E-Commerce and Mobile Banking Fraud: Examining the Nexus on the Performance of Deposit Money Banks in Nigeria

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Abstract
The study examined the effect of e-commerce and mobile banking fraud on the performance of deposit money banks in Nigeria. The data used in the study was obtained from CBN and Nigeria electronic forum statistics. A linear regression was adopted on both functional and statistical models. The study found that E-commerce fraud has a negative and insignificant effect on return on assets of deposits money banks in Nigeria. Mobile fraud has negative and insignificant effect on return on assets of deposit money banks in Nigeria. The study therefore recommended among others that the Government should evolve a good regulatory environment that will enable the banks to be more accountable and fraudulent activities to be easily detected. Enforcing Second Factor Authentication (2FA) on all Financial Channels: The second factor authentication adds additional level of protection to the transaction. It is best practice to implement the 2FA on all financial application and card products. This control is largely to protect theft of the identities of staff of financial institutions and use of the same to post fraudulent transactions. Enterprise Network Security Management: Measures have to be taken at enterprise level to ensure that banks remain secured. Hardening of servers and endpoints, data loss prevention programs, anti-virus protection, proper network segmentation and firewall restrictions will go a long way to keep the fraudsters at bay.
Keywords: Banking, Deposit money, E-commerce, fraud, mobile, Performance

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I. Introduction

The banking sector has evolved from a system of conventional bank auditorium transactions to a digital system which enables customers to perform wide varieties of banking activities without necessarily being present at the banks including the use of Automated teller machines (ATM), Point of Sale (POS) machines, mobile banking and different E-commerce platforms. These systems have improved efficiency in service delivery and indeed made banking activities less cumbersome and easy especially as it helps to decongest banking halls and enable seamless and stress-free operations. This transition stems from the decisions of economies of the world to move towards a cashless economy which has prompted central banks of nations to incorporate and enforce electronic banking into the commercial activities of deposit money banks across the world and Nigeria in particular. Tijani &Ilugbemi (2015) acknowledged that the new system has reduced the prevalence of the use of cheques, bankers' drafts, bills of exchange and open account methods of payment. The flexibility the e-banking systems have afforded its customers accounted for the explosion in payment and collection in the banking system.

However, there are overarching concerns over these contemporary online systems of transaction as fraudsters have increasingly explored them to defraud unsuspecting users of the financial services as offered by the deposit money banks. As at 17 years ago, Rezaee (2004) stated that fraudsters continually devised novel strategic measures of commiting electronic frauds in spite of the efforts to curtail that by many anti-graft agencies. Unfortunately, the situation has worsened as it has really become a shadow pandemic. In Nigeria, the growing concern over the rising trend of electronic fraud (e-fraud) across key sectors of the Nigerian economy is alarming. The incidence of electronic fraud which follows wide acceptance of new methods of mobile money and electronic banking and payment systems has been discovered to cost Nigeria a whopping sum of N197.9 billion annually (Osuagwu&Umeh, 2018). Nigeria Electronic Fraud Forum (NeFF) in its annual report for 2018, reported electronic fraud of N5.571 Billion between 2015 and 2017.Most of these electronic frauds are achieved via hacking of banks customer account and database, and these have become targets both internally and externally, experiencing losses in billions of naira.

Apparently, the frauds adversely affect individuals who receive the financial services from deposit money banks but it seems such banks are not spared in any case. In this regard, Gitau and Samson (2016) has

argued that electronic fraud has caused the liquidity of banks to decrease and their performance to deteriorate. It is therefore arguable that the prevalence of electronic fraud amounted to gross degeneration in the financial performance of the deposit money banks in Nigeria. However, E-fraud and bank performance being a relatively new area, has not witnessed much studies and there is controversy surrounding their findings. The studies of Andulrashed, Babaitu and Yinusa (2012), Kam and Okorafor (2013), Akindele (2011) agreed that there is a positive relationship between electronic fraud and performance of deposit money banks in Nigeria. There is a contradicting view by Inaya and Isito (2016), that there is a negative relationship between electronic fraud and deposit money banks in Nigeria. The study by Nwankwo (2013) on the implication of fraud on commercial banks performance in Nigeria did not focus on electronic fraud, which is a component of total fraud. All the studies with their varying findings did not fully address the implication of financial loss caused by electronic fraud on banks performance in Nigeria. Therefore, this study intends to determine the effect of financial losses caused by electronic fraud on bank performance in Nigeria looking basically at two electronic service channels: E-commerce and Mobile banking on return on assets (ROA) of Deposit Money Banks in Nigeria.

Objectives of the Study
The study has two key objectives which are;
1.   To determine the extent to which E-commerce fraud affects return on assets of Deposit Money Banks in Nigeria.
2.   To examine the effect of Mobile banking fraud on the return on assets of Deposit Money Banks in Nigeria.

Hypotheses
Ho_1:   E-commerce fraud does not significantly affect the return on assets of Deposit Money Banks in Nigeria.
Ho_2:   Mobile banking fraud does not significantly influence the return on assets of Deposit Money Banks in Nigeria.

Scope of the Study
        With regards to the inconsistency in empirical findings coupled with the indicators used to reflect banks performance in prior research, this study examines the effect of electronic related fraud on financial performance of deposit money banks in Nigeria from 2008 to 2018. The period of 11 years was chosen because electronic fraud started gaining attention in 2008 with increased adoption of electronic banking by DMBs. The study using secondary data considered the availability of data on E-commerce fraud and mobile banking fraud. The performance proxy considered in this study is Return on Assets (ROA). ROA explicitly takes into account the assets used to support business activities. It determines whether the company is able to generate an adequate return on these assets rather than simply showing robust return on sales. Asset-heavy companies need a higher level of net income to support the business.

II.   Review Of Related Literature
Electronic Banking
        Electronic banking is the use of electronic and telecommunication networks to deliver a wide range of value-added products and services to bank customers (Steven, 2002). The electronic payment system otherwise called E-Payment employs cash substitutes such as debit cards, credit cards, electronic funds transfer, direct debits/credits, internet banking and e-payments systems to perfect transactions. Electronic banking, also known as electronic funds transfer (EFT), is simply the use of electronic means to transfer funds directly from one account to another, rather than by cheque or cash. It can therefore be defined as the process by which a bank customer initiates banking transactions via electronic device without visiting the brick-and-mortar institution. Electronic Banking (Also known as "Electronic Fund Transfer") is defined by Section 58 of Cybercrime (Prohibition, Prevention etc.) Act 2015 to mean "any transfer of funds which is initiated by a person by way of instruction, authorization or order to a bank to debit or credit an account maintained with that bank through electronic means and includes point of sales transfer, automated teller machine transactions, direct deposits or withdrawal of funds, transfer initiated by telephone, internet and card payment."
        At global level ICT advancement has immensely contributed to economic development including finance and banking. The internet is one of the fastest- growing areas of technical infrastructure development. Today information and communication technologies (ICTs) are omnipresent and the trend towards digitalization is growing (Gercke, 2012). Due to the pivotal roles of banks in the growth and economic development of any nation, it has become very necessary to protect these institutions from the antics of fraudsters (Ikechi& Okay, 2013). However, it is the same ICT systems used by the banks which are negatively utilized by perpetrators of fraud. The increased use of ICT such as computers, mobile phones, internet and other associated technologies are the routes which gave rise to a lot of constructive work as well as destructive work. The destructive activities are considered

as "electronic crime" which includes POS fraud, credit card fraud, ATM fraud, BVN fraud, online banking fraud, identity theft, denial of service and other host contributing crime (Siddique & Rehman, 2011; Bamrara, Singh & Bhatt, 2013). While straight-through-transaction processing has afforded new levels of efficiency for fraud, as transactions are faster, do not require any human intervention, and are often "anonymous" (Oracle, 2012). Due to the pivotal roles of banks in the growth and economic development of any nation, it has become very necessary to protect these institutions from the antics of fraudsters (Ikechi& Okey, 2013). According to the world Economic Forum's Global Risk (2014), cyberspace has proved resilient to attacks, but the underlying dynamic of the online world has always been that it is easier to attack than to defend. On that note, the contemporary approach at all levels on how to preserve, protect and govern the common good of a trusted cyberspace must be developed, since the growth of the information society is accompanied by new and serious threats. The rising of such threats at various stages is because of the explosion of online banking coupled with the acceptance by consumers to disclose sensitive information over the internet. Electronic fraud is committed in different ways.

General Challenge in combating e-fraud / cyber fraud
The challenges faced by banks mainly include technical disadvantages, lack of knowledge and awareness, and lack of legislation. In emerging and developing economies the issue of fighting electronics fraud is a major problem owing to a number of reasons. Mostly, advances in technology are fast-paced, as are fraudsters, however organizations are often far behind and the easy availability of new technologies with high operational speeds, capacity and connectivity make unlawful activities easier to escape detection. Cyber users in Africa do not have up to date technical security measures like anti-virus packages, and many of the operating systems used are not regularly patched (Kritznger&Solms, 2012; Harry, 2002; PWC, 2011).

Generally, there is a lack of resources to investigate cyber-crime and beef up required instruments to combat electronic fraud. In the wake of ever-increasing ICT advances banking stakeholders need to engage cyber fraud awareness and education. the lack of awareness among the general public of how to maintain a minimum level of security with regard to personal information or electronic property, and it is vital not only to educate the people involved in the fight against cybercrime, but also draft adequate and effective legislation (Harry, 2002; Gercke, 2012; Mwaita&Owor, 2013). This is a very risky situation and means that there is a clear, but certainly not deliberate lack of cyber security awareness and education to make cyber users aware of all possible cyber threats and risks (kritzinger&Solms, 2012).

Most law enforcement agencies lack the technical expertise as well as sufficient regulatory powers and automated equipment to investigate complicated evidence collection because of the intangible nature of cyberspace and prosecute fraudulent digital transactions (Harry, 2002; Gercke, 2012; Mwaita&Owor, 2013). Therefore, lack of cyberspace legal legislation provides a safe haven for cyber criminals. in light of trying to protect corporate reputation, investor and public confidence most businesses are reluctant to report cyber-criminal activity (Harry, 2002)

Bank Financial Performances
Financial performance appraises a firm's ability to generate revenue through the utilization of assets. It encompasses the general financial health of a firm over a given period of time which will be vital for various stakeholders. Banks financial performance would be evaluated in return on assets, return on equity, net interest margin, gross income, net profit margin and yield on earning assets among others.
Bank performance is the adoption of a set of indicators which are indicative of the bank's current status and the extent of this ability to achieve the desired objectives. An efficient banking system facilitates linkage between mobilization and use of resources, which accelerates the process of economic growth. It is a widely accepted belief that a banking system which relies on a wide range of banking products, is able to carry out this function because it increases the efficiency of a banking system to a large extent by offering a broader and flexible array of services to the benefits of both borrowers and investors. The determinants of key performance indicators (KPIs) of private sector banks as captioned by Abduraheem, Yahaya, and Aliu (2011) include Acid test Ratio, Opportunity, Succession Rate, Cash Flow, Return on Capital Employed (ROCE), Liquidity, Customer Satisfaction Rate, Bank capital, Asset quality, Bank deposit Overall Equipment Effectiveness, Return on Investment (ROI), and Internal Promotion.
Considering performance in terms of bank capacity to generate sustainable profitability, European Central Bank (2010) argue that profitability is a bank's first line of defense against unexpected losses, as it strengthens its capital position and improves future profitability through the investment of retained earnings. It is worthy of note that an institution that persistently makes a loss will ultimately deplete its capital base, which in turn puts equity and debt holders at risk. Moreover, since the ultimate purpose of any profit-seeking organization is to preserve and create wealth for its owners, the bank's return on equity (ROE) needs to be greater than its cost of equity in order to create shareholder value. Although banking institutions have become increasingly complex,

the key drivers of their performance remain earnings, efficiency, risk-taking and leverage, in detail, while it is clear that a bank must be able to generate "earning", it is also important to take account of the composition and volatility of those earnings. (ECB, 2010).

Bank performance or efficiency refers to the bank's ability to generate revenue from a given amount of assets and to make profit from a given source of income. "Risk-taking" is reflected in the necessary adjustments to earnings for the undertaken risk to generate them (e.g. credit-risk cost over the cycle). "Leverage" might improve results in the upswing in the way it functions as a multiplier but, conversely, it can also make it more likely for a bank to fail, due to rare, unexpected losses (Abduraheem, Yahaya &Aliu, 2011).

Agu (1985) states that in measuring profits and profitability of the Nigeria Banking System 'using return on assets (ROA), return on equity (ROE) and the average consumer price index finds that financial health of banks and consequently their performance are dependent on profits declared and that the ability of banks to control and reduce operating cost will greatly determine the amounts of profits to be declared. He however could not statistically determine the relationship between profits and operating cost.

Bank performance is traditionally measured using the CAMEL rating system. CAMEL is an acronym for Capital Adequacy, Asset Quality, Management Quality, Earning Ability and Liquidity. The essence of the CAMEL rating system is to ensure soundness and stability of the banking sector. However, for the purpose of this study, the earning ability/financial performance aspect of the CAMEL is precisely discussed. The CAMEL earning ability of the banking sector entails the ability of the banks to earn income from their licensed business operations. This rating covers not only the quality and trend in earning but also the factors that may affect the sustainability of earnings (Ilori&Ajiboye, 2016). The appropriate choice of measures of earnings largely determines the degree of proper representative of multidimensional behaviour of the specific performance area (Isiam, 2013). The widely used gauge for assessing the earnings of banks are return on assets, return on equity, profit before tax and interest margin. Others are dividend per share, earnings per share, net assets per share, yield on earning assets and net interest income among others.

Independent Variables
The various channels for electronic fraud are used as independent variables. These channels include WEB and Mobile banking fraud reduces the profitability of the banks as .customers affected may flee the bank thus causing reduction in deposits or referrals.

Dependent Variables
Return on Assets (ROA)
ROA gives profitability on assets of the firm after meeting all expenses and taxes. it measures the profit of the firm after tax for each Naira invested in assets (Horne &Wachowiez 2005). It isan indicator of managerial performance. so higher value of this ratio means better managerial performance (Ross, Westerfield& Jaffe 2005). ROA can be increased by increasing profit margin or asset turnover.
ROA = Net Profit / Total Assets

Return on Equity (ROE)
Return on equity represents profitability of shareholders of the firm after meeting all expenses and taxes (Horne &Wachowiez 2005). ROE is net earnings per Naira equity capital. Higher ROE means better managerial performance. But higher ROE can be due to financial leverage. So higher levered firms have higher ROE which increases risk too (Ross, Westerfield& Jaffe 2005). Usually, ROE is higher for high growth companies.
ROE = Net Profit / Shareholders' Equity.

Theoretical Framework
There are many theories that relate to fraud. Fraud has been a subject with several theoretical underpinning. Other studies have conceptualized fraud under the theoretical framework of differential theory of Edwin Sutherland, Fraud Triangle theory of Donald Cressey, Fraud Diamond theory of Wolfe and Hermerson, and a host of others.

However, this study is anchored on the fraud triangle theory in explaining the elements of fraud in the banking industry. The theory happens to be the most widely used theory. It was based on a model developed by Donald Cressey, a sociologist and criminologist who studied the behaviour of white-collar crime in the 1950's in respect of those he termed trust violators. He observed that fraud is likely to occur given a combination of three factors; namely: Pressure(motivation), Opportunity and Rationalization.
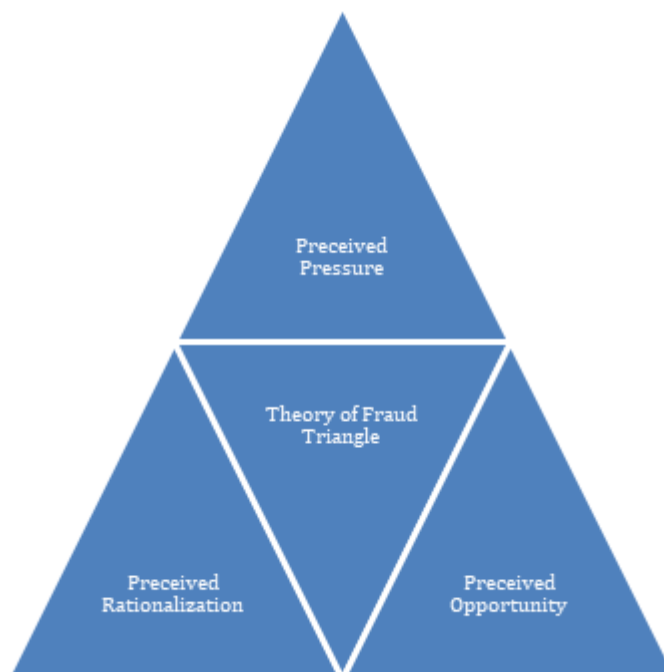
Figure 2:2 The Fraud Triangle (Donald Cressey, 1973)

According to Dorminey, Fleming, Kranacher and Riley (2012), Cressey identified three elements that made up the fraud triangle. He opined that for an ordinary individual to commit fraud three elements must be present. First is pressure; pressure is the motivation of the person to commit fraud, usually a financial burden. Adeyomo (2012) opine that other business and organizational pressures may create a motive for fraud. He noted that the desire to pull in more investment, secure tax advantage, and meet the teaming requirement of banking regulators may pressure management to commit fraud. Most researchers have used a number of staff involved in fraud as a proxy for rationalization.

Next is opportunity; which is the method by which the crime could be committed. Opportunity is a vital element in the fraud triangle because a potential fraudster may have the desire to commit fraud but without the perceived opportunity fraud may not occur. Opportunities can span from weak internal control, weak audit committee, management override, collusion, lack of supervision, and individual skill set such as employee knowledge of accounting and how to conceal misstatement (Dorminey et al, 2012). In explaining the opportunity, the number of reported cases has been adopted as a proxy by authorities in the field (Muritala, Ijaiya, & Adeniran, 2017; Taiwo, Babajide, Okafor &Isibor, 2016).

Lastly, rationalization; this is how the person justifies in their own mind, the action of committing the crime. Rationalization helps to justify a crime in a way that makes it acceptable in the mind of the fraudster. it may arise from an employee's feeling of dissatisfaction at work, low compensation or lack of recognition. Some fraudsters may even rationalize that the bank has enough money and will not be affected by a simple fraud (Adeyomo,2012).

Empirical Review
Gitau and Samson (2016) assess the effect of financial fraud on the financial performance of Commercial Banks in Kenya looking basically at Nakuru Town. The study carries out an assessment of the effects of frauds on commercial banks performance. Specifically, the study identified the effect of cheque fraud, fraudulent invoice and payments, extent of money laundering and fraudulent loans on the financial performance of commercial banks in Nakuru town. The study used descriptive research design on its population of study in Tier I banks in Nakuru County. A survey of 11Tier 1 Banks was specifically targeted looking at the management, tellers, Loans department, and Accounts opening section of the banks. Multivariate regression using SPSS was used for analysis. The result showed that banks' financial performance variable Return on Assets (ROA) has significantly affected liquidity ratios and fraud loss with positive correlation.

Nwankwo (2013) evaluated the impact of fraud on the performance of commercial banks in Nigeria. It also sought to ascertain the relationship between bank ATM Fraud, Forged Cheque, Clearing Cheque Fraud and bank performance. Augmented Dickey Fuller (ADF) unit root test and co-integration test using OLS was used for analysis. The outcome of the research revealed that there is a significant impact of fraud on the performance of commercial banks in Nigeria. The implication of this is that if the level of fraud in commercial banks did not

reduce to the barest minimum, it may not allow commercial banks to perform well and as well contribute to the growth of Nigeria economy.

Abdulrasheed, Babaitu and Yinusa (2012) examined the impact of fraud on bank performance in Nigeria. Total fraud amount was used as independent variable and ROE and ROA were used as dependent variables. Parametric table and Pearson correlation was used for analysis. Result of the study shows that there is a significant relationship between banks profit and total amount of funds involved in fraud. Abaenewe, Ogbulu and Ndugbu (2013) using judgmental sampling method examine electronic banking and bank performance in Nigeria. The study looked at the profitability performance of banks measured in terms of returns on equity (ROE) and returns on assets (ROA) collected data and was tested at pre- and post-adoption of e-banking performance using a standard statistical technique for independent sample at 5 percent level of significance for performance factors. The study revealed that the adoption of electronic banking has positively and significantly improved the returns on equity (ROE) of Nigerian banks. On the contrary, it also revealed that e-banking has not significantly improved the returns on assets (ROA) of Nigerian banks.

Funso and Temitayo (2018) investigated the impact of fraud on the performance of deposit money banks in Nigeria between the periods from 1994 to 2015. The study adopted bank deposit as the dependent variable while the one-period lagged value of bank deposit, amount involved in reported fraud cases, amount lost to fraud and number of staff involved in fraud cases were used as independent variables. The study using a generalized method of moments (GMM) estimator to analyze the data collected discovered that the amounts involved in fraud cases, amount lost to fraud and number of staff involved in fraud have a negative and significant influence on the deposit of banks in Nigeria.

Abdulrasheed, Babaita and Yinusa (2012) examined the problem of fraud and its implications for bank performance in Nigeria using empirical analysis. Data were collected from NDIC annual reports for the period 2004-2009. Parametric tables and Pearson Correlation were utilized for data analysis. It was discovered that banks recorded the highest cases of fraud in 2008. Hypothesis testing showed that there is a significant relationship between the total amount involved in fraud cases and bank's profit.

Adediran and Olugbenga (2010) explored the impact of fraud on bank performance in Nigeria for the period 2000-2007. OLS regression was adopted for the analysis. Findings were that total reported cases of fraud, amount involved in the frauds and actual expected loss due to frauds had significant inverse relationship with commercial banks investment.

These empirical reviews discussed, were short of specific secondarily analyzed study on electronic fraud as it affects banks performance thus the need to embark on the possible implication of financial loss from electronic fraud on banks performance in Nigeria. This study will present a more current work on the subject (2008-2018) covering 10years as earlier works covered a different scope without covering 2018; use the two major electronic fraud channel measurement parameters: mobile banking and E-commerce to regress the Return on Assets of Deposit money banks and use multiple regression and granger causality test for analysis of the study based on model adopted.

III. Methodology

The research design used for this study is the *ex post facto* research design. This is because the data were secondary and is *ex post* from the Central Bank of Nigeria and the Nigerian electronic fraud forum statistics sources. Moreover, the reported figures or proxies for the variables of interest are not susceptible to the manipulations or doctoring of the researcher because they are information in the public domain and are easily verifiable. This study is a systematic and objective inquiry into events, developments and experiences of the past (*ex-post facto*) research. The research work therefore will specify relevant models and employ appropriate statistical tools of Ordinary Least Square (OLS), Co-integration to estimate and evaluate the models.

The data obtained were analyzed with an Econometrics text kit (Software) called E-view –Version 10.0.
The data used for this study are those relating to:
1. Return on Assets (ROA) - Dependent Variable
2. WEB/internet banking fraud - Independent variable
3. Mobile Banking fraud (M) - Independent variable
4. E-commerce fraud (EC) – Independent variable

Model Specification and Validity
This research work adopts the model of Nwankwo (2013) with major modifications (for example replacement of EPS, forged cheque and clearance fraud with Mobile fraud, WEB/Internet banking fraud, E-commerce fraud and DMBs return on Assets);

$$EPS = a_0 + a_1 ATM\ fraud + a_2 FC + a_3 CF + Ui \qquad (1) \qquad (Nwankwo, 2013)$$

Where EPS–Earnings Per Share

FC – Forged Cheque
CF – Clearing Fraud
ATMfraud – Automated Teller Machine Fraud
A_0, a_1, a_2 and a_3 – Parameters
Ui - Error term
Where ROA = Return on Assets
EC = E-commerce fraud
M = Mobile banking fraud
a_0, a_1, a_2 and a_3 - are parameters
U_t =   Error term
The functional relationship between dependent and the independent variables that will be used in our study are established as follows.

Model I:
ROA =f(EC), ... (9)
ROA = a_0 +a_1EC + u .... (10)

$$\mu = Error\ term$$
$$ao = Intercept$$
$$a_1 = parameter/coefficient$$

Model II:
ROA =f(M) .... (11)
ROA = a_0 +a_1M + u .... (12)

$$\mu = Error\ term$$
$$ao = Intercept$$
$$a_1 = parameter/coefficient$$

This study focuses on the effect of electronic fraud on banks performance in Nigeria from 2008 to 2018. The focus area of study is thus on electronic fraud and the sample size and period covered is 10 years from 2008 to 2018.

WEB/Internet Banking (IB): A method of banking in which transactions are conducted electronically via the Internet. This is the financial loss recorded by banks on internet banking activities.
E-commerce (EC): electronic commerce is the buying and selling of goods and services, or the transmitting of funds or data, over an electronic network, primarily the internet. The e-commerce identified here is the point of financial loss encountered via electronic fraud.
Mobile (M): Mobile banking is banking transactions conducted through mobile devices, especially the Phones. This covers all the mobile banking Apps and USSD codes. The financial loss recorded via mobile banking fraud that is reported to the banks.

Techniques of Data Analysis
The research work will employ the following techniques for analysis:
i.   Descriptive Statistics
ii.   The Unit Root/Stationarity Test
iii.   Ordinary Linear Regression Test

Unit Root Test
The empirical analysis will start by checking the time series properties of the variables using the Augmented Dickey Fuller (ADF) test to establish the order of stationarity. This became necessary in order to avoid the incidence of spurious regression estimates. The test involved estimation of the following regression equation given below:
$$\Delta X_t = \alpha + \beta t + \delta X_{t-1} + \varepsilon_t$$
Where X in the above equation is the variable under consideration. Thus, the ADF unit root test states that H_0: β=0 and H_1: β<0, where the ADF statistics was compared with the observed Mackinnon critical values.
The formulated models will be tested for stationary using the Augmented Dickery Fuller Unit root test to be sure that one is not analyzing inconsistent and spurious relationships. A series that exhibits a stochastic trend, or even simply wanders around at random will not be stationary and cannot be forecast far in the future. Stationary series will constantly return to a given value and no matter the starting point, in the long- run, it is expected to attain that

value (Hall, 1994). To illustrate the use of Dickey Fuller test, one can state the autoregressive AR (1) process. Thus,

$$Y_t = \mu + pY_{t-1} + \varepsilon t$$

Where μ and p are parameters and εt is the white noise assumption. Y is a stationary series if $-1<p<1$. Nevertheless, the above description is valid only if the series is an AR (1) process. If p =1, Y is a non- stationary series (a random walk with drift). The hypothesis of a stationary series can therefore be evaluated by testing whether the absolute value of p is strictly less than one (Dickey and Fuller, 1981). Thus, H_0: p =0 and H_1: P<1. If the series is correlated at higher order lags, the assumption of white noise disturbance is violated and the ADF test makes a parametric correction for higher order by assuming that the Y series follows an AR(p) process. The test methodology is then adjusted by adding lagged difference terms of the dependent variable Y to the right-hand side of the regression. Thus,

$$\Delta Y_t = \mu + \gamma Y_{t-1} + \delta_1 \Delta Y_{t-1} + \delta_2 \Delta Y_{t-2} + \text{..................} + \delta_{p-1} \Delta Y_{t-p+1} + \varepsilon_t$$

The hypothesis for the augmented specification is tested thus; H_0: $\gamma<0$.

A non- stationary series could be made stationary by differencing once or twice. This is called an integrated series. It could be integrated with order 1 which is often denoted as I (1) or order 2 represented by I(2). The stationary linear combination of the variables under consideration is called co-integration equation (Engle and Granger, 1991).

That variables are co- integrated, implies that they share a long-run relationship and will move closely together over time; meaning that the difference between such variables are stable over time and there is some degree of convergence in the long-term.

To test for co-integration, Johansen's (1991) method is to test the restrictions imposed by co-integration on the unrestricted vector auto- regressions (VAR) involving the series. If the VAR is of order P, the starting equation can be stated as:

$$\Delta Y_t = \Pi Y_{t-1} + \sum_{i-1} \prod_i \Delta Y_{t-i} + BX_t + \varepsilon_t$$

Test for Serial Correlation

In a time-series or panel data model, this is correlation between the errors in different time periods. A series is said to be serially correlated where the data are correlated across time and the errors arise from adjacent time periods. It could either be positive or negative serial correlation:

$$\text{Corr } (u, u_s) \neq 0$$

A suspicion of serial correlation may be corrected using;

The Durbin-Watson (DW) Statistics: A test for first order autocorrelation, i.e. a test for whether a (residual) series is related to its immediate preceding values. One way to motivate the test and to interpret the test statistic would be in the context of a regression of the time t error on its previous value. (Durbin and Watson, 1951).

$U_t = pu_{t-1} + v_t$

Where: u_t= Error term at time t; p = Probability values; v_t= Variable at time t.

Regression Analyses

The Classical Linear Regression Model (CLRM) which represents the foundational model for most higher and vigorous econometric analyses form the most fundamental technique of data analyses for this work. The E-views Generalized Least Square (EGLS) method will be used as it captures the required robustness and flexibility required for a panel data research work. Regression analyses is basically concerned with the study of the dependence of one variable (dependent variable) on one or more other explanatory or independent variables (regressors) with the view to finding out or estimating/predicting the mean or average value of the former in terms of known or repeated values of the latter (Gujarti& Porter, 2009).

In specific terms, regression analyses explain the variation in an outcome (dependent variable) Y, as it depends on a predictor (independent explanatory) variable X. It is a correlation-based test. Correlation is one of the most common and useful statistics. It describes the degree of relationship between two variables.

Its predictive power is dependent on the estimation of the relationship between X and Y variables. The accuracy of such predictive capability depends on the amount of scatter: the less the scatter, the more the predictive accuracy. Stokewell, (2008) opines that correlation and regression is used when there is an alleged linear relationship between two or more variables beyond what is expected by chance.

Test for Significance (T-Statistic or Z-Statistic)

The p-value of the t-statistic or z-statistics will be used to test the significance of the overall regression using Generalized Least Square and the significance of the parameter estimates respectively. The chosen level of significance for this research work was 5% (except otherwise stated). The p-value from the computed Eviews table is compared with the p-value of the z-statistics from the Z-normal distribution table otherwise. If the p-value

from the computed E-views is greater than the p-value from the z-distribution table, the relationship is said to be significant, otherwise it is not significant. (Brooks, 2014)

This is a procedure by which sample results are used to verify the truth or falsity of a null hypothesis in the tests as conducted and reported (Lehman, 1959).

The key idea behind the significance of the parameter estimates is that of the test **statistic** (estimator) and the sampling distribution of such under the null hypothesis. The hypothesis is stated thus according to Gujarati and Porter (2009):

H_0: $\beta i = 0$

H_A: $\beta i \neq 0$

The decision to accept or reject H_0 is made on the basis of the value of the test statistic obtained. If Z^* falls in the acceptance region, the null will be accepted but will be rejected if it falls outside the acceptance region. If the null hypothesis is accepted, it indicates that the parameters are not statistically significant. On the other hand, it is statistically significant if the value of the test statistic lies outside the acceptance region hence H_A will be accepted, Osuala, (2010).

Decision rule: Using Ordinary Least Square (OLS), accept Null hypothesis (H_o) if the computed Z-statistics or T-statistic p-value (Z_{PV} or T_{pv}Computed) is greater than the chosen level of significance and conclude that there is no significant relationship between the tested variables of interest, otherwise reject.

T-statistics or Z-statistic is a test of significance of the overall regression and it points out whether a significant relationship exists amongst all the variables fitted into the regression model. It specifically measures the goodness of fit of the model.

Decision Rule

A decision rule specifies when the null hypothesis (H_o) should be rejected. A very common one specifies that H_o should be rejected if the calculated value of a statistic is Z-statistic or t-statistic equal or is more positive than the positive critical value, or the value of a statistic is equal to or more negative than the negative critical value of the statistic. Thus, the decision rule is to reject the null hypothesis and accept the alternative if $p<0.05$, otherwise accept the null hypothesis if $p>0.05$.

IV.   Presentation And Analysis Of Data
Table 1: Mobile Banking Fraud and E-commerce Fraud and Return on Assets of Deposit Money Banks from 2008 to 2018.

YEAR	MOBILE BANKING FRAUD (billions) Naira	E-COMMERCE FRAUD (billions) Naira	ROA %
2008	0	0	4.29
2009	0	0	-9.28
2010	0	0	3.91
2011	0	0	-0.04
2012	0	0	2.62
2013	6,787,544	13,948,390	2.32
2014	13,328,957	58,994,920	3.39
2015	248,144,131	52,161,394.14	2.34
2016	235,170,720	132,252,118.32	1.48
2017	347,645,088	36,054,759.08	0.48
2018	598,811,187.60	14,355,665.57	0.88

Source NIBSS Publication 2018 and NDIC Annual report

Mobile Banking Fraud

Mobile banking fraud within the period of the study was ₦ 6,787,544 in 2013 but rose to ₦ 248,144,131 in 2015 before it decreased to ₦ 235,170,720 in 2016.From 2017 to 2018 mobile banking fraud has been increasing with the highest mobile banking fraud occurring in 2018.This may be as a result of poor standard of living and high rate of youth unemployment within the period of the study.
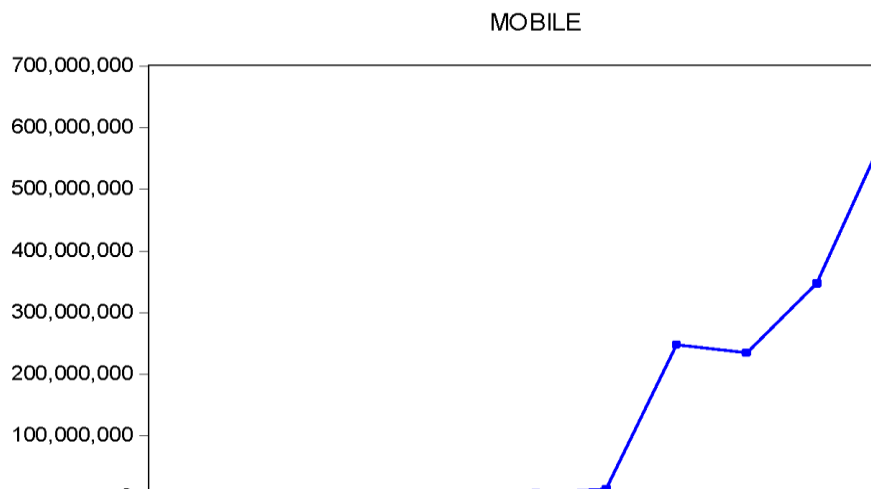
MOBILE

Fig.4. 3: Graph Trend in Mobile Fraud 2008 to 2018
Source: NIBSSpublication, 2008 – 2018; and eviews 9.0 version data output
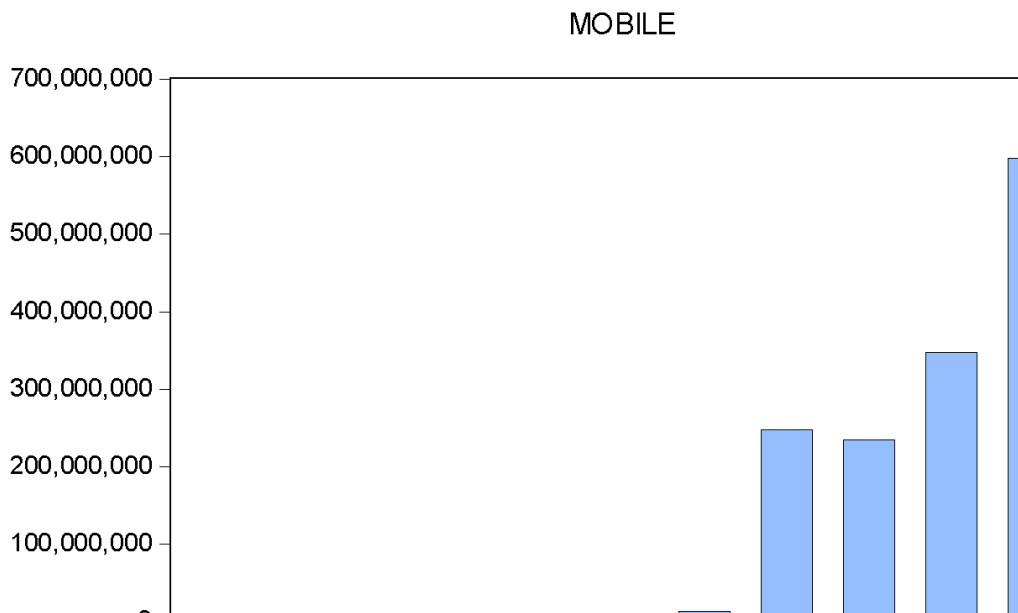
MOBILE

Fig. 4.4: Bar Chart Trend in Mobile Fraud 2008 to 2018
Source: NIBSSpublication, 2008 – 2018; and e-views 9.0 version data output

E-commerce Fraud
E-commerce fraud was ₦ 13,948,390 in 2013, by the end of 2014 it had risen to ₦ 58,994,920. It declined marginally from 2014 to 2015. However, it rose to ₦ 132,252,118.32 in 2016 but from 2017 to 2018 e-commerce fraud decreased from ₦ 36,054,759.08 to ₦ 14,355,665.57.
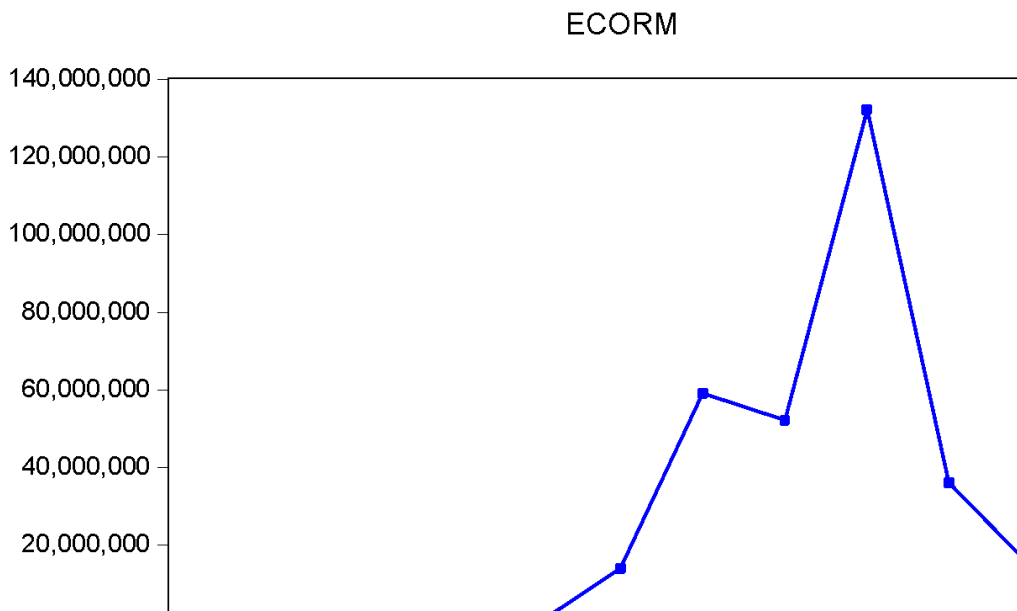
ECORM

Fig. 4.7: Graph Trend in E-commerce   Fraud 2008 to 2018
Source: NIBSSpublication, 2008 – 2018; and eviews 9.0 version data output

ECORM

Fig. 4.8: Bar Chart Trend in E-commerce Fraud 2008 to 2018
Source: NIBSSpublication, 2008 – 2018; and eviews 9.0 version data output

Return on Assets

The return on assets of deposit money banks in Nigeria was 4.29% in 2008 and all time high of 3.91% in 2010. Return on assets of deposit money banks in Nigeria has the lowest figure in 2009 with -9.28% within the period of the study. From 2015 to 2018 the return on assets of deposit money banks in Nigeria has been decreasing this might be connected to the economic recession Nigeria experienced within this period.

ROE
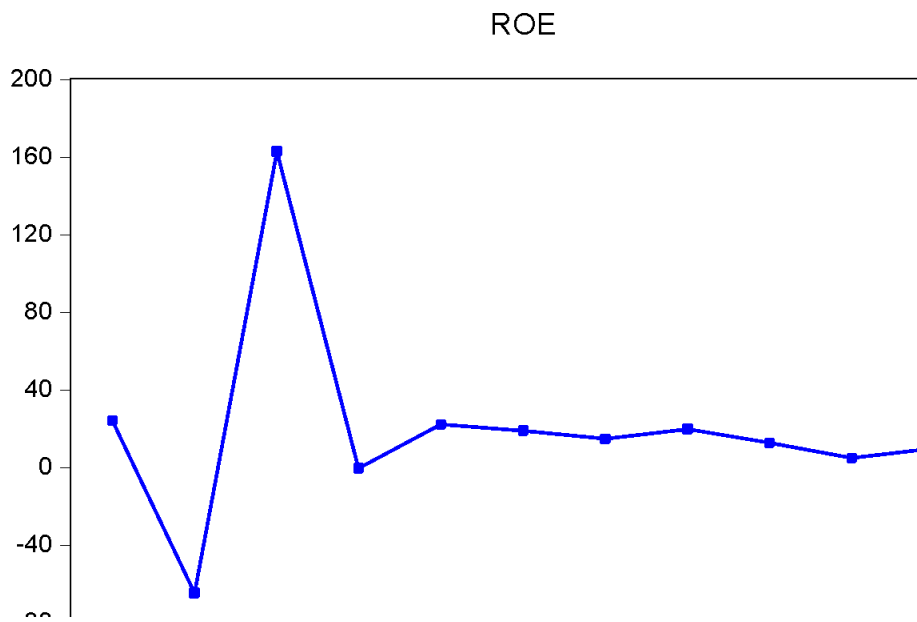
Fig. 4.9: Graph Trend in ROE Fraud 2008 to 2018
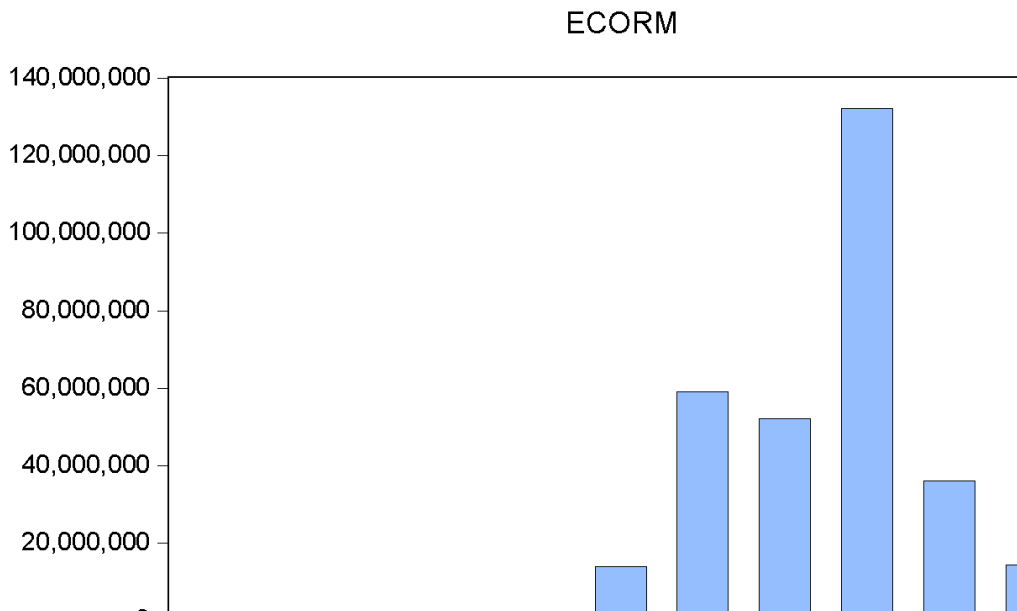*Source: NIBSSpublication, 2008 – 2018; and e-views 9.0 version data output*

ROE
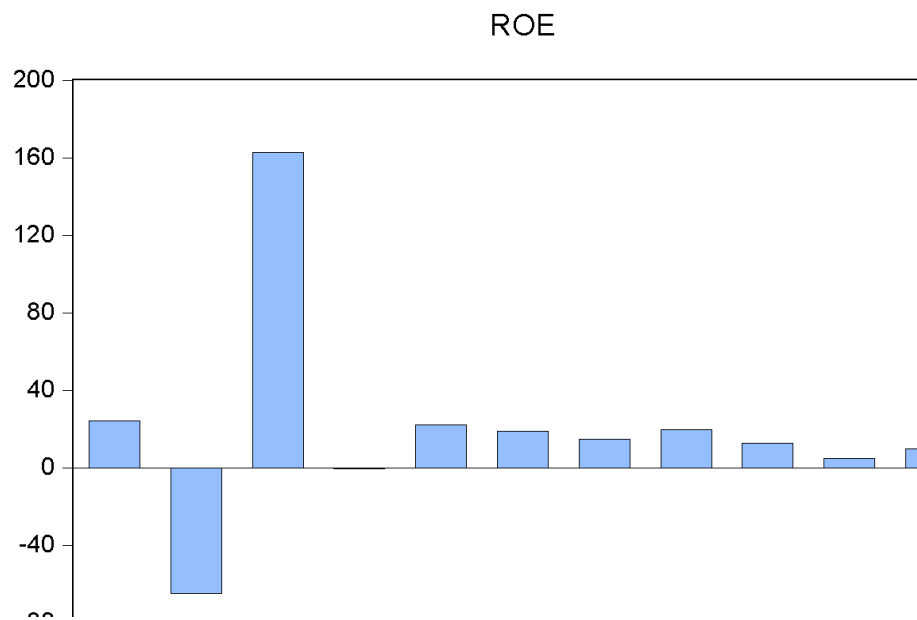
Fig. 4.10: Bar Chart Trend in ROA Fraud 2008 to 2018
Source: NIBSSpublication, 2008 – 2018; and eviews 9.0 version data output

Test for Unit Root
H_0: data is not stationary
H_1: data is stationary
The Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) test of unit root were used to prove that the data were stationary.
Decision rule: reject H_0 and accept H_1 when ADF or PP statistic is greater than the critical value at 5%.

Table 3: Result of ADF Unit Root Test at level

VARIABLES	ADF TEST STATISTICS VALUE	MACKINNON CRITICAL VALUE AT 5%	ORDER OF INTEGRATION	DECISION RULE		REMARKS
				H_0	H_1	
ECORM	-1.840593	-3.212696	**I(0)**	Accept	Reject	Non-Stationary
MOBILE	1.631914	-3.212696	**I(0)**	Accept	Reject	Non-Stationary
ROA	-4.705331	-3.212696	**I(0)**	Reject	Accept	Stationary

Source: Authors' Computation

From table 3 the results of the test for stationarity of data at level i.e. before differencing, it could be deduced that all the variables have their ADF test statistics value lesser than the Mackinnon critical value (at absolute term) and at 5% except ROA. Therefore, we accept H_0 and reject H_1 for ECORM and MOBILE. To ensure the stationarity of data for variables found to be non-stationary at level, there is a need to proceed to test for stationarity at first difference. The first difference ADF unit root test is presented in table 4.

Table 4: Result of ADF Unit Root Test at First Difference

VARIABLES	ADF TEST STATISTICS VALUE	MACKINNON CRITICAL VALUE AT 5%	ORDER OF INTEGRATION	DECISION RULE		REMARKS
				H_0	H_1	
ECORM	-3.666614	-3.259808	**I(1)**	Reject	Accept	Stationary
MOBILE	-1.965205	-3.259808	**I(1)**	Accept	Reject	Non-Stationary
ROA	-13.05085	-3.259808	**I(1)**	Reject	Accept	Stationary

Source: Authors' Computation

From table 4 the results of the test for stationarity of data at level i.e. before differencing, it could be deduced that MOBILE hasits ADF test statistics value less than the Mackinnon critical value (at absolute term) and at 5% except for ECORM and ROA. Therefore, we accept H_0 and reject H_1 for MOBILE.To ensure the stationarity of data for variables found to be non-stationary at first difference, there is need to proceed to test for stationarity at second difference. The second difference ADF unit root test is presented in table 5.

Table 5: Result of ADF Unit Root Test at Second Difference

VARIABLES	ADF TEST STATISTICS VALUE	MACKINNON CRITICAL VALUE AT 5%	ORDER OF INTEGRATION	DECISION RULE		REMARKS
				H_0	H_1	
ECORM	-6.562852	-3.320969	**I(2)**	Reject	Accept	Stationary
MOBILE	-4.414096	-3.320969	**I(2)**	Reject	Accept	Stationary
ROA	-32.25073	-3.320969	**I(2)**	Reject	Accept	Stationary

Source: Authors' Computation

ADF unit root test in Table 5 shows that all the variables are stationary at a second difference. In order to confirm the stationarity of the variables we proceed to carry out Phillips Perron (PP) Test of stationarity.

Table 6: Result of PP Unit Root Test at level

VARIABLES	ADF TEST STATISTICS VALUE	MACKINNON CRITICAL VALUE AT 5%	ORDER OF INTEGRATION	DECISION RULE		REMARKS
				H_0	H_1	
ECORM	-1.840593	-3.212696	**I(0)**	Accept	Reject	Non-Stationary
MOBILE	5.063455	-3.212696	**I(0)**	Reject	Accept	Stationary
ROA	-4.477974	-3.212696	**I(0)**	Reject	Accept	Stationary

Source: Authors' Computation

From table 6 the results of the test for stationarity of data at level i.e. before differencing, it could be deduced that all the variables have their PP test statistics value less than the Mackinnon critical value (at absolute term) and at 5% except ROA and MOBILE. Therefore, we accept H_0 and reject H_1 for ECORM.

To ensure the stationarity of data for variables found to be non-stationary at level, there is a need to proceed to test for stationarity at first difference. The first difference PP unit root test is presented in table 7.

Table 7: Result of PP Unit Root Test at First Difference

VARIABLES	ADF TEST STATISTICS VALUE	MACKINNON CRITICAL VALUE AT 5%	ORDER OF INTEGRATION	DECISION RULE		REMARKS
				H_0	H_1	
ECORM	-3.671548	-3.259808	**I(1)**	Reject	Accept	Stationary
MOBILE	-1.965205	-3.259808	**I(1)**	Accept	Reject	Non-Stationary
ROA	-10.76730	-3.259808	**I(1)**	Reject	Accept	Stationary

Source: Authors' Computation

From table 7 the results of the test for stationarity of data at level i.e. before differencing, it could be deduced that MOBILE hasits ADF test statistics value less than the Mackinnon critical value (at absolute term) and at 5% except for ECORM and ROA. Therefore, we accept H_0 and reject H_1 for MOBILE.To ensure the stationarity of data for variables found to be non-stationary at first difference, there is need to proceed to test for stationarity at second difference. The second difference PP unit root test is presented in table 8.

Table 8: Result of PP Unit Root Test at Second Difference

VARIABLES	ADF TEST STATISTICS VALUE	MACKINNON CRITICAL VALUE AT 5%	ORDER OF INTEGRATION	DECISION RULE		REMARKS
				H_0	H_1	
ECORM	-6.473028	-3.320969	**I(2)**	Reject	Accept	Stationary
MOBILE	-7.346135	-3.320969	**I(2)**	Reject	Accept	Stationary
ROA	-35.10149	-3.320969	**I(2)**	Reject	Accept	Stationary

Source: Authors' Computation

PP unit root test in Table 8 shows that all the variables are stationary at second difference. The Augmented Dickey-Fuller (ADF) and Phillips Perron (PP) unit root test at second difference were applied in this regard and results in Tables 3-8 unveil that the data are not affected by stationarity problems linked with lost time series data.

Due to the short period of the study, the short run relationship between the variables were ascertained as the number of observations would not allow for assessment of a long run relationship. This was achieved using the OLS technique and results summarized in Table 9 and 10.

Test of Hypotheses
Hypothesis One
H_0 E-commerce fraud does not significantly affect return on assets of deposit money banks in Nigeria.
H_1 E-commerce fraud significantly affects the return on assets of deposit money banks in Nigeria.

Table 9: OLS Regression of E-commerce Fraud and Return on Assets of Nigerian DMB

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(ECORM)	-0.245896	0.335517	-0.732888	0.5043
C	4.108818	5.860534	0.701100	0.5219
R-squared	0.118384	Mean dependent var		-0.181835
Adjusted R-squared	-0.102019	S.D. dependent var		0.623348
S.E. of regression	0.654373	Akaike info criterion		2.250923
Sum squared resid	1.712815	Schwarz criterion		2.181509
Log likelihood	-4.752768	Hannan-Quinn criter.		1.973055
F-statistic	0.537125	Durbin-Watson stat		2.687282
Prob(F-statistic)	0.504261			

Source: Computer output data using Eviews9.0.

The result in Table 9 revealed that E-commerce Fraud is statistically insignificant at 5% level of significance with p-value of 0.5043.
A-Priori Expectation: The coefficient of the constant 4.108818 implies that holding E-commerce Fraud constant, return on assets of deposit money banks in Nigeria would increase by a factor of 4.10. E-commerce Fraud has a negative relationship with return on assets of deposit money banks in Nigeria. E-commerce Fraud coefficient of -0.245896 suggests that a percentage increase in E-commerce Fraud would reduce return on assets of deposit money banks in Nigeria by a factor of 0.245 which is in line with the a-priori expectation.

The Adjusted R-squared value of -0.102019 indicates that E-commerce Fraud explained -10.2019 variations in return on assets of deposit money banks in Nigeria. The F-statistic of 0.537125 and p-value of 0.504261 shows that E-commerce Fraud did not significantly influence variations in return on assets of deposit money banks in Nigeria within the period of the study.

Conclusion: The results of the OLS regression estimate in table 11 showed E-commerce coefficient of -0.245896and probability of 0.5043 which is greater than 0.05. Therefore, E-commerce Fraud has negative and insignificant effect on return on assets of deposit money banks in Nigeria for the period. Thus, we accept the null hypothesis and reject the alternate hypothesis that E-commerce Fraud does not have a significant effect on return on assets of deposit money banks in Nigeria within the period of the study.

Hypothesis Two
H_0 Mobile banking fraud does not significantly relate to return on assets of deposit money banks in Nigeria.
H_1 Mobile banking fraud significantly relates to return on assets of deposit money banks in Nigeria.

Table 10: OLS Regression of Mobile Fraud and Return on Assets of Nigerian DMB

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LOG(MOBILE)	-0.272471	0.137325	-1.984134	0.1182
C	5.430516	2.542684	2.135741	0.0996
R-squared	0.496018	Mean dependent var		0.407131
Adjusted R-squared	0.370022	S.D. dependent var		0.726035
S.E. of regression	0.576262	Akaike info criterion		1.996693
Sum squared resid	1.328312	Schwarz criterion		1.927279
Log likelihood	-3.990079	Hannan-Quinn criter.		1.718825
F-statistic	3.936787	Durbin-Watson stat		1.754473
Prob(F-statistic)	0.118241			

Source: Computer output data using Eviews9.0.

The result in Table 10 revealed that Mobile Fraud is statistically insignificant at 5% level of significance with p-value of 0.1182.
A-Priori Expectation: The coefficient of the constant 5.430516 implies that holding Mobile Fraud constant, return on assets of deposit money banks in Nigeria would increase by a factor of 5.43. Mobile Fraud has a negative relationship with return on assets of deposit money banks in Nigeria. Mobile Fraud coefficient of -0.272471 suggests that a percentage increase in Mobile Fraud would reduce return on assets of deposit money banks in Nigeria by a factor of 0.272 which is in line with the a-priori expectation.
The Adjusted R-squared value of 0.37002 indicates that Mobile Fraud explained 37.002 variations in return on assets of deposit money banks in Nigeria. The F-statistic of 3.936787 and p-value of 0.118241 shows that Mobile Fraud did not significantly influence variations in return on assets of deposit money banks in Nigeria within the period of the study.

V.   **Conclusion**:
The results of the OLS regression estimate in table 12 showed Mobile coefficient of -0.272471and probability of 0.1182 which is greater than 0.05. Therefore, Mobile Fraud has negative and insignificant effect on return on assets of deposit money banks in Nigeria for the period. Thus, we accept the null hypothesis and reject the alternate hypothesis that Mobile Fraud does not have a significant effect on return on assets of deposit money banks in Nigeria within the period of the study.

Diagnostic Tests of the Data
Test for Serial Correlation – Breusch-Godfrey (BG) Tests
The Breusch-Godfrey tests is used to test for the presence or absence of serial or autocorrelations in the model with the Null hypothesis stating that there is No autocorrelation. This holds if p-value is greater than the chosen level of significance otherwise rejected.
H_0= There is no serial correlation in the model
H_1= There is serial correlation in the model
Decision rule
If the probability value is less than 0.05 reject the H_0 and accept the H_1

Table 11: Breusch-Godfrey Serial Correlation Test

Breusch-Godfrey Serial Correlation LM Test: Hypothesis One			
F-statistic	0.408660	Probability.F	0.7099
Obs*R-squared	1.740633	Probability Chi-Square	0.4188
Breusch-Godfrey Serial Correlation LM Test: Hypothesis Two POS			
F-statistic	0.467508	Probability.F	0.6814
Obs*R-squared	1.911435	Probability Chi-Square	0.3845
Breusch-Godfrey Serial Correlation LM Test: Hypothesis Three E-commerce			
F-statistic	0.462924	Probability.F	0.6836
Obs*R-squared	1.898626	Probability Chi-Square	0.3870
Breusch-Godfrey Serial Correlation LM Test: Hypothesis Four Mobile			
F-statistic	4.988964	Probability.F	0.1670
Obs*R-squared	4.998157	Probability Chi-Square	0.0822

Source: Computer output data using E-views9.0.

From table 11, the p-value is greater than the chosen level of significance of 5%, indicating the absence of autocorrelation in the models. The result of the serial correlation shows that the probability value in hypothesis one is 0.7099, in hypothesis two 0.6814, in hypothesis three 0.6836 and hypothesis four 0.1670 which is greater than 0.05 implying that we accept H_0 and reject H_1. We then conclude that there is no serial autocorrelation in the models and that the models are appropriate for the study.

Normality Test

The normality test was done using the Jarque-Bera Normality test, which requires that for a series to be normally distributed; the histogram should be bell-shaped and the Jarque-Bera statistics would not be significant. This implies that the p-value given at the bottom of the normality test table should be greater than the chosen level of significance to accept the Null hypothesis, that the series is normally distributed.

Table 12 Normality test

Normality Test: Hypothesis One	
Jarque-Bera	0.361788
Probability	0.834524
Normality Test: Hypothesis Two POS	
Jarque-Bera	0.320577
Probability	0.851898
Normality Test: Hypothesis Three E-commerce	
Jarque-Bera	0.323810
Probability	0.850522
Normality Test: Hypothesis Four Mobile	
Jarque-Bera	0.247255
Probability	0.883709

Source: Computer output data using E-views9.0.

The result of the normality test shows that the probability value of hypothesis one is 0.834524, hypothesis two 0.851898, hypothesis three 0.850522 and hypothesis four 0.883709 is greater than 0.05.Based on this however we accept H_0 and reject H_1. We then conclude that the residuals are normally distributed and random.

Test for Heteroskedasticity

The assumption of the classical linear regression that the variance of the errors is constant is known as *Homoskedastycity*. If the variance of the errors is not constant, this would be known as *Heteroskedasticity.* Hence, we test for the presence of heteroskedasticity with the intention of treating the same if found. The Null hypothesis states that there is no Heteroscedasticity if the p-value is greater than the level of significance.
H_0= There is no heteroskedasticity
H_1= There is heteroskedasticity

Table 13: Heteroskedasticity Test

Heteroskedasticity Test: Hypothesis One			
F-statistic	0.295722	Probability.F	0.6155
Obs*R-squared	0.413047	Probability Chi-Square	0.5204
Heteroskedasticity Test: Hypothesis Two POS			
F-statistic	0.053548	Probability.F	0.8284
Obs*R-squared	0.079261	Probability Chi-Square	0.7783
Heteroskedasticity Test: Hypothesis Three E-commerce			
F-statistic	0.046170	Probability.F	0.8404

Obs*R-squared	0.068465	Probability Chi-Square	0.7936
Heteroskedasticity Test: Hypothesis Four Mobile			
F-statistic	0.544166	Probability.F	0.5016
Obs*R-squared	0.718503	Probability Chi-Square	0.3966

Source: Computer output data using E-views9.0.

From the result in Table 14 we accept the Null hypothesis that there is no heteroskedasticity in the models since p-value is greater than the chosen level of significance of 5%. This shows that the models have global utility and are normally distributed. And based on this we conclude that this is the best model to explain the relationship between these variables included in the models.

Interpretation of Granger Causality Test
The Granger Causality test is used to determine the causation that exists between two variables. The regression analysis including using the OLS method can only show the existence of a relationship, but fail in the establishment of causation between variables, hence, the need for causality tests.

Decision Rule: - If the probability value is less than 5% and the F-calculated is greater than the F-tabulated at 95% confidence level (5% significant level), we accept Alternate Hypothesis (H_1) and reject the Null Hypothesis (H_0). If the probability value is greater than 5% and the F-calculated is less than the F-tabulated at 95% confidence level (5% significant level), we reject the Alternate Hypothesis (H_1) and accept the Null Hypothesis (H_0).
For F-tabulated, the F-distribution value with $K - 1 = K'$
And $N - K$ degree of freedom @ 95% confidence level
Hence, (F_{95}, V_1, V_2)dof
Where $V_1 = K - 1 = K'$ $V_2 = N - K$
$\qquad\qquad V_1 = 5 - 1 = 4$ $V_2 = 11 - 5 = 6$
$(F_{95} \simeq 4, 6)$dof
F-tab = 4.53   (as given in the statistical table)

Table 14: E-Corm Fraud and Return on Assets of Deposit Money Banks

	HYPOTHESIS	F-STATISTICS	PROBABILITY
A	H_0: - ECORM does not Granger Cause ROA	9.54300	0.0300
	H_1: - ECORM does Granger Cause ROA		
B	H_0: - ROA does not Granger Cause ECORM	0.85175	0.4919
	H_1: - ROA does Granger Cause ECORM		

Source: *Granger Causality test result*

There exist a Unilateral causality between E-commerce (ECORM) fraud and Return on Assets (ROA) since the probability value of the first case is less than 5% and its corresponding F-statistic is greater than the F-tabulated, we reject the Null Hypothesis (H_0) and accept Alternate Hypothesis (H_1) for the first case (Case A) while in the second case, the probability value is greater than 5% and the F-statistic is less than the F-tabulated, therefore, we reject the Alternate Hypothesis (H_1) and accept the Null Hypothesis (H_0) in the second case (Case B).The result revealed that there is unidirectional relationship between ECORM fraud and ROA with causation moving from ECORM fraud to ROA.

Table 15 Mobile Fraud and Return on Assets of Deposit Money Banks

	HYPOTHESIS	F-STATISTICS	PROBABILITY
A	H_0: - MOBILE does not Granger Cause ROA	8.21776	0.0383
	H_1: - MOBILE does Granger Cause ROA		
B	H_0: - ROA does not Granger Cause MOBILE	0.17497	0.8456
	H_1: - ROA does Granger Cause MOBILE		

Source: *Granger Causality test result*

Table 15 shows a Unilateral causality between MOBILE fraud and Return on Assets (ROA) since the probability value of the first case is less than 5% and its corresponding F-statistic is greater than the F-tabulated, we reject the Null Hypothesis (H_0) and accept Alternate Hypothesis (H_1) for the first case (Case A) while in the second case, the probability value is greater than 5% and the F-statistic is less than the F-tabulated, therefore, we reject the Alternate Hypothesis (H_1) and accept the Null Hypothesis (H_0) in the second case (Case B).This shows that MOBILE Fraud granger causes return on assets of deposit money banks in Nigeria with causation moving from MOBILE fraud to ROA.

VI.   Discussion of Findings

This study evaluated the effect of E-commerce and Mobile electronic fraud on the performance of deposit money banks in Nigeria over a period of eleven years, which is from 2008-2018. The findings of the study revealed the following:

1)   E-commerce fraud has negative and insignificant effect on the return on assets of deposit money banks in Nigeria.

2)   Mobile fraud has negative and insignificant effect on return on assets of deposit money banks in Nigeria.

The study found a negative but insignificant relationship between electronic fraud and return on assets of deposit money banks in Nigeria this shows that electronic fraud within the period of the study has not significantly affected the performance of deposit money banks in Nigeria. The negative relationship shows that when electronic fraud is increasing banks performance will be reduced as bank customers will not want to use some services provided by banks thereby increasing the operating cost for banks. This result is in line with Udeh and Ugwu (2018), Muoghalu, Okonkwo and Anawude (2018) on the inverse relationship between fraud and performance of deposit money banks in Nigeria. Increase in electronic fraud also lowers shareholders wealth owing to the value of money that would be lost. The negative relationship also revealed that electronic fraud destroys bank reputation, discourages banking habit among the banking public, and reduces banks profitability which reduces the ability of banks in meeting up with staff welfare. The bank will also lack the ability to compete favourably with its competitors since there will be increased operational expenses and reduced operational efficiency. If banks do not put adequate measures to limit electronic fraud, banks' plans and strategies will be endangered; it can even lead to the liquidation of banks. Increase in electronic fraud in the country will discourage foreign direct investment and foreign investors, it will also lead to depletion of shareholders' funds and banks capital base and national image.

VII.   Conclusion

The study explored electronic fraud and performance of deposit money banks in Nigeria. This has become necessary in the face of increase in the level of fraudulent activities going on in the banking system. As a result of this, it is expedient to know what must be done to reduce this menace drastically. From the findings of this study, it has been discovered that electronic fraudulent activities have a negative effect on the performance of deposit banks in Nigeria. It is clear that this has affected the performance of the banking sector over the period, thus for a stronger and more resilient banking and financial system, banks need to improve their current state of development.

VIII.   Recommendations

In review of the findings of this study, the following recommendations are suggested to bank management for execution to improve the deposit money banks operation and financial stability in general:

1.   Government should evolve a good regulatory environment that will enable the banks to be more accountable and fraudulent activities to be easily detected.

2.   Enforcing Second Factor Authentication (2FA) on all Financial Channels: The second factor authentication adds additional level of protection to the transaction. It is best practice to implement the 2FA on all financial application and card products. This control is largely to protect theft of the identities of staff of financial institutions and use of the same to post fraudulent transactions.

3.   Enterprise Network Security Management: Measures have to be taken at enterprise level to ensure that banks remain secured. Hardening of servers and endpoints, data loss prevention programs, anti-virus protection, proper network segmentation and firewall restrictions will go a long way to keep the fraudsters at bay.

4.   Intensifying anti-fraud awareness campaigns: A lot of e-fraud cases are aided by underlying social engineering schemes, phishing scams and instances of identity theft. It may surprise you that most solutions cannot guarantee the detection and prevention of phishing scams especially when they target customer-initiated (self-service) transactions. The best tools are for banks to conceptualize and design effective (easy-to-understand) awareness campaigns that will assist people to identify and respond to these threats. While email warnings may protect a bank from being liable for phishing fraud, it may not protect such a bank from the risk of reputational damage. Nigerian banks should consider embarking / promoting a massive nation-wide awareness campaign.

5.   Regular penetration and vulnerability testing: Having taken deliberate steps to secure its e-payment ecosystem, banks should conduct regular penetration and vulnerability tests. The test attempts to exploit the vulnerability in a system to determine whether unauthorized access or other malicious activity is possible and identify which flaws pose a threat to the application.

6.   Monetary authorities should ensure effective and efficient banking supervision.

7.   Banks should improve their electronic instruments to prevent easy manipulation of illegal transactions.

8.   There should be steady reformation in the banking system in order to sustain its credibility.

9.   Banks should prevent or fight any factor that can hinder its performance.

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