FRAUD AND BANK PERFORMANCE IN NIGERIA – VAR GRANGER CAUSALITY ANALYSIS

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Abstract

This paper examines the causality between fraud and bank performance in Nigeria over the period 2000-2016 for quarterly financial data using Johansen's Multivariate Cointegration Model and Vector Autoregressive (VAR) Granger Causality analysis. The results show a long-run relationship between the variables. Bank performance was found to be linked to Granger fraud variables and vice versa at 10% significant level. This study reveals that there was a direct causal relationship between bank performance and fraud because increase in fraudulent activities in the banking sector leads to reduction in bank performance. Hence, this study recommends that internal control systems of banks should be strengthened so as to detect and prevent fraud. In this way, bank assets would be protected.

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Introduction

Fraud, according to Nwankwo (2013) is a social evil that affects the entire sector of the economy including the banking system. Fraud in the banking sector is generally looked at as acts that involve the loss of assets through a deceitful and dishonest means - Thanasak (2013). It certainly constitutes one of the most serious threats to the practice and spread of banking in Nigeria and the rest of the world.

Banks all over the world have maintained a unique position in economies through their contribution to the economic growth and development of a nation. Therefore, any problem that tends to hinder their operation such as 'fraudulent practices' is often viewed seriously. Banking fraud can be traced as far back as failures that occurred in England between 1815 and 1950 when 200 banks were confirmed liquidated (Owolabi, 2010). Nigerian banking fraud experience can be traced back to 1930 when all banks except the National Bank of Nigeria collapsed (Owolabi, 2010).

Many studies in the literature (Thanasak, 2013; Nwankwo, 2013; Norman & Hesri, 2010; Florenz, 2012; Gbegi & Adebisi, 2013) have discussed fraud-related issues with reference to fraud theory and have opined that it is important for a business organization to examine the relationship between fraud and bank performance. The most cited theory on fraud is the Fraud Triangle Theory (FTT) of Cressey (1971) which stipulates that perceived rationalization proxy by number of fraud cases, perceived pressure proxy by expected loss on fraud, and perceived opportunity proxy by amount involved in fraud are the three elements that lead people in any organization to commit fraud respectively. It is upon these backdrops that this study intends to evaluate the causal relationships between fraud and bank performance in Nigeria. However, in line with the stated objective, the following hypotheses have been formulated in order to be able to ascertain the existence of a relationship which exists between fraud and bank performance in Nigeria:

H_{0i}: Fraud and bank performance do not have significant long run relationship in the Nigerian banking industry.

H_{02}: There is no significant causal relationship between expected loss on fraud (ELF) and return on assets (ROA) in the Nigerian banking industry.

H_{03}: There is no significant causal relationship between

amount involved in fraud cases (AIF) and return on assets (ROA) in the Nigerian banking industry.

H_{04}: There is no significant causal relationship between number of fraud cases (NFC) and return on assets (ROA) in the Nigerian banking industry.

The remainder of the paper is organized as follows. Section 2 provides a brief overview of the related literature and presents formulated hypotheses. Section 3 shows detailed information concerning the dataset and its structure. Section 4 provides a methodology description and the empirical results. Section 5 is the conclusion.

Literature review

During the past two decades, interest of academic scholars and practitioners in the field of fraudulent financial reporting (Cressey, 1971; Inaya & Isito, 2016; Nwakwo, 2013, Abdulrasheed, Babaita, & Yinusa, 2012; Ebimobowei, 2012, Kanu & Okorafor, 2013; Chiezey & Onu, 2013; Olaoye & Dada, 2014; Adeyemo, 2012; Akindele, 2011) have grown dramatically on examining the relationship between fraud and bank performance using the fraud triangle theory.

This study is premised on the fraud triangle theory established by Cressey (1971) in examining the relationship between fraud and bank performance. This is because the theory explains the three independent variables (perceived rationalization proxy by number of fraud cases, perceived pressure proxy by expected loss on fraud, and perceived opportunity proxy by amount involved on fraud) used in this study in relation to the dependent variable (bank performance proxy by return on assets). Cressey (1971) focused his research on the factors that lead individuals to engage in fraudulent and unethical activity.

An empirical study by Inaya and Isito (2016) investigated the social impact of fraud on the Nigerian banking industry. They found that banks in Nigeria are significantly engaging in a high rate of fraud. In another version, the study by Nwankwo (2013) which evaluated the relationship between fraud and Nigerian bank performance found that there was significant effect of fraud on commercial bank performance in Nigeria. Also, Abdulrasheed, et al. (2012) examined the impact of fraud on bank performance in Nigeria. The result showed that there exists a significant relationship between total amount involved in fraud and bank profit as a proxy for bank performance. Onuorah and Ebimobowei (2012) also

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examined the relationship between fraudulent activities and forensic accounting in the Nigerian banking sector in which they found that banks in Nigeria need to adopt more proactive measures like forensic accounting techniques.

Kanu and Okorafor (2013) studied the relationship between fraud and bank deposits in the Nigerian banking sector using descriptive and inference statistics. The study showed a positive relationship between bank deposits and fraud in the Nigerian banking industry. Chiezey and Onu (2013) used primary data to analyze the impact of fraud and fraudulent practices on bank performance in Nigeria covering 2001 to 2011. The result revealed that the ratio of mobilized funds lost to fraud was on the high side between 2001 and 2005 but was significantly reduced between 2006 and 2011. The study showed that the fraudulent activities led to banks and their customers having financial problems.

Olaoye and Dada (2014) looked at the interrelationship between nature, causes, effects, detection and prevention measures for bank fraudulent activities in Nigeria. The result of the analysis showed that banks should endeavor to have effective internal control mechanisms in the bank and banking staff adequately remunerated for their services. In addition, Adeyemo (2012) investigated the causes and effects of bank fraud in the Nigerian banking sector, showing that the battle for uncovering, reclusion, and retribution of fraudulent acts must be dealt with from two extensive situations. Akindele (2011) examined the challenges of (ATM) Automated Teller Machine usage and fraud in Nigeria's banking sector. His results showed that a communication gap, lack of adequate training and poor leadership skills were the greatest causes of fraud in banks.

Based on other research in the literature, this study has come to fill the gaps identified in the literature by using return on assets (ROA) to capture bank performance; and quarterly time series data in contrast to the primary data exhibited by most of the studies.

DESCRIPTION OF THE DATASET AND METHODOLOGY

This section includes the choice of our population, sample, measurement of variables, and model specification as well as the technique of data analysis applied. This study adopted ex-post facto research design, while a vector autoregressive (VAR) granger causality

model was used to analyze the secondary quarterly data obtained from Nigeria Deposit Insurance Corporation (NDIC) database. The population sample of the study was comprised of listed financial institutions as of 31st December, 2016. Going by the research in the literature, this study adopted the model by Chiezey and Onu, (2013) which used variables like expected loss on fraud (ELF), amount involved in fraud (AIF) and number of fraud cases (NFC) as proxies for perceived pressure, opportunity and rationalizations respectively.

In determining the VAR Granger Causality analysis, the first to be calculated is the stationarity of the data using the Augmented Dickey-Fuller (ADF) and Phillip- Perron (PP) unit root after which the descriptive statistics are used to examine the properties and characteristics of the data. Then, the optimal lag length is formulated in order to proceed to the Johansen cointegration test in order to examine the long run relationship among the variables. Having gone through this process, the VAR Granger Causality analysis is estimated to determine the causal relationship between fraud and bank performance.

ROA_t, NFC_t, ELF_t, and AIF_t denote the return on assets, number of fraud cases, expected loss on fraud, and amount involved on fraud respectively. Following on this, our estimated causality equations are specified as thus:

$$ROA_t = \sum_{i=1}^{n} \beta_1 ROA_{t-i} + \sum_{i=1}^{n} \alpha_1 NFC_{t-i} \quad (1)$$
$$NFC_t = \sum_{i=1}^{n} \beta_2 NFC_{t-i} + \sum_{i=1}^{n} \alpha_2 ROA_{t-i} \quad (2)$$
$$ROA_t = \sum_{i=1}^{n} \beta_3 ROA_{t-i} + \sum_{i=1}^{n} \alpha_3 ELF_{t-i} \quad (3)$$
$$ELF_t = \sum_{i=1}^{n} \beta_4 ELF_{t-i} + \sum_{i=1}^{n} \alpha_4 ROA_{t-i} \quad (4)$$
$$ROA_t = \sum_{i=1}^{n} \beta_5 ROA_{t-i} + \sum_{i=1}^{n} \alpha_5 AIF_{t-i} \quad (5)$$
$$AIF_t = \sum_{i=1}^{n} \beta_6 AIF_{t-i} + \sum_{i=1}^{n} \alpha_6 ROA_{t-i} \quad (6)$$
$$NFC_t = \sum_{i=1}^{n} \beta_7 NFC_{t-i} + \sum_{i=1}^{n} \alpha_7 ELF_{t-i} \quad (7)$$
$$ELF_t = \sum_{i=1}^{n} \beta_8 ELF_{t-i} + \sum_{i=1}^{n} \alpha_8 NFC_{t-i} \quad (8)$$
$$AIF_t = \sum_{i=1}^{n} \beta_9 AIF_{t-i} + \sum_{i=1}^{n} \alpha_9 NFC_{t-i} \quad (9)$$
$$NFC_t = \sum_{i=1}^{n} \beta_{10} NFC_{t-i} + \sum_{i=1}^{n} \alpha_{10} AIF_{t-i} \quad (10)$$
$$ELF_t = \sum_{i=1}^{n} \beta_{11} ELF_{t-i} + \sum_{i=1}^{n} \alpha_{11} AIF_{t-i} \quad (11)$$
$$AIF_t = \sum_{i=1}^{n} \beta_{12} AIF_{t-i} + \sum_{i=1}^{n} \alpha_{12} ELF_{t-i} \quad (12)$$

ROA = Return on Assets (Proxy for Bank Performance)

ELF = Expected Loss on Fraud (Proxy for Perceived Pressure)

AIF = Amount involved in Fraud Cases (Proxy for Perceived Opportunity)

NFC = Number of Fraud Cases (Proxy for Perceived Rationalization)

Table 1: Unit Root Test Results

Variables	ADF (at levels)	At first difference	Order of integration	Philip Peron (at level)	First difference	Order of integration
ROA	-2.695062**	-5.001800***	1(1)	-3.220438	-7.212801***	1(1)
ELF	-3.790806	-4.58815***	1(1)	-2.300500	-4.411202***	1(1)
AIF	-6.118434	-7.437818***	1(1)	-2.793128	-7.344579***	1(1)
NFC	-3.535954	-5.527688***	1(1)	-3.190070	-8.7881371***	1(1)

Source: Data source (2019)

Table 2: Descriptive Statistics Results

	ROA	ELF	AIF	NFC
Mean	2.842653	1260.080	18201.96	389.8265
Std. Dev.	3.031883	1963.827	28272.77	272.5623

Source: Data source (2019)

Table 3: VAR Lag Order Selection Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-2568.240	NA	1.519342	119.8251	120.1528	119.9459
1	-2307.325	412.6096	1.677438	110.6663	113.6153	111.7538
2	-2055.325	134.6780*	1.880136*	104.8988*	113.0904*	107.9196*

*Note: * indicates lag order selected by the criterion*
Source: Data source (2019)

Table 4: Johansen Co-integration Test Results

Hypothesized number of Co integration(s)	Eigen Value	Trace statistics	p-value	Hypothesized no. of CE (s)	Eigen value	Max –Eigen statistics	Prob value
None *	0.83334	118.257	0.0000	None *	0.833349	68.0904	0.0000
At most1*	0.49533	50.1669	0.0001	At most 1*	0.495330	25.9863	0.0096
At most2*	0.46720	24.1806	0.0019	At most 2*	0.467202	23.9252	0.0011
At most3	0.00669	0.25540	0.6133	At most 3	0.006699	0.25540	0.6133

Source: Data source (2019)

FINDINGS AND DISCUSSIONS

UNIT ROOT TEST

The study also uses both the Augmented Dickey-Fuller (ADF) and the Phillip- perron (PP) unit root test in ensuring the consistency in data used in the study. The results are shown below.

The results in Table 1 above show the Augmented Dickey-Fuller (ADF) and Phillip- Perron (PP) unit root test in which all the variables used in the model are stationary at first difference – meaning that all the variables used in the study were of the same order and the same characteristics.

DESCRIPTIVE STATISTICS ON FRAUD AND BANK PERFORMANCE VARIABLES

As observed from Table 2 above, return on assets (ROA) has the lowest mean and standard deviation value of 2.842653 and 3.031883 while amount involved in fraud cases (AIF) has the highest mean and standard deviation value of 18201.96 and 28272.77 and the mean and the standard deviation value of expected loss in fraud (ELF) and number of fraud cases (NFC) are 1260.080; 1963.827 and 389.8265; 272.5623 respectively.

THE LAG LENGHT STRUCTURE

From the results obtained from Table 3 above, it shows that the lag length selection criteria of order

Table 5: VAR Granger Causality Results

VAR Granger Causality/Block Exogeneity Wald Tests			
Sample: 2000Q1 2013Q4			
Dependent variable: ROA			
Excluded	Chi-sq	Df	Prob.
ELF	5.04325	2	0.8784
AIF	10.3506	2	0.4867
NFC	9.14322	2	0.8135
Dependent variable: ELF			
Excluded	Chi-sq	Df	Prob.
ROA	5.04325	2	0.0028
AIF	12.1634	2	0.7933
NFC	8.14183	2	0.0953
Dependent variable: AIF			
Excluded	Chi-sq	Df	Prob.
ROA	10.3506	2	0.0281
ELF	12.1634	2	0.0012
NFC	6.19823	2	0.3006
Dependent variable: NFC			
Excluded	Chi-sq	Df	Prob.
ROA	9.14322	2	0.0018
ELF	8.14183	2	0.0024
AIF	6.19823	2	0.0006

Source: Data source (2019)

is two, meaning that in order to conduct the long run cointegration as well as the vector autoregressive granger causality model analysis, lag with order two must be selected.

Cointegration Analysis Results and Interpretation

The results from Table 4 above show that both trace test and maximum Eigen value for unrestricted co-integration rank test of at most 2 * are rejected – meaning that there exists a long run relationship among the variables which are ROA, ELF, AIF and NFC. This study then goes ahead to conduct a Granger causality test in order to establish the relationship that exists between fraud and bank performance because all the variables cointegrated.

Granger Causality Test Results

The result of the causal relationship among the pair of elements fraud as identified by Cressey on his Fraud triangle theory in the entire model as shown in Table 5 above revealed that a unidirectional relationship exists among the three elements of fraud namely expected loss on fraud (ELF), amount involved in fraud (AIF) as well as number of fraud cases (NFC) and bank performance (ROA) at 5% significance level (P-value of 0.0028, 0.0281 and 0.0018).

Vector Auto Regression Results

The result of the causal relationship among the pair of elements fraud as identified by Cressey on his Fraud triangle theory in the entire model as shown in Table 5 above revealed that a unidirectional relationship exists among the three elements of fraud namely expected loss on fraud (ELF), amount involved in fraud (AIF) as well as number of fraud cases (NFC) and bank performance (ROA) at 5% significance level (P-value of 0.0028, 0.0281 and 0.0018).

In Table 6 above, number of fraud cases (NFC) indicates a negatively significant relationship while expected loss on fraud (ELF) indicates a positively significant relationship with bank performance. However, amount involved in fraud (AIF) cases indicates a negatively insignificant relationship with bank performance. The R^2 which is used to measure the degree to which changes in the dependent variable

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Table 6: Vector Auto Regression Results

Variables	Coefficient	t-statistics	Standard error
ROA	1.093704	3.93180	0.27817
NFC	-0.000545	-0.36214	0.00150
ELF	0.000469	0.81642	0.00057
AIF	-1.101205	-1.12293	9.88206
C	-1.103421	-1.04911	1.05177
R-Squared	0.65		
Adjusted R-Squared	0.53		

Source: Data source (2019)

are being explained by the independent variable exhibits the value of 0.65 suggesting 65% of the changes in ROA is caused by the independent variables. The result implies that the independent variables are statistically significant in explaining variations in the dependent variable.

Conclusions

This study through examination of the fraud triangle theory established by Cressey (1971), concludes that fraud elements like expected loss on fraud (ELF) and number of fraud cases perpetrated (NFC) have both significantly impacted return on assets (ROA). Due to the fact that the higher the number of fraud cases, the lower the amount of deposits, then the greater the amount of expected losses. Based on the findings¸ it is recommended that banks in Nigeria need to strengthen their internal control systems in order to prevent fraud and fraudulent activities and to protect their assets. Also, the regulatory and supervisory bodies of banks need to improve their supervision using all tools at their disposal to appropriately check and curtail the incidence of fraud and fraudulent practices in the banking industry in Nigeria.

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