect on financial inclusion in Nigeria.

H_1: Fraud risk exposure of automated payment channels has a significant effect on financial inclusion in Nigeria.

As regards beta (β) coefficients, table 3 denotes that a unit change in fraud risk exposure of the automated payment channels increases financial inclusion by -.21614, -0.19854 & -0.05357 units in the model 2, 3 and 4 with t > |2| at -2.65, -2.32 and -0.43 and p-values 0.029, 0.053 and 0.613. This implies that the fraud exposure of the automated payment channels has a negative effect on financial inclusion. Despite being negative, it shows a significant effect in "model 2", approaches a significant effect in "model 3" but insignificant effect in model 4 with the inclusion of the control variable (the corruption perspective index) as depicted by the t values and p-values. Findings of this study aligned with the previous empirical research of other scholars such as Adeoti (2013), Bayaro (2015) and Ehiriudu *et al*., (2016).

H_0. Fraud loss exposure of the automated payment channels does not have any significant effect on financial inclusion in Nigeria.

H_1: Fraud loss exposure of the automated payment channels has a significant effect on financial inclusion in Nigeria.

The (β) coefficients for the fraud loss exposure of the automated payment channels as depicted in table 3 denotes that a unit change in this variable increases financial inclusion by -0.07233 and -0.01649 in “models 3 and 4” with t

> |2| at -0.85 and -0.22, and P-value < 0.05 at 0.424 and 0.835 respectively. Given these results, we reject the alternate hypothesis and summarize that the fraud loss exposure of the automated payment channels has a non-significant effect on financial inclusion in Nigeria. The findings were consistent with the findings of previous studies like Princewell and Anuforo (2013), Dzomira (2014) and Kanu and Nwadiubu (2020).

However, the control variable (corruption perspective index) shows a statistically non-significant positive effect on financial inclusion with (β) coefficients 1.51449, t > |2| = 2.04 and P-value < 0.05 = 0.088. The results suggest that the effect of the slight improvement in the corruption perspective index on financial inclusion is approaching 5% significant levels but significant at 10% levels. This is also consistent with the finding of Briggs and Brooks (2011).

5. Conclusion

The following conclusion was reached:

1. The automated payment channel acceptance in Nigeria has a significant positive effect on financial inclusion and can explain at least 91.71% of the variations in the regressand;
2. The fraud risk exposure of the automated payment channels has a non-significant negative effect on financial inclusion in Nigeria and can explain not less than 3.88% variations in the dependent variable;
3. The fraud loss exposure of the automated payment channels has a non-significant negative effect on financial inclusion in Nigeria and can explain not less than 0.04% of the variations in the regressand; and
4. The corruption perception index of Nigeria has a non-significant positive effect on financial inclusion and can explain at least a 1.64% variation in financial inclusion.

These recommendations are made based on the findings of the study:

1. Since the acceptance of automated payment channels in Nigeria shows significant advances in financial inclusion, the CBN should not go back into enforcement because it is desirable.
2. The CBN should continue their engagement with all payment services providers to install sufficient security defense mechanisms and risk assessment procedures and review current operations and processes by constant evaluation of the historical and current data patterns and emerging trends to build users' confidence.
3. The payment system providers should as a matter of urgency increase the users' education and awareness to alleviate the fears of the general public because of the incessant security breaches, fraudulent attacks, and financial losses.

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