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Bank Fraud and Financial Performance in Indian Public Sector Banks: An Empirical Analysis Using OLS Regression

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Abstract

The Indian banking sector, especially public sector banks (PSBs), has faced persistent challenges related to financial fraud, undermining institutional performance and public trust. This study investigates the impact of fraud on the financial performance of PSBs from 2017 to 2023, using secondary data from Rajya Sabha records and annual bank reports. Employing Ordinary Least Squares (OLS) regression, we analyze how the number of fraud cases (LNOF) and the amount involved in fraud (LAIF) influence Return on Assets (ROA), Return on Equity (ROE), and Deposits. Results indicate that while the frequency of fraud incidents is positively and significantly associated with bank performance metrics, the monetary value of fraud has a significantly negative impact on ROA and ROE. The findings underscore the dual challenge of fraud frequency and severity, with implications for internal controls, forensic auditing, and banking regulation. The study recommends proactive regulatory oversight, adoption of forensic accounting tools, and early fraud warning systems to enhance financial stability in the public banking sector.

Keywords *– Bank Fraud, Financial performance, Public Sector banks, Forensic Accounting.*

1. Introduction

The banking sector, a cornerstone of any country's functional and economic development, is the focus of this study. The robustness of a nation's banking system is a key determinant of its overall economy and financial stability. Banks are crucial intermediaries in mobilizing funds from lenders to borrowers, bridging the gap between those with surplus capital and those with deficits. Their efficient resource channelling supports investment, fosters economic growth, and maintains liquidity within the financial system. Moreover, banks' provision of essential financial services, such as savings and loans, is vital for both individuals and businesses, further contributing to overall economic health and stability.

1.1. The Indian Banking System

The Indian banking system is distinct from those of other Asian nations due to its diverse culture, varied income patterns, large population, and vast geographical expanse (Deolalkar, 1998). Over the years, the Indian banking sector has evolved significantly, culminating in its current structure in the 21st century. A major transformation occurred with the nationalization of fourteen banks in 1969, followed by six more in 1980. This period marked a significant shift towards greater state control and expanding banking services nationwide (Bhasin, 2015). The liberalization of the Indian economy in 1991 was another pivotal moment, leading to substantial growth and changes within the banking sector. This era introduced increased competition, technological advancements, and the entry of private and foreign banks, which enhanced efficiency and service quality. Consequently, the Indian banking sector has

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become more resilient and dynamic, capable of adapting to global financial trends while addressing the unique needs of its diverse population (IBEF, 2024).

1.2. Regulatory Framework of Fraud in the Indian Banking System

As the banking sector in India has expanded, the occurrence of fraudulent activities within it has also grown significantly. Fraud is not just a financial issue but a social threat that impacts the national economy and can ripple across global financial systems. As per "Association of Certified Fraud Examiners (ACFE)" Fraud constitutes a wilful misrepresentation or concealment of information intended to result in unauthorized benefit or harm to another party. It becomes a criminal offense when it involves deliberately misrepresenting facts or concealing critical information to mislead another party for personal gain. The "Association of Certified Fraud Examiners, 2022" Fraud is generally divided into three key categories: the theft or misuse of assets, corrupt activities such as bribery, and deliberate falsification of financial records. Of these, financial statement fraud—often carried out by senior management—is considered the most damaging, as it can severely impair an organization's credibility and financial health, erode investor trust, and disrupt market stability.

While the Reserve Bank of India (RBI) acts as the central regulatory body for the banking system, it does not offer a singular definition of fraud. Instead, its (Master Direction on Fraud, 2016) identifies several forms of fraudulent conduct. These include embezzlement and criminal breach of trust, falsification of accounts, fraudulent withdrawals, unauthorized lending, misappropriation of property, foreign exchange transaction irregularities, and negligence resulting in cash losses. The circular underscores the importance of strong internal frameworks for the early detection, prevention, and reporting of such offenses. By offering this detailed categorization, the RBI aims to guide banks in effectively identifying and managing various types of fraud to uphold the integrity of the financial system.

Technological advancements have enabled fraudsters to become more sophisticated and ingenious in their fraudulent activities. As per the Reserve Bank of India's "Reserve Bank Of India 2022-23" the banking sector recorded 29,965 fraud cases involving a cumulative amount of ₹2,22,460 crore over the past three years. Public Sector Banks (PSBs) reported 9,368 cases amounting to ₹1,39,019 crore, while Private Sector Banks (PvSBs) registered 17,969 cases with a total value of ₹71,629 crore. Together, public and private sector banks were responsible for 91.22% of the total fraud incidents and nearly 95% of the total monetary loss, with the remainder attributed to foreign banks and other financial entities. The data highlights that private banks experienced the highest number of fraud cases, whereas public sector banks endured the largest financial setbacks (RBI, 2023).

This study centers on public sector banks due to their pivotal role in India's economic framework. These institutions are often the primary providers of financial services in rural and underserved regions, playing a key role in advancing financial inclusion and reaching large segments of the population. Their contribution to economic stability and the implementation of government programs makes their reliability and security critically important. Protecting public sector banks from fraudulent activities is vital for maintaining public confidence and supporting the nation's ongoing economic progress. Strengthening their ability to withstand fraud is crucial for ensuring the sustained stability and growth of India's financial sector. Accordingly, this research seeks to examine the current fraud landscape within public sector banks and suggest effective strategies to strengthen their safeguards.

1.3. Research Question

This research is structured around the following key questions:

a. In what ways does the incidence rate of fraud influence the financial performance of India's Public Sector Banks?
b. How does the total value of fraud losses affect these banks' financial stability?

These questions are designed to investigate the connection between fraudulent activities and the financial stability of PSB's in India. By examining both the number of fraud incidents and the

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amounts involved, the study aims to assess their influence on key financial metrics and evaluate the banks' capacity to sustain strong performance in the face of fraud-related risks.

1.4. Research Objective

a. First, to gauge how the number of fraud cases (NOF – Number of fraud) affects the financial performance of PSBs.
b. Second, to analyse the impact of the monetary value involved in fraudulent activities (AIF- Amount Involved in Fraud) on the financial performance of PSBs.

2. Review of Literature-

2.1 Theoretical Framework

The relationship between banking fraud and financial performance in India is analyzed through the lens of two prominent theories: the "Fraud Triangle Theory" and the "Fraud Diamond Theory". These models offer valuable perspectives on the underlying drivers of fraudulent behavior, the tactics used by perpetrators, and the broader implications for organizational effectiveness. Through the lens of these theories, the research seeks to develop a deeper understanding of how fraud undermines financial stability and operational efficiency within the banking industry.

The Fraud Triangle Theory, introduced by Donald Cressey in 1950, is cited in (Manurung D.T.H & Hadian N., 2013) Recognized as a leading model for interpreting fraudulent activity, this framework outlines three fundamental elements—pressure, opportunity, and rationalization—that contribute to fraud. Among these, perceived pressure is frequently considered the most influential in prompting unethical behavior. As outlined in SAS 99, such pressure can arise from various sources, including threats to financial stability, unmet financial performance targets, personal financial obligations, and external demands or expectations.

Opportunity refers to the weaknesses within a system that fraudsters can exploit. In the financial sector, these vulnerabilities often arise from the high volume of monetary transactions, ineffective monitoring, inadequate internal controls, organizational structure, and the absence of robust whistleblowing policies, creating an environment conducive to fraudulent activities. Rationalization involves justifying unethical actions influenced by an individual's behavior, ego, cultural background, and ethical values. (Gbegi & Adebisi, 2013).

Introduced by (Wolfe & Hermanson, 2004), the Fraud Diamond Theory expands on the traditional Fraud Triangle by incorporating a fourth critical component: **Capability**. This element highlights the importance of an individual's traits, competencies, and personal attributes in enabling them to carry out fraudulent acts. Even if Pressure, Opportunity, and Rationalization are present, fraud cannot occur without the individual possessing the necessary capability. They outline six factors that contribute to a person's capacity to commit fraud: authority within the organization, inflated ego, skill in deception, persuasive or coercive abilities, stress management, maturity, and cognitive ability. As noted by (Gbegi & Adebisi, 2013), these attributes empower individuals to exploit systemic weaknesses, endure pressure, and justify unethical actions. These theories shed light on the core drivers of banking fraud and highlight the necessity of effective controls that consider both organizational risks and individual behavioral tendencies.

2.2. Empirical Review

Existing literature presents a range of opinions on how fraud affects the financial outcomes of banks-

Ikpefan, (2006) looked into how losses, whether already incurred or expected—especially those due to fraud and money laundering—impacted the financial performance of Nigerian banks from 1989 to 2004. The study showed that financial crimes lead to a drop in bank deposits, pointing to a loss of customer trust and a threat to financial stability. To counter these effects, the research emphasized the importance of implementing strong internal control mechanisms, hiring competent personnel, conducting public

awareness initiatives to rebuild trust, and strengthening the capacity of regulatory bodies such as the "Economic and Financial Crimes Commission (EFCC)" to combat financial misconduct effectively.

Adediran & Olugbenga (2010) analyzed the connection between fraud and financial outcomes in Nigeria's banking sector between 2000 and 2007. Employing Ordinary Least Squares (OLS) regression on data derived from the annual reports of selected banks, the study showed that more frequent fraud and the financial losses linked to it—whether actual or expected—negatively influenced banks' investment decisions. These results highlight the harmful impact of fraudulent activities on investment capacity within the banking sector and emphasize the need for robust fraud prevention strategies to ensure financial stability and enhance investor trust.

AbdulRasheed et al. (2012) analyzed how the number and value of fraud cases affected bank profitability, serving as a measure of financial performance from 2004 to 2009. The study highlighted that the Nigerian banking sector experienced the highest amount of fraud in 2008. The study found that fraud harmed the financial health of Nigerian banks, emphasizing the importance of effective fraud prevention and stronger internal controls to safeguard financial stability.

L. Inaya & Ochuko Isito (2016) explored the social implications of fraud on the performance of banks, focusing particularly on its influence in Nigeria. Even though fraud cases and losses slightly reduced ROE without statistical significance, they still had a broader negative effect on the financial health of banks from a social perspective. The researchers stressed the urgent need for regulatory authorities to adopt proactive measures in combating fraud. Furthermore, banks are encouraged to actively participate in fraud detection initiatives, maintain regular oversight of their operations, and implement preventive actions to shield both the institution and society from the damaging consequences of fraudulent behavior. Promoting a culture of transparency and accountability within the banking system was also identified as a key strategy in minimizing fraud-related risks.

Offiong et al., (2016) investigated the impact of fraud-related variables—specifically the number of fraud cases, staff involvement, and the monetary value involved—on bank performance, using bank deposits as a performance indicator. Employing Ordinary Least Squares (OLS) regression for analysis, the findings indicated that among the three variables, only the amount involved in fraud had a statistically significant and positive effect on bank performance.

Taiwo et al. (2016) indicated that the financial magnitude of fraud and the extent of employee involvement both adversely affected the Return on Assets (ROA) of Nigerian banks. Paradoxically, a higher number of fraud cases was positively correlated with ROA. Based on these findings, the researchers recommended the promotion of comprehensive fraud awareness and education within the banking sector, the integration of forensic accounting practices, and active intervention by regulatory bodies. Additionally, the implementation of a strong internal control framework was emphasized as essential in combating fraud. By fostering awareness and deploying effective preventive measures, banks can better protect their assets and sustain financial stability.

Sharma & Verma (2017) looked into how fraud affected the financial health of public sector banks in India from 2005 to 2015. Fraud was evaluated in terms of its frequency and severity, while financial performance was measured using indicators such as Return on Equity (ROE), Return on Assets (ROA), and Return on Investment (ROI). The study applied panel data techniques—specifically fixed and random effects models—and found that the number of fraud incidents as well as the financial sums involved significantly affected the financial outcomes of the banks under review. The findings highlight the urgent need for public sector banks to strengthen their fraud detection and prevention mechanisms to safeguard financial stability and institutional credibility.

Ogbeide (2018) assessed how fraud affected Nigerian banks' performance from 1993 to 2016, using co-integration and error correction models to study both long-term effects and short-term changes. The results indicated that the number of fraud cases—particularly their three-period lagged values—had a significant negative effect on bank deposits. Likewise, the one-period lagged values of the fraud amount also showed a detrimental impact on deposit levels. Drawing from the results, the study suggests that

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banks should fortify their internal control frameworks to effectively manage fraud risks, thereby supporting improved financial performance and fostering greater organizational resilience.

Mawutor et al. (2019) analyzed how fraud affected the performance of Nigerian deposit money banks from 2006 to 2016. After confirming all analytical assumptions, the study used OLS regression and found that while the fraud amount had an insignificant negative effect on deposits, the number of fraud cases and staff participation had a significant positive influence. These findings imply that, despite the harm caused by financial losses, increased detection and reporting of fraud may enhance institutional vigilance and internal controls. The study recommends that regulatory bodies implement stricter oversight and regulatory measures to curb the growing prevalence of fraud and ensure the financial soundness of the banking sector.

Aribaba et al. (2019) explored both immediate and sustained effects of fraud-related variables on the financial performance of banks in Nigeria over the 1992–2015 period. Employing co-integration and error correction models of Johansen, the study identified a dynamic relationship between fraud-related variables—such as the amount of fraud, expected losses, and fraud frequency—and bank size, with critical financial indicators including Return on Equity (ROE) and capital adequacy ratios. The results highlight the importance of integrating forensic accounting practices as a proactive approach to combating fraud. The application of these advanced techniques can greatly enhance fraud detection and prevention efforts, thereby strengthening the financial stability and resilience of banking institutions.

Repousis et al. (2019) investigated various types and methods of fraud within the banking sector, using primary data collected through questionnaires administered to five commercial banks in Greece. The findings identified forgery, bribery, and money laundering as the most serious fraud risks. Dormant accounts and checks were commonly exploited by fraudsters as tools for executing fraudulent schemes. In response to these insights, the study recommends that banks invest in comprehensive employee training, enforce strict ethical guidelines and codes of conduct, and implement stringent controls over dormant accounts and check processing. Additionally, measures such as signature verification, rigorous Know Your Customer (KYC) protocols, unannounced audits, and effective whistleblowing mechanisms are crucial for strengthening fraud prevention efforts. Enhancing these safeguards can significantly improve fraud detection and prevention, thereby reinforcing the integrity and credibility of the banking sector.

L. S. Inaya & Obasuyi (2020) investigated the upward trend in banking fraud in Nigeria between 2008 and 2018, finding that the volume of fraud, expected losses, and cross-border irregularities had a notable adverse effect on ROA and ROE. To improve the financial stability and resilience of banks, the study recommends that regulatory authorities and banking leadership adopt robust anti-fraud measures. This includes enhancing internal control systems, promoting greater transparency, and leveraging advanced technologies for fraud detection and prevention.

H. Tega & O. David (2021a) assessed the impact of several fraud-related factors—such as computer-based fraud, peer pressure, misappropriation by senior management, and weak auditing practices—on the financial performance of Nigerian banks between 2016 and 2020. The study employed structured questionnaires alongside secondary data from the annual reports of selected banks to collect comprehensive information. Analytical tools, including Generalized Least Squares (GLS) and Z-statistics, were used, revealing that each variable under consideration had a statistically significant adverse effect on the performance of the banks. The study emphasizes the urgent need for banks to adopt advanced technological solutions to combat fraud, stressing the importance of modernizing fraud prevention strategies to improve the overall financial security and stability of the banking sector.

Manyo et al. (2023) assessed the relationship between the financial performance of Nigerian banks and key fraud indicators—namely, the value of fraud, the frequency of fraud incidents, and the extent of employee involvement—across the period 1994 to 2020. The analysis demonstrated that an increase in both the number of fraud incidents and the amount of money involved was significantly and positively associated with bank performance metrics. However, fraud involving staff led to a significant negative impact. Based on these insights, the study advocates for the establishment of official reporting hotlines

by regulatory agencies, alongside awareness campaigns to educate stakeholders about the risks and consequences of fraudulent practices. Comprehensive staff training programs should be implemented to promote ethical behavior and vigilance. Additionally, banks should adopt a rigorous fraud case review system, enhance internal controls, and conduct continuous monitoring to facilitate early detection and prevention of fraudulent activities, ultimately safeguarding their financial health.

Deeksha & Rani Kamlesh, (2023)examined the impact of fraudulent activities on the financial performance of selected private sector banks in India during the period 2017 to 2022. The banks selected—HDFC Bank, ICICI Bank, Kotak Mahindra Bank, Axis Bank, and IndusInd Bank—were chosen based on their market capitalization as of 31 March 2022. Secondary data were collected from the annual reports of the Reserve Bank of India (RBI) and the respective banks. Applying Ordinary Least Squares (OLS) regression analysis, the study found that the monetary value of fraud had a significant negative effect on financial performance, while the number of fraud incidents did not show a statistically significant impact. Based on these findings, the study recommended that regulatory bodies adopt proactive strategies for early detection and prevention of fraud to safeguard the financial stability of private sector banks.

The reviewed literature collectively emphasizes the multifaceted and varying impact of fraud on banks' financial performance. Researchers have utilized a variety of financial indicators as proxies to measure performance, including bank deposits, return on investment, net profits, return on assets (ROA), return on equity (ROE), and bank investments. In the present study, ROA, ROE, and bank deposits (Dop.) have been selected as key indicators to evaluate the financial performance of Public Sector Banks (PSBs) in India. This selection is intended to provide a well-rounded perspective on how fraudulent activities influence core financial metrics and reflect the overall financial stability and operational soundness of PSBs. **Return on Assets (ROA)** serves as a key measure of profitability, representing the ratio of a bank's total income to its total assets. It indicates how efficiently management is leveraging assets to generate earnings, with a higher ROA reflecting superior asset utilization and stronger financial performance. On the other hand, **Return on Equity (ROE)** assesses profitability relative to shareholders' equity, highlighting the effectiveness with which a bank employs its equity base to deliver returns. When analyzed alongside **bank deposit levels**, these indicators collectively provide a holistic understanding of a bank's financial health—especially in the face of fraud-related risks and pressures.(Almaqtari et al., 2019).

Deposits play a pivotal role in a bank's profitability, serving as a fundamental source of funding for its operations (Kanu & Okorafor, 2013) as cited by (Mawutor et al., 2019). The accumulation of deposits provides the necessary capital for banks to extend loans, make investments, and enhance their liquidity position, enabling them to meet withdrawal demands and other financial obligations. Consequently, a healthy level of deposits is essential for banks' sustained growth and stability, underpinning their ability to generate income and maintain financial health. Together, these indicators provide a comprehensive view of a bank's operational effectiveness and economic stability, making them essential for evaluating the impact of fraudulent activities on a bank's financial statements. Based on mixed findings of studies, hypotheses have been created –

2.2. Hypotheses

H1: The number of fraud cases (NOF) has no significant impact on the financial performance of public sector banks in India.

H_{01}- NOF does not significantly impact the ROA of PSBs.

H_{02}- NOF does not significantly impact the ROE of PSBs.

H_{03}- NOF does not significantly impact the Deposits of PSBs.

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H2 - The amount involved in fraud (AIF) does not significantly impact the financial performance of public sector banks in India.

H_{04}- AIF does not significantly impact the ROA of PSBs.

H_{05}- AIF does not significantly impact the ROE of PSBs.

H_{06}- AIF does not significantly impact the Deposits of PSBs.

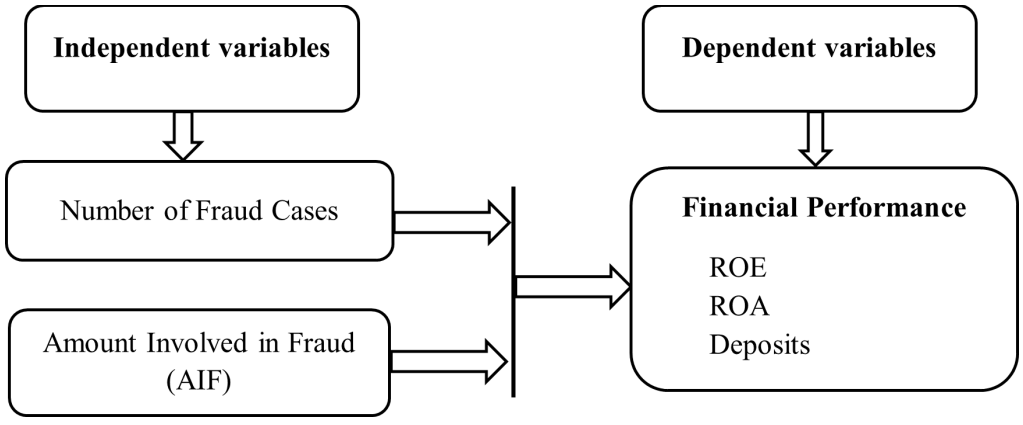
3. Research Methodology

The study uses a structured ex-post facto design to explore factors behind certain outcomes, based on past events and current conditions. (L. S. Inaya & Obasuyi, 2020). This methodological approach enhances the reliability and validity of the findings by relying on historical data and established trends. By examining prior instances of fraud, the study seeks to uncover patterns and relationships that help explain the influence of fraudulent activities on key financial performance indicators.

To assess the effect of fraud on bank performance, this study examines a population of twelve Public Sector Banks (PSBs) in India. It utilizes secondary data from 2016 to 2023, incorporating key variables such as the Number of Fraud Cases (NOF), Amount Involved in Fraud (AIF), Return on Assets (ROA), Return on Equity (ROE), and Bank Deposits (Dop). These data were sourced from **Rajya Sabha Unstarred Question No. 1514** and the annual reports of the respective banks, thereby ensuring the authenticity and reliability of the dataset. The comprehensive nature of the data facilitated an in-depth analysis of trends and the effect of fraud on critical financial performance metrics. As ROA and ROE are expressed in ratio form, the independent variables—NOF, AIF, and Dop—were logarithmically transformed to address scaling differences and ensure comparability. The study employed the **Ordinary Least Squares (OLS)** method for inferential statistical analysis and hypothesis testing. Prior to estimation, all key classical assumptions—such as linearity, stationarity, multicollinearity, serial correlation, and homoscedasticity—were thoroughly tested and satisfied. This rigorous methodological approach enhances the credibility, validity, and robustness of the study's findings.

Model Specification – The functional description of the model to test the formulated hypotheses is as follows:-

Figure 1 – Variables Under Study



Financial performance = f [Number of fraud cases (NOF) and Amount Involved in Fraud (AIF)].

Equation 1 - $ROA_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$

Equation 2 - $ROE_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$

Equation 3 - $LDop_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$

Where;

ROA = Return on assets (Proxy for financial performance of banks)

ROE = Return on equity (Proxy for the financial performance of banks)

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LDop = Logarithmic value of deposits (Proxy for the financial performance of banks)
LNOF= Logarithmic value of Number of fraud cases.
LAIF = Logarithmic value of Amount Involved in Fraud.
t = period
μ = Error term.
β_0 = Slope of intercept.
B_1 and β_2 = Coefficients of the variables that indicate the direction of the relationship.

4. Data Analysis and Interpretation

4.1 Assumption Testing

a. Linearity

The linearity of the parameters has been evaluated using the Wald test. The null hypothesis for the Wald test asserts that the parameters are not linear. The interpretation of the results hinges on the Chi-square and F-statistics derived from the test (Rahman, 2016). These statistical measures provide insight into whether the parameters deviate from linearity, thereby determining the model's validity and accuracy.

Table 1 – Test of Linearity

Wald Test for Linearity			
Dependent variable – ROA **Independent Variable** – LNOF and LAIF			
Test Statistics	**Value**	**df**	**Probability**
F-statistics	6.926777	(2, 81)	0.0017
Chi-square	13.85355	2	0.0010
Null Hypothesis: C(1) = 0, C(2) = 0 Summary of Null Hypothesis :			
Normalized Restriction (=0)		**Value**	**Standard Error**
C(1)		-0.535097	0.148056
C(2)		0.636525	0.239705
Dependent Variable – ROE **Independent Variable** – LNOF and LAIF			
Test Statistics	**Value**	**df**	**Probability**
F- statistics	7.272132	(2, 81)	0.0012
Chi-square	14.54426	2	0.0007
Null Hypothesis: C(1) = 0, C(2) = 0 Summary Of Null Hypothesis:			
Normalized Restriction (=0)		**Value**	**Standard Error**
C(1)		11.48632	4.178057
C(2)		-9.530786	2.580622
Results show that restrictions are linear in confessions.			
Dependent variable – LDop **Independent Variable** – LNOF and LAIF			
Test Statistics	**Value**	**df**	**Probability**
F-statistics	4.337488	(2,81)	0.0162
Chi-square	8.674975	2	0.0131
Null Hypothesis: C(1) = 0, C(2) = 0 Summary of Null Hypothesis :			
Normalized Restriction (=0)		**Value**	**Standard Error**
C(1)		0.784452	0.289288
C(2)		-0.079696	0.178682
Results show that restrictions are linear in confessions.			

Source – Researcher's computation

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Table 1 reveals that the p-values for the F-statistics and Chi-square tests are below the 0.05 threshold. This indicates a rejection of the null hypothesis of non-linearity, thereby confirming the linearity of the coefficients/parameters. These results suggest that the estimated regression model accurately captures the linear relationships within the data, affirming the model's validity.

b. Stationarity

The "**Augmented Dickey-Fuller (ADF)" test** was employed to assess the stationarity of the variables in the time series data. This test is widely preferred as it accounts for autocorrelation by including lagged terms of the dependent variable in the model, thereby offering a more robust and reliable evaluation of stationarity (Mushtaq, 2011). Under the ADF test, the **null hypothesis** asserts that the variable possesses a **unit root**, suggesting that it is **non-stationary**

Table 2 Test of Stationarity

Unit Root Test for Stationarity				
Variable	ADF Test-Statistics Value	Unit root at 5%	P-Value	Order of Integration
LNOF	-4.004212	-2.900137	0.0023	Level
LAIF	-6.910682	-2.896779	0.0000	Level
ROA	-5.596938	-2.896779	0.0000	Level
ROE	-3.551105	-2.898623	0.0090	Level
LDop	-9.027816	-2.897223	0.0000	Level

Source – Researcher's computation

As presented in **Table 2**, the "**Augmented Dickey-Fuller (ADF)"** test results at the **5% significance level** indicate that all variables had p-values below 0.05 at their level form, suggesting initial stationarity. These findings confirm that all variables used in the analysis are stationary, which is essential for ensuring the validity, accuracy, and reliability of time series modelling and forecasting.

c. Multicollinearity

Multicollinearity poses a challenge when independent variables within a model exhibit strong intercorrelations. This issue can be assessed and addressed using the Variance Inflation Factor (VIF) technique. The decision rules for VIF are as follows:

Table 3 – Test of Multicollinearity

$ROA_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$	
Variable	Centered VIF value
LNOF	1.381046
LAIF	1.381046
$ROE_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$	
LNOF	1.381046
LAIF	1.381046
$LDop_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$	
LNOF	1.381046
LAIF	1.381046

Source – Researcher's computation

Lower VIF values suggest that the explanatory variables are not significantly correlated with each other(Daoud, 2018). Table 3 indicates a VIF value of 1.381046, suggesting that multicollinearity is not a concern, as the independent variables are not significantly correlated. This low VIF value confirms the absence of multicollinearity, ensuring that the regression model's estimates are reliable.

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d. Autocorrelation

In regression analysis, autocorrelation is present when residuals are not independent across periods. This violation of the independence assumption can lead to inflated standard errors and unreliable or inefficient coefficient estimates. For models that incorporate lagged dependent variables, the "**Breusch-Godfrey test**" is generally considered more effective in detecting autocorrelation, as it offers greater flexibility and reliability (Uyanto, 2020). In this study, the Breusch-Godfrey test was applied using **one-year lagged values** of the dependent variables to assess the presence of serial correlation. The **null hypothesis** of the test states that **no serial autocorrelation** exists in the model.

Table 4 – Test of Autocorrelation

Breusch-Godfrey test	
$ROA_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \beta 3 ROAt_{-1} + \mu_t$	
F-Statistics - 0.243826	Prob. F(2,77) - 0.7842
Obs. R^2 - 0.522343	Prob. Chi-Square(2) - 0.7701
$ROE_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \beta_3 ROE_{t-1} + \mu_t$	
F-Statistics - 0.154213	Prob. F(2,77) - 0.8574
Obs. R^2 - 0.331132	Prob. Chi-Square(2) - 0.8474
$LDop_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \beta 3 LDopt_{-1} + \mu_t$	
F-Statistics - 0.330712	Prob. F(2,77) - 0.7194
Obs. R^2 - 0.706892	Prob. Chi-Square(2) - 0.7023

Source – Researcher's computation

According to Table 4, the p-values associated with both the F-statistics and the Chi-square test are above the 0.05 significance level. This result suggests that the null hypothesis cannot be rejected, thereby confirming the absence of serial autocorrelation in the regression model.

e. Heteroscedasticity

Heteroscedasticity occurs when the variance of the residuals is not constant across the range of the explanatory variables, which may lead to inefficient parameter estimates and unreliable standard errors. To assess the presence of heteroscedasticity, **White's Test** (1980) was applied, following the procedure described by (Rahman, 2016). The **null hypothesis** of White's Test assumes **homoscedasticity**, indicating that the residuals exhibit constant variance throughout the model.

Table 5- Test of Heteroscedasticity

White's Test	
$ROA_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$	
F-Statistics:- 0.495731	Prob. F(2,2) :- 0.7785
Obs. R^2 :- 2.587110	Prob. Chi-Square (2):- 0.7633
Scaled explained SS:- 3.974408	Prob. Chi-Square (2):- 0.5531
$ROE_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$	
F-Statistics:- 0.588666	Prob. F(2,2) :- 0.7086
Obs. R^2 :- 3.054477	Prob. Chi-Square (2):- 0.6916
Scaled explained SS:- 5.347390	Prob. Chi-Square (2):- 0.3750
$LDop_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$	
F-Statistics:- 0.344468	Prob. F(2,2) :- 0.8843
Obs. R^2 :- 1.814754	Prob. Chi-Square (2):- 0.8741
Scaled explained SS:- 1.365511	Prob. Chi-Square (2):- 0.9280

Source – Researcher's computation

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According to Table 5, the F-statistic and Chi-square test results yielded p-values greater than the 0.05 significance level. This leads to the acceptance of the null hypothesis, indicating that heteroscedasticity is not present in the model. The constant variance of residuals reinforces the model's compliance with classical linear regression assumptions and ensures that its estimates remain both reliable and efficient.

4.2. OLS Regression Results Summary

Model 1 - Impact of LNOF and LAIF on ROA

$ROA_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$				
Variable	Coefficient	Standard error	t-Statistic	P-Value
LNOF	0.636525	0.239705	2.655456	0.0095
LAIF	-0.535097	0.148056	-3.614146	0.0005
C	0.024277	0.451035	0.053826	0.9572
R-squared	0.146052			
Adjusted R-squared	0.124967			
S.E. of regression	0.856855			
F-Statistic	6.926777			
Prob(F-Statistic)	0.001617			
$ROA_t = 0.024277 + 0.636525\ LNOF_t - 0.535097\ LAIF_t + 0.856855$				

Source – Researcher's computation

Model 2 - Impact of LNOF and LAIF on ROE

$ROE_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$				
Variable	Coefficient	Standard error	t-Statistic	P-Value
LNOF	11.48632	4.178057	2.749202	0.0074
LAIF	-9.530786	2.580622	-3.693212	0.0004
C	-0.650186	7.861549	-0.082705	0.9343
R-squared	0.152225			
Adjusted R-squared	0.131293			
S.E. of regression	14.93500			
F-Statistic	7.272132			
Prob(F-Statistic)	0.001246			
$ROE_t = -0.650186 + 11.48632\ LNOF_t - 9.530786\ LAIF_t + 14.93500$				

Source – Researcher's computation

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Model 3 - Impact of LNOF and LAIF on LDop

$LDop_t = \beta_0 + \beta_1 LNOF_t + \beta_2 LAIF_t + \mu_t$				
Variable	Coefficient	Standard error	t-Statistic	P-Value
LNOF	0.784452	0.289288	2.7116632	0.0082
LAIF	-0.079696	0.178682	-0.446020	0.6568
C	11.98960	0.544333	22.02622	0.0000
R-squared	0.096738			
Adjusted R-squared	0.074435			
S.E. of regression	1.034098			
F-Statistic	4.337488			
Prob(F-Statistic)	0.016235			
$LDop_t = 11.98960 + 0.784452 LNOF_t - 0.079696 LAIF_t + 1.034098$				

Source – Researcher's computation

The results of the OLS regression analysis, as reported in Model 1 and Model 2, reveal a statistically significant positive effect of LNOF and a significant negative effect of LAIF on both ROA and ROE of Public Sector Banks (PSBs). Since the p-values for these independent variables are below the 0.05 threshold, all null hypotheses—except $H0_6$—are rejected.

Model 3 further supports these findings, indicating that LNOF exerts a positive and significant influence on LDop, consistent with its effect on ROA and ROE. In contrast, LAIF has a negative but statistically insignificant impact on LDop, resulting in the acceptance of the null hypothesis $H0_6$. These outcomes suggest that the frequency of fraud (LNOF) is positively associated with all three financial performance indicators—ROA, ROE, and LDop—whereas the monetary value of fraud (LAIF) negatively influences ROA and ROE, but not significantly LDop. The R-squared values for Models 1, 2, and 3 are 0.14, 0.15, and 0.09, respectively, indicating that the independent variables explain a modest proportion of the variation in the dependent variables. Correspondingly, the adjusted R-squared values of 0.12, 0.13, and 0.07 further confirm that only a small share of the systematic variation in financial performance is accounted for by the model, with the remaining variation likely attributable to other unobserved or omitted factors. These findings underscore the complexity of bank performance dynamics and the need to consider additional variables in future research.

The p-values for the overall F-statistics in Models 1, 2, and 3, respectively —0.001617, 0.001246, and 0.016235—are all less than 0.05, confirming that the models are statistically significant. This underscores the substantial impact of the number and amount of fraud on the financial performance of PSBs in India. These results highlight the critical role that fraud plays in shaping the financial outcomes of public sector banks, emphasizing the urgent need for robust fraud prevention and detection measures to safeguard their financial health and stability.

5. Findings

Aiming to evaluate the relationship between fraud and financial performance in the Indian banking sector, this study employed Ordinary Least Squares (OLS) regression following the successful validation of all analytical assumptions. The analysis demonstrates that an increase in the number of fraud cases is significantly and positively associated with key performance indicators, including Return on Assets (ROA), Return on Equity (ROE), and total bank deposits. In contrast, the monetary value of fraud exerts a significantly negative impact on ROA and ROE, implying that as the financial magnitude of fraudulent activities increases, key profitability indicators tend to deteriorate accordingly. These findings align with those of [(Ikpefan, 2006), (Adediran & Olugbenga, 2010), (AbdulRasheed et al., 2012), (Taiwo et al., 2016), (Sharma & Verma, 2017), (L. S. Inaya & Obasuyi, 2020), (H. Tega & O. David, 2021b), (Manyo et al., 2023)]. However, they contrast with the results reported by [(L. Inaya & Ochuko Isito, 2016) and (Offiong et al., 2016)].

In relation to bank deposits, the study found that the monetary value of fraud has a negative but statistically insignificant effect. This result aligns with the findings of (Ogbeide, 2018)and (Mawutor et al., 2019), who also concluded that fraud does not have a significant impact on deposit levels. The implication is that, although larger fraud amounts may have a slight deterrent effect on depositor behavior, this influence is not substantial. However, in practical terms, if the extent of fraudulent activities within banks were to increase significantly, it could erode public confidence, leading to greater hesitancy among customers to deposit their funds. Despite the minor portion of deposits withheld from the banking system due to fraud concerns, their reintegration could markedly enhance the overall performance of banks. These reintegrated deposits could be directed into various productive ventures, yielding higher returns and bolstering the economic growth and stability of the banking sector. Therefore, banks must maintain customer trust through robust anti-fraud measures. Doing so will help maximize deposits and improve banks' financial health and operational efficiency. Moreover, a trustworthy banking environment encourages greater customer participation, increases capital availability for investments and growth, reinforces the financial system's resilience, and contributes to broader economic development.

6. Conclusion and recommendations

Across both advanced and emerging economies, fraud persists as a critical concern within the financial sector, exerting a detrimental influence on the operational efficiency, profitability, and overall stability of banks. The present analysis highlights that both the frequency and monetary value of fraud significantly influence the financial health of banking institutions. There is clear evidence that fraud is a major contributor to bank failures, with its consequences extending beyond direct financial losses to include the erosion of investor confidence and the undermining of institutional credibility. Effectively addressing this issue demands proactive intervention by regulatory authorities, including the implementation of stringent oversight and compliance mechanisms. Banks must strengthen their internal control frameworks and integrate forensic accounting methods to effectively detect, investigate, and prevent fraud. Equally important is the adoption of advanced fraud detection technologies to facilitate early identification and mitigation of associated risks.

In addition to technological and regulatory measures, awareness-building initiatives aimed at educating both employees and customers about the consequences of fraud are essential for fostering a culture of integrity. Employee stress-relief programs can also play a preventive role by reducing internal pressures that may trigger unethical behavior. Vigilance regarding red flags or early warning signs, coupled with immediate reporting of suspicious activities, is critical to minimizing losses and enabling timely corrective action. By adopting a comprehensive, multi-faceted approach, the banking sector can strengthen its resilience to fraudulent threats and reinforce financial stability. These findings hold significant practical implications for policymakers, regulators, and banking executives, providing a strategic foundation for the effective detection, prevention, and management of fraud within the financial sector.

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