

THE MODERATING ROLE OF COMPUTER-ASSISTED AUDIT TECHNIQUES AND TOOLS (CAATS) IN THE RELATIONSHIP BETWEEN FORENSIC ACCOUNTING AND MONEY LAUNDERING PREVENTION IN PAKISTAN'S BANKING SECTOR

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Abstract

This study aims to explore the influence of Forensic Accounting (FA) on Money Laundering Prevention (MLP) with the moderating effect of Computer-Assisted Audit Techniques and Tools (CAATs) in the National Bank of Pakistan. The quantitative research design was used, and data were gathered from 264 employees in audit, compliance, and internal control jobs using a structured questionnaire. IBM SPSS and Hayes' PROCESS Macro were used to analyze the data. The results show that there is a significant negative relationship between FA and MLP, and money laundering reduction with stronger forensic accounting practices. Additionally, the moderation analysis showed that CAATs significantly enhance the effectiveness of forensic accounting in combating illicit financial activities. The findings provide valuable insights for strengthening

anti-money laundering frameworks and improving the integrity of the banking sector.

Keywords: Forensic Accounting, Computer-Assisted Audit Techniques and Tools, Money Laundering Prevention.

INTRODUCTION

The phenomenon of money laundering has become a major threat to the integrity and stability of the financial systems of the world. Money laundering is a process of hiding the background of illegal money and incorporating it into the normal financial system, which helps criminals and reduces public confidence in financial institutions and economic growth (Levi & Reuter, 2006). Financial institutions, with commercial banks especially, are very vulnerable to this threat as they are the major conduits for financial transactions. In developing economies like Pakistan, it is further exacerbated due to growing transactions, technical limitations, and evolving financial prevention techniques (Ali et al., 2025).

To address these issues, FA has emerged as an essential weapon in the fight against financial crimes and is now a key focus. It combines the elements of accounting and auditing with investigative methods to identify and uncover possible fraud and suspicious transactions and aid in legal action. FA plays a vital role in anti-money laundering (AML) measures as it examines financial transactions and records to detect fraud and money laundering schemes. Additionally, FA promotes transparency and accountability within financial institutions, a key factor in preventing financial crimes and stopping fraud (Odeyemi et al., 2024).

However, the sophistication of money laundering is becoming more complex, and it has become evident that technology must become more sophisticated than conventional FA techniques to assist in fighting money laundering. In the context of financial investigations, Computer-Assisted Audit Techniques and Tools (CAATs) have played a crucial role in improving the efficiency and effectiveness of financial investigations. The automated data analysis, real-time financial transaction monitoring, anomaly detection, and predictive analysis features of CAATs enhance auditors' and forensic accountants' ability to identify financial transactions and activities that may appear suspicious (Abey Siri Munasinghege & Perumbuli Mudalige, 2024). In banking applications, where significant

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amounts of transaction data need to be processed and analyzed swiftly, these capabilities are especially crucial (Farhat et al., 2026).

In addition, CAATs help financial institutions to enhance their regulatory compliance, policy-making, and early detection of money laundering operations (Lupo, 2023). Combining FA with cutting-edge audit technology offers a holistic solution for tackling financial preventions and enhancing organizational resilience. In recent years, there is evidence that technological audit tools can have a substantial impact on the effectiveness of FA procedures and the effectiveness of the institutional governance mechanisms that underpin AML efforts (Al Natour et al., 2023).

Although the usage of CAATs in financial prevention is increasing, there has been little empirical research into the role of CAATs in FA and MLP in Pakistan's banking industry (Sawaya et al., 2026). Thus, the purpose of this study is to investigate the function of FA in combating money laundering at the National Bank of Pakistan, as well as to assess the moderating role of Computer Assisted Audit Techniques and Tools (CAATs). The findings will help financial professionals, regulators, and legislators enhance money laundering regulations and promote the integrity of the financial system (Al Natour et al., 2023).

2-Literature

2.1 Rational Choice Theory (RCT)

RCT was developed by Cornish and Clarke (1986), which assumes individuals will engage in criminal behavior based on the perceived benefits and costs associated with their behavior. The theory states that offenders are more likely to engage in prevention when the perceived benefits of the offense are greater than the perceived costs of getting caught and punished (Becker, 1968). When it comes to money laundering, criminals and people want to get as much money as they can from an illegal transaction while they have as little chance as possible of being caught. FA can act as a deterrent because it makes it more likely that the activities of money laundering will be discovered, adding to the cost of engaging in money laundering activities (Al-Raggad et al., 2025; Wayo, 2023). Additionally, Computer-Assisted

Audit Techniques and Tools (CAATs) further reinforce this deterrence effect by improving transaction monitoring, anomaly detection, and audit efficiency, rendering it more challenging for wrongdoers to hide illicit financial transactions (Tantini & Nuswantara, 2025; Al Natour et al., 2025). Thus, the Rational Choice Theory is an appropriate theoretical framework for the study, as it explains how FA, with the aid of CAATs, can enhance the financial crime of MLP by augmenting detection opportunities and perceived risks.

2.2 Relationship between FA, CAATs, and MLP

Money laundering is a serious issue in financial institutions that is being recognized, investigated, and prevented using forensic accounting. Through accounting skills, FA also enhances anti-money laundering practices and financial system transparency. The studies conducted so far demonstrated that the effectiveness of FA can be achieved by preventing financial loss, such as money laundering, to a large extent (Wayo, 2023; Stanković & Fazlović, 2022; Alabraba, 2024; Teibowei, 2025). In the same way, the use of Computer-Assisted Audit Techniques and Tools (CAATs) has also become popular as a way of enhancing anti-money laundering systems. Automated auditing, real-time transaction monitoring, and advanced data analysis all contribute to detecting unusual financial activities and maximizing audit efficiency. Previous research has shown that CAATs have a significant effect on reducing financial preventions and enhancing the regulatory compliance in banking institutions (Adeyanju & Adenikinju, 2022; Ghani, Shahimi, & Azmi, 2024; Cvetković, Mičić, & Vujičić, 2024; Wayo, 2023).

H1: There is a negative relationship among FA, CAATs, and MLP.

H2: FA has a significant negative effect on MLP.

2.4 Moderating Role of CAATs in the Relationship between FA and MLP

CAATs can be used to augment the effectiveness of FA in the fight against money laundering. These technologies help enhance the analytical, transaction monitoring, and fraud detection capabilities, thereby helping forensic accountants detect suspicious activity more quickly. The results of previous research indicate that advanced audit technologies enhance the effectiveness of FA practices and enhance the outcomes of anti-money laundering efforts (Al Natour et al., 2025; Adeyanju & Adenikinju, 2023;

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Wayo, 2023; Al Natour et al., 2024).

H3: CAATs significantly moderate the relationship between FA and MLP.

3. Sampling, Sampling Techniques, and Measures

The population of this study is 660 audit, compliance, and internal control staff of the National Bank of Pakistan (NBP), comprising the Head Office, Auditor Offices, and Controlling Offices of NBP. Since the population is geographically spread throughout four regional clusters (KP, Punjab, Sindh, and Baluchistan), a probability-based cluster sampling technique was used. The number of respondents required was calculated using Yamane's (1973) formula with 5% margin of error and proportionately assigned to selected clusters. The data will be gathered with a structured online questionnaire on a 5-point Likert scale. The correlation, direct, and moderating effects between the study variables will be evaluated by SPSS-25 data analysis software and Hayes' PROCESS Macro software (Hayes, 2017). Likewise, the data collection tool used was a semi-structured questionnaire, designed based on the questionnaire that was developed by Ringh and Sultani (2014) in their comparable research in Sweden.

4-Data Analysis and Results

Table 1. Normality, Validity, and Reliability Results

Construct	Mean	SD	Skewness	Kurtosis	MO	BTS(sig)	α
FA	.12	.42	0.31	.98	.84	0.000	0.91
CAATs	.25	.39	0.24	.10	.82	0.000	0.88
MLP	.08	.47	-0.29	.82	.79	0.000	0.86
Skewness	Kurtosis	MO	BTS	Factor Loading	Cronbach's Alpha		

Construct	ean	D	Skewness	urtosis	MO	BTS(sig)	α
	± 2.0	7.0	0.50	$p < 0.05$		≥ 0.50	≥ 0.70

Note: FA = Forensic Accounting; CAATs = Computer-Assisted Audit Techniques and Tools; MLP = Money Laundering Prevention. Hair et al. (2019); Field (2013); Kaiser (1974); Pallant (2020). Hence, the data were deemed appropriate for further correlation study, regression study, and moderation study.

4. Correlation Analysis

Table 2. Correlation Analysis

Variables	FA	CAATs	MLP
FA	1	.521**	-.638**
CAATs	.521**	1	-.487**
MLP	-.638**	-.487**	1

In Table 2, Pearson's correlation analysis was used to explore the relationships between FA, CAATs, and MLP. The results show that CAATs are positively associated with FA ($r = .521, p < .001$), meaning that the more CAATs are used, the more the FA practice is used. Moreover, there is a strong negative correlation between the two variables ($r = -.638, p < .001$), suggesting that the greater the ability to prevent money laundering, the weaker the FA practices. Likewise, there is a strong negative correlation between CAATs and MLP ($r = -.487, p < .001$), which indicates that the use of CAATs is associated with the reduction of money laundering activities. The results of the study indicate that the hypothesis H1 is supported, that is, there is a significant negative relationship between FA and MLP because the correlation coefficient is negative and statistically significant.

4.2 Simple Linear Regression and Moderation Analysis

Table 3. Simple Linear Regression Results for the Effect of FA(FA) on MLP(MLP)

Predictor	E	β	t	r^2	Adj. R ²	F
Constant	184	198	26.182	.000	.638	.07
					.405	180.921

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Predictor	E	β	t	²	Adj. R ²	F
FA	0.682	.051	.638	-13.451	000	

Dependent Variable: MLP; N = 264, p < .001

The result of simple linear regression is presented in Table 3, which shows the relationship between FA and MLP. Results show that the model is statistically significant ($F = 180.921, p < .001$) and F.A. accounts for 40.7% of the variance in MLP ($R^2 = .407$). The regression coefficient of FA is negative and significant ($\beta = -0.638, B = -0.682, t = -13.451, p < .001$), suggesting that a rise in FA practices will result in a decrease in money laundering prevention. Specifically, for every unit increase in the FA, there is a 0.682-unit decrease in MLP. Thus, the results validate H2, which suggests that FA has a strong negative relationship with the prevention of money laundering.

Table 4. Moderation Analysis Using PROCESS Macro (Model 1)

Variables	Coeff.	SE(B)	²	R ² Change	t	
Constant	5.021	.215	452	.023	23.353	.000
FA	-0.591	.058			10.190	.000
CAATs	-0.217	.064			-3.391	.001
FA × CAATs	-0.286	.096			-2.979	.003

Dependent Variable: MLP

MLP(MLP) is significantly negatively related to FA(FA) ($\beta = -0.682, p < .001$). This means that for every unit increase in FA, MLP decreases by 0.682 units. The moderation results also show that the overall model accounts for 45.2% of the variance in MLP ($R^2 = .452, p < .001$), and the interaction effect accounted for an additional 2.3% of the variance in MLP

(R^2 Change = .023). The coefficient for CAATs is negative and significant ($\beta = -0.217$, $p = .001$), suggesting greater use of CAATs is associated with a decrease in MLP. Most importantly, the moderating effect was confirmed by the negative and statistically significant interaction ($FA \times CAATs$; $\beta = -0.286$, $p = .003$). The result indicates that the overall effect of CAATs is a negative association between FA and MLP. That is, the more CAATs that are used, the more effective the FA is at MLP. So, H3 is supported.

Discussion

It has been found that MLP is negatively and significantly related to FA, which means that the stronger the FA practices, the lower the money laundering activities in the NBP. The correlation and regression analysis results validate H1 and H2, which show that FA has a significant impact on predicting lower levels of money laundering prevention. The results obtained confirm the results of previous studies that found that FA has beneficial effects on the detection of fraud, compliance with regulations, and effectiveness of anti-money laundering (Wayo, 2023; Stanković & Fazlović, 2022; Alabraba, 2024; Teibowei, 2025). The results also corroborate the RTC (Cornish & Clarke, 1986; Becker, 1968) that individuals become less inclined to use financial precautions when they feel that the detection and punishment of such techniques is more likely. FA can also bolster investigative and monitoring efforts, increasing the risk of money laundering, and therefore making it less likely it is to be done. Moreover, the moderation analysis corroborates the negative relationship between FA and MLP with the introduction of Computer-Assisted Audit Techniques and Tools (CAATs), which is supported by H3. The fact that the interaction effect is significant and negative suggests that the effectiveness of FA on the reduction in MLP is increasing with the high levels of CAATs utilization. The results are in line with previous research, which highlights the advantages of CAATs in audit efficiency, transaction monitoring, anomaly detection, and anti-money laundering controls (Adeyanju & Adenikinju, 2022; Ghani, Shahimi, & Azmi, 2024; Cvetković, Mičić, & Vujičić, 2024; Al Natour et al., 2024; Al Natour et al., 2025). Therefore, the findings indicate that the use of forensic accounting, along with the use of advanced audit technology, is a more efficient tool in preventing money laundering within the banking

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industry. The study underscores the need for the integration of forensic knowledge and technological skills into AML efforts to bolster anti-money laundering regimes and contribute to the integrity of the financial system.

Conclusion

The findings revealed that the correlation between FA and MLP is a significant negative correlation; thus, the good implementation of FA will reduce the incidence of money laundering activities. Furthermore, the use of technological audit tools in forensic practice was regarded as one of the most important keys to the success of FA in the fight against money laundering, and CAATs proved to be of great assistance in this regard. The findings support the Rational Choice Theory (RCT), and show that improved monitoring, detection, and investigative capabilities increase the perceived risk of financial preventions. Moreover, the study also contributes to the existing literature on anti-money laundering as it empirically shows the complementarity of FA and CAATs in the money laundering prevention process. The results highlight the need for financial institutions to improve their anti-money laundering systems and the integrity of the financial system through investing in FA skills and advanced audit technologies.

Theoretical and practical implications

This study presents a valuable theoretical contribution by applying Rational Choice Theory to the anti-money laundering practices in the banking industry. The analysis revealed that the use of FA can be used to reduce the MLP correlation, and Computer-Assisted Audit Techniques and Tools (CAATs) can increase the MLP correlation. The results contradict the assumption of Rational Choice Theory in that there is a greater positive attitude towards financial prevention when detection/monitoring processes improve with increased perceived risk. In practice, the results underlined the key role that FA and CAATs play in the enhancement of the AML framework. The negative effect of forensic accounting on the prevention of money laundering is also great, indicating that forensic accounting is a significant factor in preventing money laundering. Apart from this, the influence of the CAATs also points out the role of the technological tools in

enhancing the efficiency of the FA, as well as in monitoring transactions, analysing data, and detecting anomalies. The findings of this research underscore the need for a mix of forensic knowledge and state-of-the-art audit technologies to optimize compliance with banking regulations, internal control systems, and the stability of the banking system.

Limitations and Future Research Directions

The study's scope is limited as it has been conducted with the employees of the National Bank of Pakistan, and thus, the results may not apply to other banks or the banking sector. Secondly, the study design type used was a cross-sectional study design, which only allows perceptions to be captured at a single time in the study, limiting the ability to make causal statements. Further research could be conducted in the future that looks at more than one commercial bank, along with longitudinal research, and the incorporation of objective financial performance indicators. Other technological and organizational factors, such as the use of artificial intelligence, data analytics capabilities, compliance culture, or the effect of internal controls, could be considered as moderators or mediators of the relationship between FA and MLP in future research.



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