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FORENSIC ACCOUNTING TECHNIQUES AND FRAUD PREVENTION IN NIGERIAN BANKS

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Abstract

This doctoral research investigates the impact of forensic accounting techniques on fraud prevention in Nigerian banks, with a specific focus on Computer Assisted Audit Techniques (CAATs), Ratio Analysis (RA), and Trend Analysis (TA). The study aims to, examine the relationship between CAATs, RA, and TA and fraud prevention in Nigerian banks, determine the extent to which these techniques contribute to fraud detection and prevention, identify the challenges and limitations of implementing forensic accounting techniques in Nigerian banks, develop a framework for enhancing fraud prevention mechanisms in Nigerian, a survey research design was adopted and questionnaires administered to 150 forensic accountants, auditors, and bank managers who are believe to be knowledgeable on the concepts of fraud and banking operations, based on the annual reports of ANAN and ICAN of a population of 1985 population of chartered accountants in Nigeria, multiple regression analysis and structural equation modeling (SEM), finding revealed that CAATs and RA significantly impact fraud prevention ($p < 0.01$), TA has no significant effect on fraud prevention ($p > 0.05$), forensic accounting expertise, software proficiency, and management support are crucial factors, the study recommends that, Nigerian banks should engage forensic accounting experts and invest in forensic software implement CAATs and RA techniques, provide regular training and capacity building for forensic accountants and auditors, develop a fraud prevention framework incorporating forensic accounting techniques.

KEYWORDS: International Financial Reporting Standard, Public-Sector, Public-Sector Accounting, financial reporting, accountability.

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1.0 Introduction

Maurice E Peloubet is credited with developing the term Forensic accounting in his 1946 essay "Forensic Accounting: Its Place in Today's Economy". By the late 1940s, Forensic accounting had proven its worth during World War II; however, formalized procedures were not put in place until the 1980s when major academic studies in the field were published. Forensic accounting came into existence as indispensable cronies in the war against fraud and economic crimes. Forensic accountants with appropriate training, education, and experience can assist agencies and departments charged with the responsibility of enforcement, recovery, audit committees, regulation, and financial statement audit teams to enhance their responsibilities (Popoola, Che-Ahmad, Samsudin, & Yussof :2013).

Before the latest economic downturn, the accounting profession was already undergoing radical changes as a result of the Enron and WorldCom debacles as well as other accounting scandals. With the spotlight on the accounting profession, a new market with a breed of new accountants: forensic accountants has emerged. This has led to an increase in demand for forensic accounting services as the public deals with financial collapses.

The Nigerian Banking sector is one of the most controlled and regulated sectors. Despite this, fraud has continued to rear its ugly head in the sector.

Reporting financial irregularities in the firms' accounts has been an increasing phenomenon in the world and has continuously remained a leading issue at any point in time. Modern organized financial crimes are highly sophisticated and many of the management staff are not experts in fraud-related problems (Ogutu and Ngahu : 2016).

The rampant impacts of crime globally have increased the need for credible and high-quality forensic accounting. However, forensic accountancy as a profession with its services as consultancy expert testimony, litigation support, and fraud auditing (investigation accountancy) bridges a large gap in the prevention of such financial crime. In Nigeria, many foreign investors have lost several billions of dollars to fraudsters because of corruption thereby leading to reduction or even dis-investment from Nigeria and its attendant negative consequences on economic growth.

1.2 Objectives of the study

The main stay of this study is to examine the effect of forensic accounting techniques on fraud prevention in the Nigerian banking sector.

The following specific objectives are set out below:

i. To determine the extent to which computer assisted audit techniques (CAT) helps in fraud prevention in Nigerian banks.
ii. To determine the extent to which ratio analysis aids fraud prevention in Nigerian banks.
iii. To determine the extent of trending in fraud prevention in Nigerian banks.

1.3 Research questions

Based on the research objectives, the following research questions are formulated:

i. To what extent do computer-assisted audit techniques (CAT) prevent fraud in Nigerian banks?
ii. To what extent do ratio analyses prevent fraud in Nigerian banks?
iii. To what extent does trending prevent fraud in Nigerian banks?

1.4 Research hypotheses

Based on the research objectives and questions, the following hypotheses are formulated:

H_0: The application of computer-assisted audit techniques (CAT) has no significant effect on fraud prevention in Nigerian banks.

H_0: The application of ratio analyses has no significant effect on fraud prevention in Nigerian banks.

H_0: The application of trending has no significant effect on fraud prevention in Nigerian banks.

2.0 **Literature review**

2.1 Conceptual review

2.1.1 Forensic accounting

Dhar and Sarkar (2010) define forensic accounting as the application of accounting concepts and techniques to legal problems. It demands reporting, where accountability of the fraud is established and the report is considered as evidence in a court of law or administrative proceedings.

Forensic accounting is the integration of accounting, auditing, and investigative skills (Zysman : 2004).

Akintoye (2008) said forensic accounting is a discipline that is suitable for legal review, offering the highest level of assurance, and including the new generally accepted connotation of having been arrived at scientifically and providing the needed findings in settling disputes. Forensic accountants calculate values, draw conclusions, and identify irregular patterns or suspicious transactions by critically analyzing the financial data. It provides an accounting analysis to the court for dispute resolution in certain cases and it also provides the courts with the explanation that fraud has been committed (Adrian & Lawrence:2009).

2.1.2 The meaning of fraud

No one description of financial fraud suffices; it has been variously described in the literature. Wikipedia dictionary describes Fraud as crimes against property, involving the unlawful conversion of property belonging to another to one's own.

Williams (2005) incorporates corruption into his description of financial crimes. Other components of fraud cited in Williams's (2005) description include bribes cronyism, nepotism, political donation, kickbacks, artificial pricing, and frauds of all kinds. The array of components of financial crimes, some of which are highlighted above, is not exhaustive.

Fraud, according to the Black Law Dictionary 1997 in Okoye and Gbengi (2013), includes all the multifarious means human ingenuity can devise that are resorted to by the individual to get an advantage over another by false suggestions or suppression of the truth. It includes surprises, tricks, cunning or dissembling and unfair ways by which another is cheated.

2.1.3 Frauds in digital environment

Information and Communication Technology is an integral part of our lives. We are dependent upon technology for all kinds of our daily work whether personal or professional. We live in a digital environment as all our transactions are linked in some or other ways to this technology. Banking, Insurance or Finance companies use technology for their business transaction. Misuse of data is the biggest threat in this digital world.

2.1.4 Fraud management

According to Koh (2009) when a company undergoes severe financial problems and ends up in bankruptcy, fraud, by senior management may be involved. Fraud management detects known fraud types and patterns of unusual behaviour, helps investigate these unusual patterns for potential fraud, and uses the knowledge thus generated to upgrade and protect against future intrusion.

Fraud management is a system where corporate bodies seek tools that will help them to proactively prevent, detect, and stop fraudulent activities on their network (Paul: 2002).

The above definitions of fraud management, imply that Fraud management involves both manual and automated actions aimed to curb fraud losses. The present economy therefore calls for the use of higher technology to combat fraud by management.

2.2.0 Theoretical review

Studies have employed several theories to explain why corporate bodies may use forensic accounting skills to manage fraud and crimes. However, for this study, the relevant theories are the fraud triangle, fraud Diamond, Fraud Management lifecycle, and fraud scale theories.

2.2.1 Fraud triangle theory

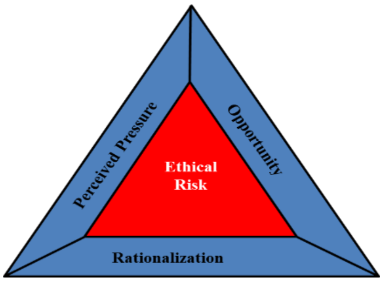


Figure 1: Fraud Triangle. Source: Donald Cresset, 1950

This theory is credited to American Criminologist Donald Cresset (1950). The fraud triangle is what the forensic accountant relies on to identify suspected fraud, the causes, and the weakness in the system that prompted the fraud. Based on the fraud triangle concept, the three factors that cumulate into the triangle are; pressure, opportunity, and rationalization. This is the theory for which the research is anchored. The theory is relevant to this research because it explains the need to eliminate pressure, opportunity and rationalization which may instigate and motivate fraudulent activities.

Opportunity: Employees use their position to commit fraud when internal controls are weak, or where there is poor management oversight on internal control Implementation. Most employees who commit fraud do so because they have the opportunity to access Assets and information that allows them to obscure their fraudulent deeds. Employees indeed need access to certain platforms to perform their jobs. The same access can provide the employee with an opportunity to commit fraud.

Pressure/Incentive: Pressure can make a staff commit fraud. Pressure does not only mean financial pressure. Lister (2007), states that there are three types of motivation or pressure; personal pressure to pay for lifestyle, employment pressure from continuous compensation structures, or management's financial interest, and external pressure such as threats to the Business's Financial stability, financial covenants, and market expectations. Therefore, forensic accountants have to keep in mind that pressure/motive to commit fraud can be either personal pressure, employment pressure, or external pressure and each of these types of pressure can also happen because of financial and non-financial pressure (Gbegi & Adebisi:2013).

Rationalization: This is an attempt by employees to justify why they commit fraud. For instance, an employee who is about to be evicted from his/her home can use rationalization to justify a fraudulent act. The employee may say "I deserve to have a place to call my home", so also an employee who feels he/she is underpaid may say it is a way of augmenting the payment due to him/her. As such, the rationalization is an act of an employee who commits fraud to give reasons for his action.

2.2.2 **The Fraud Diamond Theory**

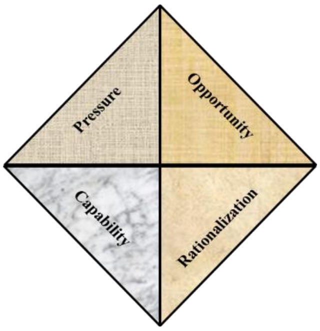


Figure 2: Fraud Diamond. Source: Wolf and Hermanson

Wolf and Hermanson (2004) presented the fraud diamond model where they introduced another view on factors of fraud. The model adds another variable “capabilities” to the three factors theory of the fraud triangle. Wolfe and Hermanson (2004) opined that although perceived pressure might coexist with an opportunity and rationalization, it is improbable for fraud to occur unless the fourth element (that is capability) is also present. In other words, the potential perpetrator of crime must have the skills and ability to commit fraud. Many frauds would not have happened without the right person with the right capabilities to implement the fraud. They suggested four observation traits for committing fraud:

1. Authoritative position or function within the organization.
2. Capacity to understand and exploit accounting systems and internal control.
3. Confidence that he/she will not be detected, or if caught, he/she will get out of it easily.
4. Capability to deal with the stress created within and otherwise good person when he or she commits bad act.

2.2.3 **Fraud scale theory**

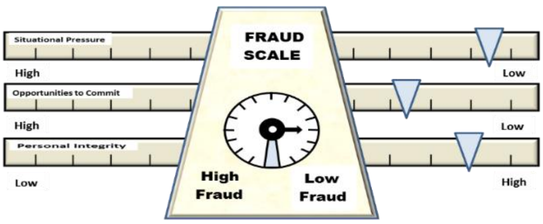


Figure 3: Fraud Scale Theory. Source: Albrecht, Howe, and Romney (1984)

The fraud scale theory was developed by Albrecht, Howe, and Romney (1984), as an alternative to the fraud triangle model. The fraud scale is very similar to the fraud triangle; however, the fraud scale uses an element called "personal integrity" instead of rationalization. This personal integrity element is associated with each individual's code of ethical behavior. Albrecht et al (1984) also argued that, unlike rationalization in the fraud triangle theory, personal integrity can be observed in both an individual's decision and the decision-making process, which can help in assessing the integrity and determining the likelihood that an individual will commit fraud. Experts agree that fraud and other unethical behaviors often occur due to an individual's lack of personal integrity or other moral reasoning.

2.2.4 **Fraud management lifecycle theory**

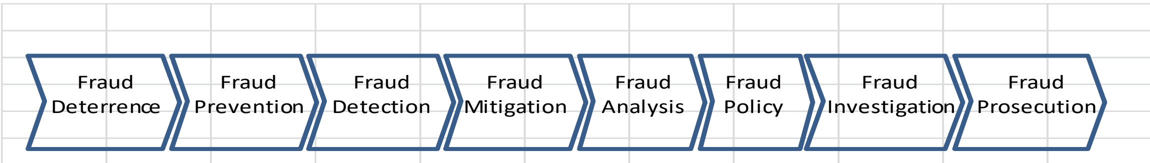


Figure 4: Fraud management lifecycle Source: Adapted from Wilhelm, 2004

Fraud Management Lifecycle Theory by Wesley Wilhelm (2004). The fraud management lifecycle is a network where each stage is a sum of entities that are made up of interrelated, interdependent and independent actions, operations and functions that help in fraud control (Njenga and Osiema :2013). Wilhelm (2004) in his study noted that effective management of the Fraud Management Lifecycle starts with understanding or defining the stages in the lifecycle. If there is no awareness and understanding of the lifecycle of fraud, fraud management professionals are unlikely to communicate effectively with each other, with the stakeholders in industries, and within their respective businesses. The Fraud Management Lifecycle is made up of eight stages.

The first stage is deterrence, which is characterized by actions and activities intended to stop or prevent fraud before it is attempted. This means deterrence is meant to discourage even an attempt at fraud. Deterrence is achieved by creating fear of consequences or difficulty of perpetration, to turn aside, discourage or prevent fraudulent activity from being attempted (Kimani:2011).

The second stage is prevention stage activities. These are activities intended to prevent fraud from occurring or to safeguard the organization and its processes against fraud. The ability of prevention to stop losses through fraud from occurring and stopping fraudulent activity from continuing is an important aspect. The latter activities are more mitigating. Prevention, when understood from a security perspective, can be thought of as hardening the target. Deploying protective procedures, processes, systems, and verifications that make fraud harder to commit Prevention activities are intended to make fraud more difficult to commit (Wilhelm:2004).

Detection is the third and it includes three activities that are connected in the fraud arena: fraud testing, fraud attempts, and fraud successes. The point of deviation is that not all fraud attempts are successful and that not all perceived fraud attempts are intended to be successful. Thus, detection in the fraud arena should ensure the revelation of the existence of fraud testing, fraud attempts, and successful frauds (Wilhelm: 2004).

The fourth stage involves mitigation of fraud. By definition, mitigation in fraud is to stop a fraudster from going on with fraud or completing their fraudulent activities, to reduce their chances of success. Mitigation activities can take place immediately or may be delayed for some time. The faster mitigation activities can be undertaken, and then will be the results (Khan:2008). Mitigation in fraud focuses on actions that are intended to reduce the extent of the fraud, the amount of the associated fraud losses, and the effort and expense required to recover or correct the impact of the fraudulent activity (Wilhelm:2004). This last goal is especially important when identity theft and the resulting identity fraud are involved. The faster the fraud activity is detected and mitigation activities initiated, the less time, effort, and expense will have to be invested in correcting the accounting record.

The fifth stage is analysis which involves activities to identify and understand losses incurred despite the deterrence, detection, prevention, and mitigation stage activities. Analysis valuates the impact of fraud management activities upon legitimate operations. Analysts give feedback to mitigation concerning the performance measurements of activities to fully act on detection alerts to reduce the losses from fraud activities. Analysis provides the investigators with information to understand the environment well and assess their investigative activities and success (Khan:2008).

Fraud policy is a statement that assists the employees to understand fraud, the organization’s attitude towards fraud and the action to take in case of fraud perpetration suspicion (Australian National Audit Office:2011). Njenga and Osiema (2013) in their research stated that policy to address fraud should seek to balance deterrent value, loss reduction, sales volume, operational scalability, and cost-effectiveness. Policy development involves constantly putting together all the situations that had been separated during analysis. The knowledge gained through analysis, should be combined with internal, external, and interactive environmental factors to develop policies that address the whole while leveraging the knowledge of the parts (Wilhelm:2004).

The investigation stage involves getting sufficient evidence and information to stop fraudulent activity, recover stolen assets or return the assets to owners, and provide sufficient information and support for the successful prosecution and conviction of the fraudsters (Njenga and Osiema:2013). Fraud investigations concentrate on three major areas of activity; internal investigations, external investigations, and law enforcement coordination. Internal investigations will focus investigations on employees, contractors, consultants, or vendors while external investigations are conducted on customers, fraudsters, and organized groups (Wilhelm:2004).

The last stage of the fraud management lifecycle is prosecution. Prosecution is defined as “the institution and conducting of legal proceedings against someone in respect of criminal charge” (Oxford Dictionary). There are three major intentions of prosecution in the fraud. The first is to punish the perpetrator of fraud in an attempt to prevent further fraud. Secondly, the prosecution intends to establish, maintain, and enhance the reputation of the organization by discouraging fraud, so that the fraud perpetrators and those to commit fraud become aware of it. This is accomplished by the aggressive and successful arresting and punishing of fraudsters who target the organization. The third goal is to recover the stolen assets or restitution where possible (Khan:2008).

2.3 Empirical review

There has been research on forensic accounting both within and outside Nigeria.

Okafor and Agbiogwu (2016) conducted a study on the effect of forensic accounting skills on the management of Bank fraud in Nigeria. In their research work, they adopted a non-probability sampling technique to select the five (5) commercial Banks used as the population for the study. Based on the analysis of variance (ANOVA) the findings of their study reveal that possession of basic forensic skills significantly reduce the occurrence of fraud cases in the banking sector and that there is a significant difference between services of forensic accountants and External auditors, and that the presence of forensic accountants in Banks can aid in reducing fraud cases.

Enofe, Omagbon and Ehigiator (2015) examined the impact of forensic audit on corporate fraud in Nigeria. The study employed primary data with the aid of questionnaire. Data were analyzed using ordinary least square (OLS) regression technique. The study revealed that the frequent utilization of forensic audit services will significantly help in the detection, prevention as well as reduction of incidences of fraud in businesses.

Onodi, Okafor & Onyali (2015), examined the effect of forensic investigation methods in corporate fraud deterrence in Nigerian Banks. This study adopted a survey research design and data from primary source were collected through interviews and administration of questionnaires, while secondary sources consisted of reports on fraud and forgery in the banking sector. Statistical tools used to analyze the data included percentages, mean scores, frequency tables, regression analysis, and Z-test. The result revealed that there is a significant relationship between forensic investigative methods and corporate fraud deterrence. The finding revealed that expert services of forensic investigators are normally required in the prosecution of fraud, but the majority of the audit and accounting personnel in Nigeria are suffering from poor perception and knowledge of forensic investigative methods.

Zachariah, Masoyi, Ernest, and Gabriel (2014), worked on the topic titled "Application of forensic auditing in reducing fraud cases in Nigeria money deposit Banks". The study analyzed the trend in fraud cases from 2001-2012, including the amounts involved in fraud, the most frequent types of fraud, and the losses sustained by Banks. The descriptive analysis revealed that there are up and down movements in fraud cases. Since Banks continually lose huge sums of money as a result of the inability of the auditors and the supervisory regulators to curtail the trend, there is therefore the need to devise different means of tackling fraud in the Banks. According to the authors, Nigerian Banks over the past decades have suffered from the menace of fraud which resulted in distress and liquidation which hamper the roles of Banks in the economy. The study therefore suggested the employment of forensic auditing in Nigerian Banks by amending the existing statutes, in such a way that forensic auditors are included in the audit team.

Izedonmi & Ibadin (2012), examined forensic accounting and financial Crimes; looking at some basic and common financial crimes in corporate organizations, resting the focus on Nigeria, and by extension, the developing world. They revealed that the motivations for financial crimes are built around some risk factors, such as incentive (or pressure), opportunity, and rationalization surrounding the financial criminals.

Onuorah & Ebimobowei (2012) conducted a study on fraudulent activities and forensic accounting services of banks in Port Harcourt, Nigeria. The study employed a sample of (24) banks and analyzed the aid of least-squares and Granger Causality. The results of the study revealed that the forensic accounting application impacts the level of fraudulent activities in the banks, for the fact that forensic accounting gives banks good mechanisms that help to detect these fraudulent activities.

Njanike, Dube, and Mashayanye (2009), worked on "the effectiveness of forensic auditing in detecting, investigating, and preventing Bank frauds". The study dwelt on the effectiveness of forensic auditing in detecting, investigating, and preventing Bank fraud. The paper used questionnaires, personal interviews, and document reviews to gather data. Data for the research was gathered from forensic auditors from thirteen commercial banks, four building societies, and four audit firms in Harare, Zimbabwe. A sample of thirty forensic auditors was used from the thirteen commercial Banks, four-building sectors/societies, and four audit firms in Zimbabwe. It was found that forensic accounting departments suffer from multiple challenges, amongst them being the lack of material resources, technical know-how, interference from management, and unclear recognition of the profession. The study concluded that forensic auditors must be capacitated materially and technically to improve their effectiveness. In addition, forensic auditors should create a constituted body that serves their interests and regulates their activities just like any other profession.

Bressler (ND) researched the role of attorneys and judges' understanding of forensic accounting data as aid to litigation services. Stating that the judges' perception of Accounting Information Systems (AIS) is key in a judicial process, as it affects the jurors' position.

2.4 **Gap in the literature review**

Numerous studies have been conducted on fraud prevention, but very few are centered on forensic accounting and the banking sector. However, this study uniquely examined the techniques of forensic accounting and fraud prevention in Nigerian banks. The effective implementation of these forensic techniques, we believe, will help in the prevention of fraud in Nigerian banks.

3.0 Research methodology

3.1 Research design

This study adopts both qualitative analysis and quantitative analysis approaches for data analysis. A survey design was adopted, questionnaires were administered, and data was collected to describe or predict some phenomena about fraud in more qualitative banking operations. Questionnaires were administered to solicit responses from respondents believed to have the desired information. The survey population is based on the Annual ICAN report (ICAN:20020), there are; 1,444 ICAN members in Cross River State and 541 ANAN members in Cross River State, according to ANAN's annual reports (ANAN:2020). The stated value gives a total of 1985. Having a margin of error of 5% on the population of 1985, the sample size value of 150 was arrived at using Taro Yamane's formula to investigate the relationship between the variables under study. The study also adopts a quantitative approach using secondary data that available on fraud and banking operations. This is to ensure an all-encompassing analysis of the impact of forensic accounting on fraud management.

3.2 Population of the study

The population of this research comprises auditors, accountants, and information technology (IT) staff at banks in Calabar, Cross River State of Nigeria. The Banks and the population of audit, accounts and IT staff are tabulated below:

Table 3.1 The population of Studied Banks

S/N	BANKS	POPULATION IN PERSON (Relevant Staff Only)
1.	Access Bank Plc	25

2.	First Bank of Nigeria Limited	35
3.	Union Bank of Nigeria Plc	15
4.	United Bank for Africa Plc	20
5.	Zenith Bank Plc	20
6.	Fidelity Bank Plc	15
7.	First City Monument Bank Plc	15
8.	Guaranty Trust Bank Plc	15
9.	Ecobank Nigeria Plc	20
10.	Sterling Bank Plc	30
11.	Heritage Bank Plc	15
12.	Wema Bank Plc	15
Total		240

Source: Field study 2019

3.3 Sample size of the study

The sample size of the study will be 150 bank staff obtained using the Taro Yamane sampling technique.

Table 3.2

S/N	BANKS	SAMPLE SIZE
1.	Access Bank Plc	16
2.	First Bank of Nigeria Limited	22
3.	Union Bank of Nigeria Plc	9
4.	United Bank for Africa Plc	13
5.	Zenith Bank Plc	13
6.	Fidelity Bank Plc	9
7.	First City Monument Bank Plc	9
8.	Guaranty Trust Bank Plc	9
9.	Ecobank Nigeria Limited	13
10.	Sterling Bank Plc	19
11.	Heritage Bank Plc	9
12.	Wema Bank Plc	9
TOTAL		150

Source: Field study 2019

3.4 Techniques of data analysis

This study examined the effects of forensic accounting techniques on fraud prevention in Nigerian banks by using multiple regression analysis. This model is suitable because the research focus is on examining the relationship between forensic accounting techniques and fraud prevention in Nigerian banks. The Augmented Dickey-Fuller (ADF) test was used to examine the presence of unit roots in the variables. The unit root test provided the lead on employing the ordinary least square (OLS) and to carry out a co-integration test for further analysis. All estimations were performed with the econometric software program E-View.

3.5 Model specification.

The model specification used to examine forensic accounting techniques as the determinants of fraud prevention is specified as:

FRP = f (CAT, RAS, TRD)

It is stated econometrically as:

$FRP = \beta_0+\beta_1CAT+\beta_2RAS+\beta_3TRD+\mu$

Where:

β_0 = Unknown Constant term to be estimated

FRP = Fraud Prevention

CAT = Computer-Aided Audit Techniques

RAS = Ratio Analysis

TRD = Trending

μ = Stochastic error term

$\beta_1 - \beta_3$ = Unknown coefficients to be estimated

$\beta_0, \beta_1, \beta_2, \beta_3 \geq 0$

4.0 Results and discussion of findings

4.1 Data Analysis

The unit root test

The results of the unit root test of stationarity using the Augmented Dickey Fuller test and Phillip Peron (PP) test are reported in tables 4.2, 4.3. 4.4

Table 4.2

Null Hypothesis: CAT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-9.280990	0.0000
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: CAT has a unit root
Exogenous: Constant
Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-9.401842	0.0000
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Table 4.3

Null Hypothesis: RAS has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.07542	0.0000
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: RAS has a unit root

Bandwidth: 3 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.05353	0.0000
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Table 4.4

Null Hypothesis: TRD has a unit root

Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-7.656989	0.0000
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: TRD has a unit root
Exogenous: Constant
Bandwidth: 2 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-7.685369	0.0000
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Table 4.5

Null Hypothesis: FRP has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=13)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.427171	0.0004
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.
Null Hypothesis: FRP has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-4.241736	0.0008
Test critical values:	1% level	-3.477835	
	5% level	-2.882279	
	10% level	-2.577908	

*MacKinnon (1996) one-sided p-values.

Table 4.6
Summary of unit root test result

VARIABLE	**ADF TEST RESULT**	**PP TEST RESULT**
CAT	**I(0)**	**I(0)**
RAS	**I(0)**	**I(0)**
TRD	**I(0)**	**I(0)**
FRP		

The result of the unit root test using the augmented dickey-fuller (ADF) test as presented in tables 4.2, 4.3, and 4.4 above showed that all our variables are stationary at levels. Therefore, the null hypothesis variable has a unit root that can be rejected at levels for all. Similarly, the result of the unit root test using the Philip-Perron(PP) test, as presented in tables 4.2, 4.3, and 4.4 above showed that all our variables are stationary at levels.

Regression Analysis
Regression result of our model after log transformation
Lnfrp c lncat lnras lntrd
Table 4.7

Dependent Variable: LNFRP

Method: Least Squares
Date: 10/22/19 Time: 01:31
Sample: 1 140
Included observations: 140

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.933490	0.232070	8.331513	0.0000
LNCAT	0.305106	0.083660	3.646961	0.0004
LNRAS	0.068152	0.059946	1.136880	0.2576
LNTRD	0.218369	0.068205	3.201671	0.0017

R-squared	0.358171	Mean dependent var	3.954549
Adjusted R-squared	0.344013	S.D. dependent var	0.081352
S.E. of regression	0.065890	Akaike info criterion	-2.573516
Sum squared resid	0.590436	Schwarz criterion	-2.489469
Log likelihood	184.1461	Hannan-Quinn criter.	-2.539362
F-statistic	25.29813	Durbin-Watson stat	0.971598
Prob(F-statistic)	0.000000		

Table 4.8**: Diagnostic test**

Serial correlation/Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	29.40494	Prob. F(2,134)	0.0000
Obs*R-squared	42.70208	Prob. Chi-Square(2)	0.0000

The model has serial correlation. Prob. Chi-Square is less than 5%. We reject the Null hypothesis of No serial Correlation.

Table 4.9**: Heteroskedasticity test**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	9.189189	Prob. F(3,136)	0.0000
Obs*R-squared	23.59550	Prob. Chi-Square(3)	0.0000
Scaled explained SS	37.37574	Prob. Chi-Square(3)	0.0000

Model is heteroskedastic. Prob. Chi-Square is less than 5%. We reject the Null hypothesis of heteroskedasticity.

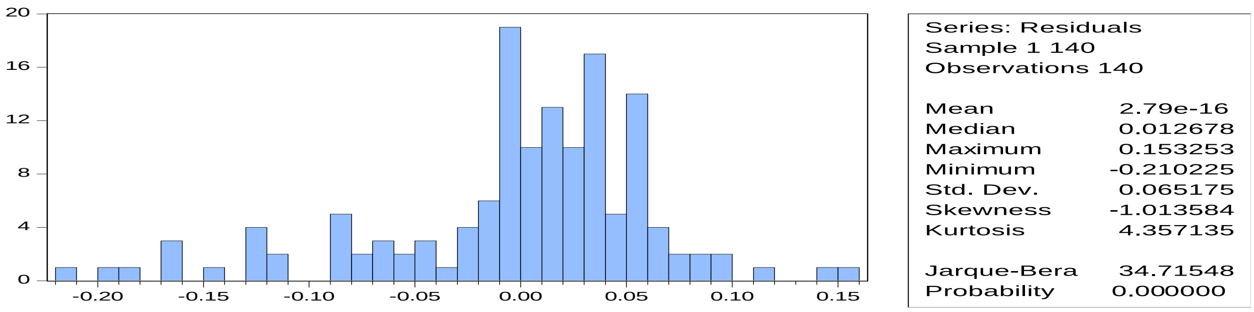


Figure 5**: Normality test**

Residual is not normally distributed. Probability is less than 5% for Jarque-Berra Statistics.

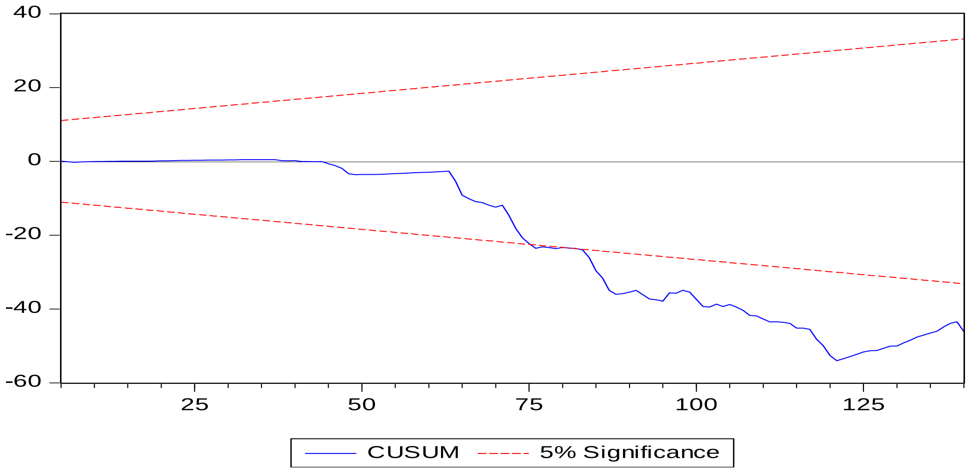


Figure 6**: Stability Test**

Our model is not stable because the BLUE line is outside one of the boundary RED lines.
In our model residual has serial correlation, is heteroscedastic, is not normally distributed, and has stability problems.
We need to correct our model, especially for serial correlation problems. To do this we:

i. Turn all variables to their first difference
ii. Remove constant(c) from our model
iii. Auto regress the dependent variable lnfrp.

We therefore formulate our new model as:
D(lnFRP) D(lnFRP(-1)) D(lnCAT) D(lnRAS) D(lnTRD)

Table 5.0: **Regression result after correction of our model**

Dependent Variable: D(LNFRP)
Method: Least Squares
Date: 10/22/19 Time: 01:52
Sample (adjusted): 3 140
Included observations: 138 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
D(LNFRP(-1)	-0.084733	0.079662	-1.063667	0.2894
D(LNCAT)	0.121188	0.057836	2.095366	0.0380
D(LNRAS)	0.071421	0.039686	1.799662	0.0742
D(LNTRD)	0.080475	0.055231	1.457060	0.1474

R-squared	0.217007	Mean dependent var	-0.001454
Adjusted R-squared	0.199477	S.D. dependent var	0.062108
S.E. of regression	0.055570	Akaike info criterion	-2.913802
Sum squared resid	0.413790	Schwarz criterion	-2.828954
Log likelihood	205.0523	Hannan-Quinn criter.	-2.879322
Durbin-Watson stat	1.929314		

Diagnostic check after correcting the model

Table 5.1**: Serial Correlation**

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.768517	Prob. F(2,132)	0.4658
Obs*R-squared	1.588404	Prob. Chi-Square(2)	0.4519

There is no serial correlation in our model. We cannot reject Null hypothesis that there is no serial or autocorrelation in our model since our prob. Chi-Square is not less than 5 percent.

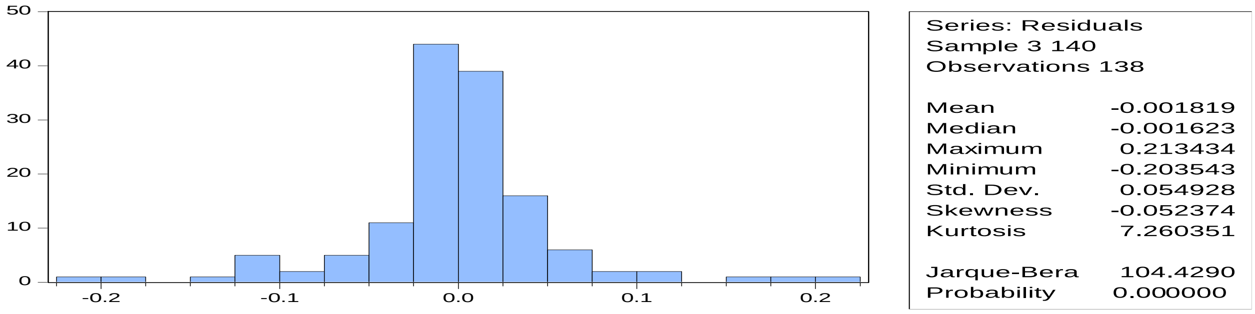
Table 5.2**: Heteroskedasticity Test**

Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	5.323825	Prob. F(4,133)	0.0005
Obs*R-squared	19.04628	Prob. Chi-Square(4)	0.0008
Scaled explained SS	56.19017	Prob. Chi-Square(4)	0.0000

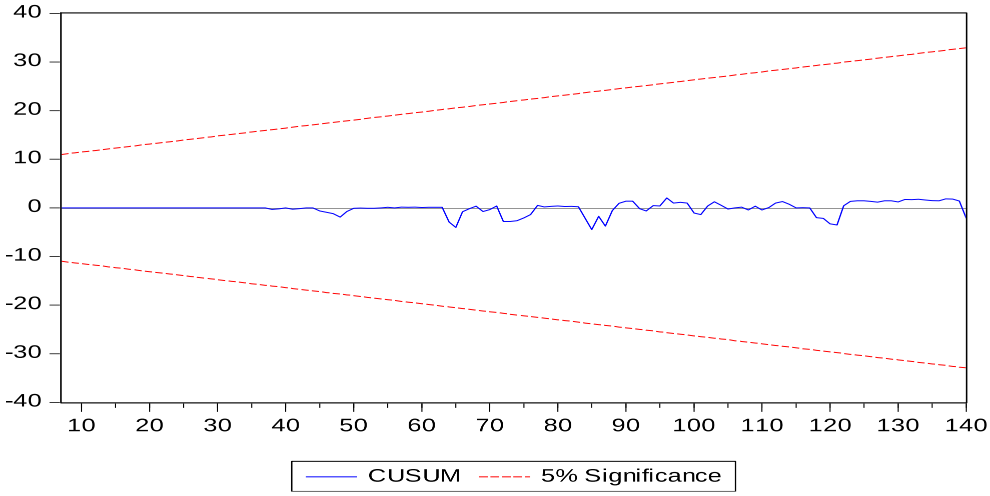
There is heteroscedasticity in our model. Our Prob. Chi-Square is less than 5percent. We reject the Null hypothesis

Table 5.3**: Normality Test**



Our model is not normally distributed. We reject the Null hypothesis that our residual is normally distributed.

Table 5.4**: Stability Check**



Our model is stable. Has no stability problem Rsquare of 21.7 percent indicates that only 21.7 percent of variation in fraud prevention is explained by our three independent variables CAT, RAS, and TRD. 78.3 percent are explained by variables not captured in our model.

CAT and RAS are significant and positively related to fraud prevention in Nigerian banks for the period under observation. CAT is significant at 3.8 percent while RAS is significant at 7.42 percent. Every one percent increase in CAT will lead to a 12.11 percent increase in fraud prevention while a one percent increase in the use of RAS will lead to a 7.14 per cent increase in fraud prevention

Test of Hypotheses

Hypothesis 1:

H_O1: The application of computer-assisted audit techniques (CAT) has no significant effect on fraud prevention in Nigerian banks.

Decision rule: accept H_O1 if the probability of t-stats is greater than 10 per cent else reject H_O1. From our model we can see that CAT has a probability of 0.0380 which is 3.8 per cent, therefore we cannot accept H_O1 rather we accept H_A1. It therefore means that Computer-assisted audit techniques have a significant effect on fraud prevention in Nigerian banks.

Hypothesis 2:

H_O1: The application of ratio analysis (RAS) has no significant effect on fraud prevention in Nigerian banks.

Decision rule: accept H_O1 if the probability of t-stats is greater than 10 per cent else reject H_O1. From our model we can see that RAS has a probability of 0.0742 which is 7.42 per cent, therefore we cannot accept H_O1 rather we accept H_A1. It therefore means that ratio analysis has a significant effect on fraud prevention in Nigerian banks.

Hypothesis 3:

H_01: The application of trending (TRD) has no significant effect on fraud prevention in Nigerian banks.

Decision rule: accept H_O1 if the probability of t-stats is greater than 10 per cent else reject H_O1. From our model we can see that TRD has a probability of 0.1474 which is 14.74 percent, therefore accept H_O1 and reject H_A1. It therefore means that trending has no significant effect on fraud prevention in Nigerian banks.

4.2 Discussion of findings

Rsquare of 21.7 per cent indicates that only 21.7 per cent of the variation in fraud prevention is explained by our three independent variables CAT, RAS, and TRD. 78.3 per cent are explained by variables not captured in our model.

CAT and RAS are significant and positively related to fraud prevention in Nigerian banks for the period under observation. CAT is significant at 3.8 percent while RAS is significant at 7.42 percent. Every one per cent increase in CAT will lead to a 12.12 per cent increase in fraud prevention while a one per cent increase in the use of RAS will lead to a 7.14 per cent increase in fraud prevention.

5.0 Summary, conclusion and recommendations

5.1 Summary of findings

This study is aimed at determining the effects of forensic accounting techniques on fraud prevention in Nigerian banks. On a specific note, the extent to which computer-assisted audit techniques (CAT), ratio analysis (RAS), and trending (TRD) affect fraud prevention was established. Using a purposive sampling technique, twelve banks operating in Calabar were used as the focal for the study. These banks arguably, have the same fraud peculiarities as the non-selected banks across Nigeria. Results of the study, at a ten per cent level of significance, showed that computer-assisted aided techniques (CAT) and ratio analysis (RAS), have significant effects on fraud prevention in Nigerian banks; while trending (TRD) has no significant effect on fraud prevention in Nigerian banks

5.2 Recommendations

The following recommendations are made from the findings of this study:

1. Further research on forensic accounting and fraud prevention in banks should exploit other variables such as data mining, relative size factor (RSF), Benford’s law technique, computer forensic tools, advanced statistical techniques, and the same differences

since the three variables of computer-assisted aided techniques (CAT), ratio analysis (RAS), and trending (TRD), used in this study explained only 21.7 per cent of the variation in bank fraud prevention; 78.3 per cent of variation in bank fraud prevention lies in these other variables.

2. Banks should employ the services of forensic accounting experts, well-versed in the use and application of forensic software.

3 Researchers who have an interest in knowing the effects of forensic accounting techniques on the prevention of bank fraud should consider other forensic accounting techniques like data mining, Relative Size Factor (RSF), Benford's law technique, genogram, and timeline analysis, same different, computer forensic tools, and advanced statistical techniques.

4 Studies similar could be done, but by investigating other techniques for preventing bank frauds like expert system, boron hashtee, model-based reasoning, and rules-based approach.

5.3 Conclusion

The findings of this study brought about the conclusion that computer-assisted audit techniques (CAT), if effectively applied will have significant effects on fraud prevention.

The effective use of ratio analysis (RAS) also has a significant effect on fraud prevention in Nigerian banks. The model of the study also revealed that trending has no significant effect on fraud prevention.

Every one per cent increase in the use of CAT will lead to a 12.12 per cent increase in fraud prevention, while every per cent increase in the use of RAS will lead to a 7.14 per cent increase in fraud prevention.

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Forensic Accounting Techniques Research Questionnaire

Dear respondent,

This questionnaire has been developed for the collection of data related to forensic accounting techniques and fraud prevention in the banking industry. Your bank is one of the banks considered based on your outstanding performance. Kindly supply the information required of you and those related to your banking operations. The information is required and will be used for research purpose only. The information will be handled confidentially. As such, your personal identity is not needed. Please, be as honest as possible.

Thanks for anticipated co-operation.

Section A: Biodata

1. Gender: Male ☐ Female ☐
2. Age: (a) Below 30yrs (b) 31 – 40yrs (c) 41 – 50yrs (d) Above 50yrs
3. Highest Educational Qualification:
   (a) NCE (b) HND/First Degree (c) Masters (d) Ph.D (e) Professionally Chartered
4. Rank: ………………………………………………………………………………………….

Section B: Independent Variables

In this part, there are statements that relate to your use or application of some forensic accounting techniques. Please respond by check making the cells that truly express your honest opinion of the practices in your bank.

Note: TAVLE = To a very large extent
TALE = To a large extent
NTALE = Not to a large Extent
NTAVLE = Not to a very large extent
TNEAA = To no extent at all

ITEM	VARIABLE / ITEM CONTENT	RESPONSES				
		TAVLE	TALE	NTALE	NTAVLE	TNEAA
	Subscale 1: Computer Assisted Audit Techniques (CAATs)					
1	CAATs is the process of using computer to automate the Information Technology (IT) audit processes. Your bank uses CAATs.					
2	Data query implies to find, extract, eliminate or delete from a database. In your bank, Data Query Languages (DQLs) are used to make queries in your databases and information systems.					
3	Structured Query Language (SQL) and Data Mining Extension (DMX) are used in your bank.					

4	Effective and efficient application of Computer Assisted Audit Techniques (CAATs), requires specialised training. Your bank has specially trained staff in the use of CAATs.					
5	CAATs is of two types namely Data analysis software and Test data. Electronic Spreadsheet is one of the data analysis software, and is used in your bank.					
6	Audit Command Language (ACL) is audit software that assists auditors with identifying potential fraud patterns and data irregularities. Your bank makes use of ACL.					
7	Enterprise Application Software (EAS) and Arbatus are specialised audit software. Your bank uses these specialised audit software.					
	Subscale 2: Ratio Analysis.					
	Ratio analysis is the use of our accounting information to help us be aware of prospective problems and to compare with other industry ratios.					
1	Return on Assets (ROA) is expressed as: Net Income divided by Total Assets, Multiplied by 100. This ratio is computed in your bank to measure how management is using its assets to generate more income.					
2	Return on Equity (ROE) is expressed as: Net Income divided by average Equity, Multiplied by 100. This ratio is computed in your bank to measure how well management is using investments (shareholders fund) to generate more income.					

3	Return on Investment (ROI) is expressed as: Net Income divided by cost of investment, Multiplied by 100. This ratio is computed in your bank to evaluate the efficiency of an investment or compare the efficiency of a number of different investments.					
4	Debt-to-assets ratio is an indicator of a company financial leverage. Expressed mathematically as Total debt divided by total assets. This ratio is computed in your bank to measure total assets financed by creditors.					
5	Debt-to-equity ratio is an indicator of a company financial leverage. Expressed mathematically as Total debt divided by total equity. This ratio is computed in your bank to measure if it has more debt financing than equity financing and vice versa.					
6	Debt-to-capital ratio is an indicator of a company capital structure, financial solvency and degree of leverage. Expressed mathematically as Total debt divided by total debt plus total equity. This ratio is computed in your bank to measure total debt and financial liabilities against the total shareholders equity.					
7	Asset-to-equity ratio is an indicator of a company financial leverage. Expressed mathematically as Total assets divided by total equity. This ratio is computed in your bank to measure the portion of the bank's assets that are financed by shareholders equity.					
8	The cash ratio compares a company's liquid assets to its current liabilities. It is the most conservative of all liquidity measurements. Expressed mathematically as Total cash and cash equivalents divided by current liabilities. Your bank uses this ratio to determine if it can meet its short-term obligations.					
	Subscale 3: Trending					

1	Trending compares current year ratios with previous years ratios. Trending is a common practice in your bank.					
2	Through trending, your bank can easily identify financial irregularities when current year financial data are compared with that of previous years.					
3	Trending, as a financial analytical tool, helps your bank top management in decision making.					
4	A linear trend analysis always shows that something is increasing or decreasing at a steady rate. Your bank makes use of linear trend.					
5	Trend analyses are based on the idea that what happened in the past gives an idea of what will happen in the future. Your bank uses this technique to guide against future occurrences of fraud.					
6	Your bank apply trending as a financial analytical tool in their decision making.					
Section C: Dependent Variable						
	Subscale 1: Fraud Prevention					
1	Wrong classification of expenditure as either capital or operational expenditure in the accounts is easily detected.					
2	The bank has the ability to detect immaterial and duplicated transactions in the books of the bank.					
3	The bank has ability to monitor abnormal trends in its operations and takes corrective actions either monthly. Quarterly, yearly or cross sectionally.					
4	The bank has the ability to monitor transactions from initiation point to completion with time-logs and track initiator's profile.					

5	The bank has ability to establish monthly or quarterly or yearly individual operational costs implications to total operational costs or performance.					
6	The frequent analyses of debt-to-assets ratio, which will reveal the amount of the bank assets financed by creditors, can help prevent fraud.					
7	The frequent analyses of debt-to-equity ratio, which will reveal if your bank has more debt financing than equity financing, can help prevent fraud.					
8	The frequent analyses of debt-to-capital ratio, which will reveal your banks total debts plus financial liabilities against total shareholders' equity, can help prevent fraud.					
9	The use of electronic spreadsheet as data analysis application software, can help in fraud prevention.					
10	Trending can easily identify financial irregularities when current year financial data are compared with that of previous years and this can help prevent fraud.					
11	When frauds are detected trough trending from previous year's data, the results can guide against future occurencies of fraud.					

Data used for the estimation

CASES	CAT	FRP	RAS	TRD
1	35	54	42	29
2	23	55	36	27
3	31	55	32	28
4	32	55	40	29
5	33	55	40	29
6	33	55	42	30
7	31	55	32	30
8	33	55	32	26
9	33	55	40	26
10	32	55	36	29
11	35	55	32	30
12	33	55	40	30

13	34	55	32	30
14	35	55	40	30
15	29	55	32	30
16	32	55	32	29
17	31	55	32	29
18	33	55	40	30
19	34	55	40	30
20	34	55	40	30
21	34	55	39	29
22	34	55	39	29
23	35	55	40	30
24	35	55	40	30
25	33	55	40	25
26	33	55	40	25
27	33	55	40	25
28	31	55	40	26
29	35	55	40	30
30	35	55	40	30
31	35	55	40	30
32	35	55	40	30
33	34	55	40	30
34	30	55	33	30
35	32	55	40	30
36	31	55	32	24
37	35	55	40	30
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49	33	54	42	29
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53	32	55	33	24
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61	33	55	40	30
62	35	55	38	30
63	35	55	40	30

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65	27	41	28	24
66	28	49	35	22
67	30	51	37	28
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69	33	51	38	23
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83	33	53	40	29
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85	28	39	29	21
86	32	46	37	25
87	30	40	30	23
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136	33	55	38	28
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139	32	55	40	29
140	34	45	40	26

Source: Scores from questionnaires.