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Research paper

Audit Committee Gender Diversity, Women Audit Partner and Fraud Risk in China

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Abstract

This study examines the impact of audit committee gender diversity (ACGD) and women audit partners (WAP) on fraud risk (FR) in Chinese A-share listed companies. It also explores the moderating effect of WAP on the ACGD-FR relationship within China's dual-signature audit system. Using a quantitative approach, the study analyzes 21,760 firm-year observations from 2019 to 2023 and employs logistic regression to assess the effects of ACGD, WAP, and their interaction on FR. The results indicate that both ACGD and WAP are significantly and negatively associated with FR, with their interaction further reducing fraud risk. These findings provide important academic implications by extending the audit governance literature through a dual focus on ACGD and WAP, while also offering practical insights for policymakers and corporate managers seeking to enhance governance effectiveness through gender diversity initiatives. The novelty of this study lies in its systematic analysis of the synergistic role of ACGD and WAP in mitigating fraud risk, an area largely overlooked in prior research.

Keywords: *Audit Committee Gender Diversity; Women Audit Partners; Fraud Risk; Dual-Signature Audit System; Corporate Governance.*

1. Introduction

In recent years, gender diversity has received widespread attention due to its critical role in auditing and corporate governance. Research shows that audit committee gender diversity (ACGD) and the participation of women audit partners (WAP) can improve audit quality and reduce fraud risk (FR) by providing diverse perspectives, higher ethical standards, and greater professional skepticism. Furthermore, gender diversity has demonstrated significant potential to improve internal controls, increasing financial transparency, and enhancing accountability (McLaughlin et al., 2021; Miglani & Ahmed, 2019; Nekhili et al., 2020). Despite these potential benefits, women remain significantly underrepresented on audit committees and in key audit positions (McLaughlin et al., 2021; Nekhili et al., 2020; Perry et al., 2023). Existing research mainly focuses on gender diversity at the board level, with relatively little study of audit committees, a key governance committee. Due to the uniqueness of institutional environments and cultural norms in emerging markets, especially in China, the effects and mechanisms of implementing gender diversity in these regions may differ significantly from those in developed economies. In addition, most studies focus on a single level of gender diversity (such as the independent role of ACGD or WAP), but lack a systematic discussion of the synergistic effect of the two, especially in the context of China's special audit system with the "double signature system" requirement.
Current research still lacks clear answers to the following questions: whether ACGD can independently reduce the occurrence of FR by improving audit supervision and risk management, thereby lowering the likelihood of auditor-detected FR and reducing the potential for receiving a modified audit opinion. Also, whether WAP can independently reduce fraud risk through higher professional skepticism and audit quality; whether there is a synergistic effect between them, and through which mechanisms they enhance each other's effects? Therefore, this study addresses these gaps by examining how ACGD and WAP individually and synergistically affect FR, proxied by modified audit opinions. Specifically, first, this study analyzes the relationship between ACGD and FR to explore whether it significantly reduces the incidence of fraud; second, it examines the unique contribution of WAP in reducing FR; and finally, it examines the moderation of WAP in the relationship between ACGD and FR. Further revealing the synergy between ACGD and WAP and their overall impact on corporate governance quality and financial transparency.
By exploring these issues, this study provides empirical evidence on the role of gender diversity in audit governance and offers an important reference for policymakers and corporate managers in promoting gender diversity. Enhancing gender diversity in audit committees and key audit positions can significantly improve corporate governance efficiency and audit quality. The study suggests that regulatory bodies consider introducing gender diversity quotas or incentive policies, support women's career development, and optimize the structure of audit teams under the dual-signature system to achieve greater transparency and accountability. These policy recommendations also contribute to aligning corporate governance with international standards and promoting long-term enterprise sustainability.
This study makes significant contributions to the fields of audit committee gender diversity (ACGD), women audit partners (WAP), and fraud risk (FR). First, it addresses the lack of attention in the existing literature to the audit committee as a key governance body and systematically explores the synergistic effects of ACGD and WAP under China's dual-signature system, revealing their unique roles in

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reducing fraud risks. Second, by focusing on Chinese A-share listed companies, this study provides localized insights into the role of gender diversity in emerging markets and offers policy recommendations, such as implementing gender diversity quotas and supporting women's career development, to improve audit quality, transparency, and corporate governance efficiency. Furthermore, this study extends the application of critical quality theory and resource dependence theory to multi-level governance, offering new theoretical and practical perspectives on gender diversity research.

This study adopts an empirical analysis method, using Chinese A-share listed companies as the research sample, and uses corporate financial data and audit information from 2019 to 2023 for analysis. This study employs logit panel data analysis to explore the impact of audit committee gender diversity (ACGD) and women audit partners (WAP) on fraud risk (FR) in Chinese A-share listed companies. The results show that both ACGD and WAP are significantly negatively associated with FR, highlighting their critical roles in reducing fraud risk and improving corporate governance. Furthermore, the interaction between ACGD and WAP demonstrates a synergistic effect, where the presence of gender diversity at both levels further reduces the likelihood of FR. These findings underscore the necessity of promoting gender diversity in audit committees and key audit roles, particularly within the context of China's dual-signature system, to enhance governance efficiency and audit quality.

This study has important contributions both at the theoretical and practical levels. On the theoretical level, it enriches the understanding of gender diversity in audit governance by systematically examining the direct impact of audit committee gender diversity (ACGD) and women audit partners (WAP) on fraud risk (FR), while providing an in-depth analysis of their synergistic effects. This expands the academic perspective on the subject. By incorporating critical quality theory and resource dependence theory, the study highlights the essential role of diverse perspectives and collaborative governance in enhancing oversight efficiency, strengthening risk management, and promoting ethical decision-making. Furthermore, by focusing on emerging markets, particularly the unique institutional context of China's dual-signature system, the study fills a gap in the existing literature. It provides critical theoretical insights and practical guidance on how multi-level gender diversity can effectively reduce fraud risks and improve audit quality within complex governance frameworks.

At the practical level, this study provides important empirical evidence for policymakers and corporate managers, highlighting the critical role of enhancing gender diversity in audit committees and increasing the proportion of female audit partners in strengthening corporate governance. Despite some progress, the findings reveal that women remain underrepresented in audit committees, urging companies to prioritize diversity initiatives. The research demonstrates that greater female participation in audit committees and key auditing positions not only significantly improves audit quality but also enhances financial transparency and accountability. Companies can draw practical insights from this study by implementing inclusive recruitment strategies, establishing mentorship programs, and setting measurable diversity goals to effectively address these gaps. By leveraging gender diversity as a strategic asset, organizations can promote equity, mitigate fraud risks, enhance governance effectiveness, and advance their sustainable development goals.

We proceed as follows. Section 2 discusses previous literature and hypothesis development. Section 3 introduces the research method. We present the results and discussion in Section 4. Section 5 concludes our research with limitations and suggestions for future research.

2. Literature Review and Hypotheses Development

2.1. Audit committee gender diversity

Audit committee gender diversity (ACGD) has received significant attention due to its critical role in improving financial reporting quality and preventing fraud (Miglani & Ahmed, 2019; Oradi & Izadi, 2020). Female members bring unique governance advantages, such as heightened ethical sensitivity, stronger monitoring capabilities, and stricter decision-making standards, which help reduce the likelihood of financial fraud (Nekhili et al., 2020; Wahid, 2019). For instance, Abbott et al. (2012) and Oradi and Izadi (2020) found that having at least one female member on the audit committee significantly reduces the likelihood of financial restatements, highlighting the positive impact of gender diversity on corporate governance. Moreover, having more female members enhances the quality of decision-making through increased interactions and the consideration of diverse points of view (Abbott et al., 2012; Wahid, 2019)

The improvement in audit quality attributable to gender diversity primarily stems from female members' behavioral and cognitive strengths, which align closely with the core objectives of effective audit oversight. Female members tend to exhibit higher levels of professional skepticism, greater risk aversion, and more meticulous attention to detail (Ittonen et al., 2013; Oradi & Izadi, 2020). These attributes enhance the audit committee's ability not only to identify and mitigate fraud risks in financial reporting but also to strengthen the enforcement of corporate governance principles. Research shows that gender-diverse audit committees are more likely to demand higher-quality audits and stricter financial disclosure standards, thereby improving the integrity and transparency of financial reporting (Miglani & Ahmed, 2019).

In the context of fraud risk (FR), modified audit opinions (MAOs) serve as a critical tool for measuring fraud. MAOs reflect auditors' professional judgment regarding potential material misstatements or governance weaknesses in a company's financial reports (McLaughlin et al., 2021). Although management may attempt to influence audit opinions, studies have shown that gender-diverse audit committees can mitigate such risks through their demand for higher audit standards, stronger oversight capabilities, and strict adherence to ethical norms (Nekhili et al., 2020). Thus, the impact of ACGD in reducing financial fraud risks is reflected in its ability to improve the quality of audit opinions, which further ensures the validity of MAOs as a proxy for fraud detection.

This dynamic is particularly pronounced in emerging markets like China. Governance structures in these markets, often characterized by highly concentrated ownership and less robust regulatory frameworks, present unique challenges. Under China's dual-signature system, which requires two audit partners to co-sign financial reports, gender-diverse committees enhance collaboration with women audit partners (WAP), optimize cooperation between audit partners, and improve the overall transparency and reliability of the audit process. Specifically, within the dual-signature system, ACGD facilitates higher-quality oversight and more ethical decision-making. This ensures that audit opinions accurately reflect financial fraud risks, thereby reinforcing the effectiveness of corporate governance frameworks. Besides, by promoting transparency and accountability, ACGD strengthens stakeholder trust, reduces the likelihood of managerial manipulation of financial reports, and enhances the confidence of external investors and regulatory bodies in the company (Miglani & Ahmed, 2019). Research has shown that such committees are effective in reducing the incidence of financial misstatements and restatements, while also improving the quality and transparency of financial disclosures (Nekhili et al., 2020).

By integrating critical quality theory and resource dependence theory, this study emphasizes the essential role of diverse perspectives and collaborative governance in enhancing oversight efficiency, strengthening risk management, and promoting ethical decision-making. Critical quality theory underscores the importance of improving organizational processes to achieve superior governance outcomes, while resource dependence theory highlights how diverse audit committees provide access to unique resources and perspectives. This diversity

enriches the decision-making process and reduces fraud risks (Kanter, 1977; Pfeffer & Salancik, 1978). Collectively, these theoretical frameworks support the argument that ACGD plays an important role in fostering effective audit governance. This study develops the theoretical framework, research model, and hypotheses as shown in Figure 1. The first hypothesis is as follows:
H 1: Audit committee gender diversity is negatively associated with fraud risk

2.2. Women audit partner

While ACGD focuses on oversight at the governance level, women audit partners (WAP) play a more direct role in fraud detection by directly influencing audit quality and professional skepticism. Research indicates that women audit partners generally exhibit greater ethical sensitivity and skepticism, which enhances fraud detection mechanisms (Mnif & Cherif, 2022). Compared to their male counterparts, female partners adopt stricter auditing procedures, demonstrate a lower tolerance for risk, and demand more substantial audit evidence (Abdelfattah et al., 2021; Ittonen et al., 2013).
Women audit partners are also less susceptible to client pressure and demonstrate stronger commitment to maintaining audit independence. Prior studies have shown that firms with female partners produce higher-quality audits, are more likely to issue modified audit opinions in the presence of misstatements, and enforce stricter accounting standards (Mnif & Cherif, 2022). Hardies et al. (2016) similarly report that female auditors in Belgium provide higher-quality services than their male counterparts, as they are more likely to issue going-concern audit opinions, reflecting their higher skepticism. In China's dual-signature system, the presence of a woman as one of the signing partners enhances scrutiny and strengthens professional judgment, ensuring the financial reports accurately reflect the company's financial condition (Perry et al., 2023). Women audit partners also enhance the credibility of financial reporting through consistent ethical behavior and strong professional independence, which helps limit opportunities for managerial manipulation, promote a culture of integrity, and strengthen stakeholder confidence (Mnif & Cherif, 2022).
Under China's dual-signature requirement, the role of women audit partners becomes even more significant. Their participation enhances the audit team's collaborative efficiency through diverse perspectives, heightened professional skepticism, and higher audit standards (Ittonen et al., 2013). These qualities improve overall audit quality and reduce fraud risks (Alkebsee et al., 2021; Perry et al., 2023). Their strong ethical sensitivity and professional skepticism help balance team judgments and mitigate decision-making biases, thereby improving objectivity and consistency of audit decisions (Hao et al., 2022; Perry et al., 2023). Furthermore, women audit partners strengthen collaboration between external audit teams and internal governance bodies, such as audit committees, through effective communication and coordination. This helps bridge information gaps, align audit strategies and improve the execution of oversight processes, thereby supporting more effective fraud detection and prevention. Studies indicate that firms with women audit partners are more effective in identifying and mitigating fraud risks (Nekhili et al., 2020). Their proactive approach to high-risk and complex audit assignments further increases the depth of fraud detection and enhances organizational transparency.
The effectiveness of women audit partners in reducing fraud risk (FR) is influenced by cultural and institutional factors. In environments with inclusive policies and strong regulatory frameworks, women audit partners can fully demonstrate their professional competence and influence governance outcomes. Conversely, in less supportive environments, cultural barriers and the underrepresentation of women in leadership roles may limit their ability to exercise their skills effectively (Ghafran & O'Sullivan, 2017). This underscores the importance of institutional support and gender diversity initiatives in strengthening the impact of women audit partners on audit quality and fraud detection.
By combining ethical decision-making with rigorous professional practice, women audit partners provide a dual benefit: they ensure compliance with regulatory frameworks while simultaneously fostering a culture of accountability within organizations. These contributions are particularly vital in governance systems that face structural challenges or are undergoing transformation. Within China's dual-signature system, the collaborative approach of women audit partners further strengthens oversight mechanisms through the integration of diverse perspectives, thereby enhancing the reliability of financial reporting. Based on the theoretical framework and research model presented in Figure 1, this study proposes the following second hypothesis:
H2: Women audit partner is negatively associated with fraud risk

2.3. Moderating role of WAP

The moderating role of women audit partners (WAP) in the relationship between audit committee gender diversity (ACGD) and fraud risk (FR) highlights the importance of multi-level gender diversity in governance frameworks. While ACGD independently contributes to fraud detection through enhanced oversight and ethical governance, the presence of WAP strengthens this relationship by providing additional scrutiny, professional skepticism, independent judgement, and ethical rigor. This section examines how WAP moderates the association between ACGD and FR through their combined influence on governance efficiency and fraud prevention.
The interaction between WAP and ACGD fosters a complementary governance dynamic. Gender-diverse audit committees possess collective behavioral attributes such as heightened ethical sensitivity, stronger attention to detail, and greater accountability. WAP reinforces these attributes by applying a more rigorous and systematic audit approach. Their higher levels of professional skepticism and commitment to audit independence complement the governance role of gender-diverse audit committees. This synergy leads to improved fraud risk detection through stricter oversight and closer alignment with ethical and professional standards (Nekhili et al., 2020; Perry et al., 2023). In China's dual-signature system, the participation of WAP significantly improves the quality of collaborative judgement and reduces the likelihood of managerial manipulation.
WAP also enhances the reliability of modified audit opinions (MAOs) as proxies for fraud detection. By insisting on high-quality audit evidence and maintaining strict adherence to audit independence, WAP mitigates the risk of managerial influence on audit outcomes (Mnif & Cherif, 2022). Their greater risk aversion and meticulous attention to detail ensure that MAOs more accurately reflect underlying financial irregularities. This directly reinforces the role of ACGD in fraud risk detection. As a result, the interaction between WAP and ACGD leads to higher audit quality, a lower incidence of undetected fraud, and enhances stakeholder trust in financial reporting.
The effectiveness of WAP as a moderator is influenced by cultural and institutional factors, such as regulatory frameworks and societal norms. In institutional environments that support gender diversity, the interaction between ACGD and WAP becomes more pronounced, leading to significant improvements in fraud detection and governance outcomes (Ghafran & O'Sullivan, 2017). Conversely, in less supportive environments, systemic barriers to women's leadership may constrain their ability to fully leverage their skills, thereby limiting their moderating impact. This highlights the importance of institutional support and inclusive policies in enabling WAP to maximize its contributions to governance.

Besides, China's dual-signature system provides a unique framework for analyzing the moderating role of WAP. The collaborative approach facilitated by WAP, in conjunction with ACGD, enhances oversight mechanisms and ensures transparent governance processes. Empirical evidence shows that firms with both high ACGD and significant WAP representation demonstrate superior governance outcomes, characterized by lower incidences of FR and higher audit quality (Perry et al., 2023). Specifically, WAP's emphasis on independent judgment and its ability to challenge management decisions amplify the governance effects of ACGD. This collaboration between WAP and gender-diverse audit committees effectively reduces governance risks and strengthens organizational accountability.

The moderating effect of WAP on the ACGD-FR relationship is consistent with critical quality theory and resource dependence theory. Critical quality theory emphasizes the importance of integrating diverse perspectives to optimize governance outcomes, while resource dependence theory highlights the role of WAP in providing unique oversight resources and mitigating informational asymmetry (Kanter, 1977; Pfeffer & Salancik, 1978). These theoretical frameworks collectively support the argument that WAP strengthens the relationship between ACGD and FR by enhancing audit quality and governance efficiency. The theoretical framework and research model (Figure 1) lead to the following third hypothesis:

H3: Women audit partners strengthen the association between audit committee gender diversity and fraud risk

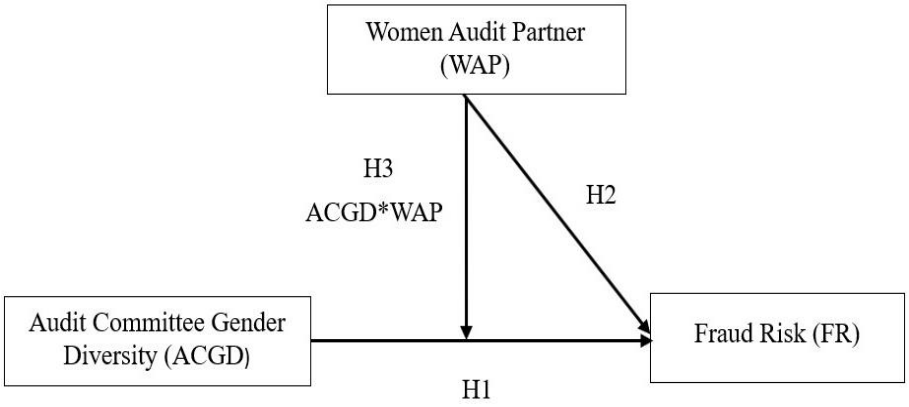


Fig. 1: Research Model

3. Research Methodology

This study employs a quantitative research design to investigate the relationship between audit committee gender diversity (ACGD), women audit partners (WAP), and fraud risk (FR). Logistic regression is used as the main analytical method, supplemented by descriptive statistics, correlation analysis, and covariance tests to ensure the robustness and validity of the findings. The sample comprises China's A-share listed companies from 2019 to 2023, excluding *ST firms and the financial sector, based on the 2012 China Securities Regulatory Commission (CSRC) industry classification, to reflect governance practices under China's dual-signature system.

The exclusion of *ST firms is not only due to financial distress, but also because they are subject to heightened regulatory scrutiny, special reporting requirements, and abnormal audit procedures, which may systematically alter governance practices and audit processes. These regulatory interventions can distort the observed relationship between governance characteristics and fraud risk, thereby introducing potential bias into the estimation results. Excluding *ST firms allows the analysis to better capture governance effects under normal operating conditions.

Data on ACGD, WAP, financial health indicators and fraud-related variables are obtained from the China Stock Market and Research (CSMAR) database, supplemented by information from company annual reports and audit opinions. By excluding financially distressed firms and financial institutions, the study focuses on analysing the broader governance effects of gender diversity on fraud risk within non-financial firms. This sampling approach is consistent with previous studies suggesting that severe financial distress and industry-specific regulations may influence governance dynamics and audit quality (Ghafran & O'Sullivan, 2017; Mnif & Cherif, 2023). Therefore, this study makes an important contribution to the literature by providing empirical evidence that reveals the role of multi-level gender diversity in mitigating fraud risk, particularly in emerging markets with unique institutional frameworks.

3.1. Research model specification

To investigate the relationship between audit committee characteristics and financial statement fraud, we constructed the following logistic regression model:

$$FR=\beta_0 + \beta_1 ACGD_{it} + \beta_2 WAP_{it} + \beta_3 (ACGD_{it}*WAP_{it}) + \beta_4 Z\text{-}Score_{it} + \varepsilon$$

Where:

FR: Fraud Risk, binary variable coded as 1 if financial statement fraud is detected (modified audit opinion), and 0 if no fraud is detected (standard unqualified opinion). ACGD: Audit Committee Gender Diversity, measured by the proportion of female members. WAP: Female Audit Partners, expressed as the proportion of signatory audit partners who are female. Interaction (ACGD × WAP): An interaction term capturing the synergy between ACGD and WAP in fraud prevention. Z-Score: Altman Z-score, which measures a firm's financial health and bankruptcy risk. Control Variables: Control variables, including industry classification and year-fixed effects. The model focuses on analysing the direct effects of ACGD and WAP on FR and their interaction effects, providing theoretical and empirical support for studying the mechanism of gender diversity in governance.

3.2. Sample and data collection

Chinese A-share listed companies from the period 2019 to 2023 were selected as the research sample. To ensure the consistency and representativeness of the sample, *ST companies as well as the financial industry (based on the 2012 version of the CSRC's industry classification) are excluded. These exclusion criteria aim to maintain the consistency of the governance framework and reduce the impact of industry-specific regulation on the research results. Data sources include the China Stock Market and Accounting Research (CSMAR) database, annual reports of listed companies, audit opinions, and other financial databases. The dataset covers key information such as audit committee gender diversity (ACGD), the proportion of female audit partners (WAP), financial health indicators, and fraud-related variables. By constructing a comprehensive dataset, this study is able to analyse the relationship between gender diversity and fraud risk in depth. To mitigate the influence of extreme values, this study applies winsorisation approach to all continuous variables at the 1st and 99th percentiles. This approach reduces the impact of extreme outliers without discarding observations, thereby preserving sample size and the original data structure (Leys et al., 2013). Given the sample size of 21,760 firm-year observations, the lowest and highest 1% of values were replaced with the nearest threshold values to reduce potential distributional distortion and improve the stability of regression estimates.

3.3. Operationalisation of the variables

The dependent variable, fraud risk (FR), is measured using audit opinion-based proxies. Following prior studies, FR is coded as 1 if a firm receives a modified audit opinion, including qualified opinions, adverse opinions, or disclaimer opinions, which are commonly associated with higher financial reporting risk. Standard unqualified opinions are coded as 0. This approach captures heightened audit concern and potential financial irregularities rather than confirmed fraud events, and is widely used in audit and governance literature. The independent variables include ACGD, measured as the proportion of female audit committee members, and WAP, measured as the proportion of women among signatory audit partners. An interaction term (ACGD × WAP) is used to capture the joint effect of gender diversity at these two levels on fraud detection. Control variables include the Z-Score (a financial health indicator) and dummy variables for year and industry to control for the effects of time and industry differences. Table 1 summarizes the operationalization of variable definitions and measurements. This structured variable framework allows this study to delve into the mechanisms by which gender diversity plays a role in fraud risk and corporate governance outcomes.

Table 1: Summary Operationalization of Variable Definition and Measurements

Name	Abbreviation	Description
Dependent variable		
Fraud Risk	FR	Binary variable: 1 if fraud detected (modified audit opinion); 0 if no fraud detected (standard unqualified opinion)
Independent variables		
Audit Committee Gender Diversity	ACGD	Proportion of women members on the audit committee
Women Audit Partner	WAP	Proportion of women signing audit partners
Moderating Variable		
Interaction (ACGD × WAP)	Interaction	Interaction term between ACGD and WAP
Control Variables		
Z-Score	Z-Score	Altman Z-score, a measure of financial health and bankruptcy risk
Company Size	SIZE	Natural logarithm of total assets
Return on Assets	ROA	Net income divided by total assets
Leverage Ratio	Leverage	Total liabilities divided by total assets
Ratio of Sales Revenue Growth	Growth	Ratio of this year's sales revenue/last year's sales revenue
Year	Year	Dummy variables representing the year (e.g., 2019, 2020, ...)
Industry	Industry	Dummy variables for industry classification.

4. Results

4.1. Descriptive statistics

Table 2 provides the descriptive statistics of all key variables. Panel A shows that the average proportion of female audit committee members (ACGD) is 20.93%, indicating a moderate level of gender diversity in the audit committees of China's A-share listed companies. However, this percentage is below the 30% "critical mass" threshold suggested by Kanter (1977), implying that gender representation in audit committees may not yet be sufficient to exert its full governance influence. Meanwhile, the mean proportion of female audit partners (WAP) is 34.67%, indicating that women's participation at the audit partner level is relatively higher than at the audit committee level. This data highlights a persistent gender gap in corporate governance roles, especially at the audit committee level, a finding consistent with previous studies (Nekhili et al., 2020; Perry et al., 2023). This finding suggests that the potential synergy between female representation across governance levels may still be limited, which could influence the overall effectiveness of gender diversity in governance.

The Altman Z-Score ranges from -507.79 to 24.94 with a mean of 2.05, indicating substantial variation in financial stability across sample firms. While the majority of firms remain financially stable, a small subset experiences severe financial distress. The wide range of Z-Score values, including the large negative minimum (-507.79), reflects firms with extremely weak financial conditions. The Altman Z-Score is constructed using weighted financial ratios that are scaled by total assets or equity-related measures. Therefore, extreme values may arise when firms report substantial losses, very low asset bases or negative equity. These observations capture underlying economic conditions rather than data errors and are relevant for controlling firms' financial risk in the fraud model.

Panel B of Table 2 shows the frequency and proportion of fraud risk (FR) occurrence. A total of 804 firms (3.69%) in the sample were identified as having committed FR, indicating a relatively low prevalence of fraud. This result is consistent with the findings of corporate fraud studies in a similar institutional context in China (Mnif & Cherif, 2022). Notably, the data show that fraud-prone firms typically have lower ACGD and WAP values, supporting the notion that gender diversity enhances supervisory efficiency and reduces opportunistic behaviour (Abdelfattah et al., 2021).

Table 2: Descriptive Analysis

Panel A					
Variable	Obs	Mean	Std. dev.	Min	Max
WAP	21,760	0.347	0.340	0	1.000
ACGD	21,760	0.209	0.218	0	1.000
Z-Score	21,760	2.048	4.002	-507.788	24.943
SIZE	21,760	22.247	1.359	16.410	28.700
ROA	21,760	0.267	0.312	-30.690	7.450
Leverage	21,760	0.421	1.250	0.010	178.350
Growth	21,760	1.167	1.130	-0.310	79.200
Panel B					
	Obs	Frequency	Percentage		
FR	21,760	804	3.69%		

These descriptive statistics highlight the importance of gender diversity and financial health in reducing financial misconduct. Specifically, both a higher proportion of women in audit-related roles and stronger indicators of financial health are strongly associated with a reduced probability of fraud. These findings support the theoretical rationale for including gender diversity and financial stability as key variables in corporate governance research (Ghafran & O'Sullivan, 2017; Mnif & Cherif, 2022).

4.2. Correlation analysis

Table 3 correlation analyses were conducted to assess the linear relationships between the variables, particularly between the independent variables and FR. The Pearson correlation coefficients provide initial insights into the direction and strength of the association between ACGD, WAP, their interaction terms, and FR. This analysis also serves as a preliminary test for multicollinearity, ensuring the independence of the variables in the regression model.

The three pairs of variables with the highest correlations are as follows. First, the correlation coefficient between Z-Score and Leverage is -0.926 (absolute value greater than 0.8), suggesting that there may be a significant multicollinearity issue between these two variables, and its potential impact on the model requires verification through further VIF analysis. Second, the correlation coefficient between ROA and Z-Score is 0.803 (absolute value greater than 0.8), which also indicates a risk of potential multicollinearity that needs to be further analysed for its possible disturbance to the robustness of the regression model. Finally, the correlation coefficient between SIZE and FR is -0.736. While this indicates a strong correlation, it does not meet the criteria for severe multicollinearity, and its specific impact on model performance needs to be assessed in conjunction with VIF analysis.

Further VIF analysis reveals that the VIF for Z-Score is 6.34, for Leverage is 7.14, and for ROA is 2.89. All values are below the common multicollinearity threshold value of 10, which indicates that there is a strong correlation between these variables, but it has not yet reached the level of serious multicollinearity, and it can be assumed that the model does not have a significant problem of multicollinearity. The problem of multicollinearity is not significant in the model. Therefore, these variables can be retained in the regression model without additional treatment.

To ensure model robustness, we conducted several diagnostic tests. The variance inflation factor (VIF) analysis confirms that multicollinearity is not a critical issue, as all values for key variables are well below the traditional thresholds of 10. In addition, we perform a series of robustness checks, including using alternative fraud measures (e.g., financial restatements) and conducting sub-sample analyses based on industry and firm size, to validate the generalisability of the findings.

Table 3: Correlation Analysis and Variance Inflation Factor (VIF) Analysis

	FR	WAP	ACGD	Interaction	Z-Score	SIZE	Leverage	ROA	Growth	VIF
FR	1.000									
WAP	-0.054	1.000								1.95
ACGD	-0.041	0.010	1.000							2.03
Interaction	-0.054	0.567	0.591	1.000						2.99
Z-Score	-0.156	0.023	0.011	0.0186	1.000					6.34
SIZE	-0.736	0.044	-0.068	-0.0189	-0.010	1.000				1.02
Leverage	0.092	-0.015	-0.007	0.0119	-0.926	0.036	1.000			7.14
ROA	-0.163	0.023	0.011	0.0204	0.803	0.052	-0.715	1.000		2.89
Growth	-0.020	0.003	0.013	0.0032	0.029	0.015	-0.002	0.046	1.0000	1.01

Note: Correlation coefficients are presented in the off-diagonal cells, while the diagonal values of 1.000 indicate perfect correlation of variables with themselves. Variance inflation factor (VIF) values are presented in the last column to assess potential multicollinearity among regressors, where VIF values below 10 indicate low multicollinearity and values above 10 indicate moderate to high multicollinearity.

4.3. Regression results

This section presents the findings from the logistic regression analysis examining the relationship between gender diversity and financial fraud risk (FR). The results for the direct effects of audit committee gender diversity (ACGD) and women audit partners (WAP), as well as the moderating effect of WAP, are reported in Table 4.

The regression results provide strong empirical support for a negative association between ACGD and FR, validating hypothesis H1. In Model 1-logit, the regression coefficient for ACGD is -1.38, which is statistically significant at the 1% level. This indicates that a higher proportion of female members on audit committees is associated with a reduced likelihood of financial fraud in a company. The odds ratio of 0.25 implies that each unit increase in ACGD is associated with a 75% reduction in the odds of fraud risk, indicating that higher ACGD firms experience a substantially lower likelihood of fraud risk. This finding aligns with McLaughlin et al. (2021), who suggest that gender-diverse audit committees perform better in monitoring and fraud prevention due to broader perspectives and higher levels of professional skepticism. Consistent with prior research, the results further emphasize that women in governance roles enhance oversight effectiveness, greater ethical sensitivity, and improved financial transparency (Miglani & Ahmed, 2019; Oradi & Izadi, 2020). In the Chinese context,

where governance challenges persist due to concentrated ownership structures, gender-diverse audit committees play a vital role in strengthening internal controls and limiting opportunistic behavior.

Consistent with hypothesis H2, the result in Model 2-logit show a significant negative relationship between WAP and FR. The regression coefficient for WAP is -0.66, which is significant at the 1% level. The odds ratio of 0.52 indicates that the presence of women audit partner reduces the likelihood of fraud risk by nearly half. This finding is consistent with Abdelfattah et al. (2021), who found that women audit partners adopt more conservative audit approaches, thereby achieving better fraud detection outcomes. In China's dual-signature system, where two audit partners are required to co-sign financial reports, WAP plays a crucial role in enhancing audit effectiveness. Their participation introduces diverse perspectives, greater professional skepticism, and stronger ethical standards, thereby enhancing the collaborative efficiency of audit teams (Nekhili et al., 2020; Perry et al., 2023).

Furthermore, Table 4 validates hypothesis H3 through regression results. In Model 3-logit, the coefficient of the interaction term (ACGD × WAP) is -1.47, statistically significant at the 1% level. The odds ratio of 0.23 indicates that companies with gender diversity at both the audit committee and audit partner levels are approximately 77% less likely to experience FR compared to companies lacking such diversity. This suggests a complementary governance effects, where WAP strengthen the oversight role of gender-diverse audit committees, thus reduce fraud risk. The result aligns with prior studies highlighting that diverse perspectives enhance monitoring quality and more effective fraud detection (Abdelfattah et al., 2021; Perry et al., 2023).

The relatively large coefficient of the Z-Score in Model 3-logit reflects its role as a control variable capturing firms' underlying financial condition. In logistic regression models with interaction terms, coefficient magnitudes may appear amplified due to differences in variable scaling and the nonlinear nature of the model. Therefore, interpretation focuses on the direction and statistical significance of the Z-Score coefficient rather than its absolute magnitude.

Table 4: The Logit Results of the Relationship between Audit Committee Gender Diversity, Women Audit Partner and Fraud Risk

Model	Model 1-logit			Model 2-logit			Model 3-logit (ACGD*WAP)		
Variables	β	z	Odds Ratio	β	z	Odds Ratio	β	Z	Odds Ratio
Constant	3.25***	9.61	25.79	3.55***	9.05	34.81	3.65***	9.8	38.47
ACGD	-1.38***	-6.21	0.25			1.00	-0.97***	3.44	0.38
Z-Score	-0.57***	-12.93	0.57	-0.57***	-12.89	0.57	-5.67***	-13.23	0.00
WAP				-0.66***	-5.01	0.52	-0.39***	-2.31	0.68
Interaction							-1.47***	-2.06	0.23
SIZE	-0.50***	-13.79	0.61	-0.49***	-13.21	0.61	-0.50***	-13.87	0.61
Leverage	2.87***	13.18	17.64	2.84***	12.93	17.12	2.98***	13.6	19.69
ROA	-1.11**	-3.42	0.33	-1.10**	-3.45	0.33	-0.93**	-3.09	0.39
Growth	-0.10**	-1.98	0.90	-0.11**	-2.11	0.90	-0.10**	-1.99	0.90
Year	Control			Control			Control		
Industry	Control			Control			Control		
Likelihood ratio（LR)	-2,520.82			-2,529.03			-2,507.65		
Wald x^2	1,839.84			1,823.41			1,866.18		
Pseudo R2	0.27			0.27			0.27		
No. of observations	21,760			21,760			21,760		

Note: Z-statistics are reported in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

5. Discussion and Conclusion

This study was motivated by the limited empirical evidence explaining how audit committee gender diversity (ACGD) and women audit partners (WAP) independently and jointly contribute to reducing fraud risk (FR), particularly within China's unique dual-signature audit system. Utilizing a substantial dataset of Chinese A-share listed companies from 2019 to 2023, comprising 21,760 firm-year observations, the findings demonstrate consistent evidence that multi-level gender diversity strengthens audit oversight and enhances governance efficiency.

As a whole, the results support all three hypotheses. First, consistent with H1, ACGD is significantly negatively associated with fraud risk, suggesting that gender-diverse audit committees enhance oversight effectiveness through stronger monitoring, heightened ethical sensitivity, and improved transparency (Nekhili et al., 2020; Oradi & Izadi, 2020). This finding reinforces prior evidence that female representation on audit committees contributes to more effective governance and reduces managerial opportunism. Second, the results validate H2, the presence of WAP is associated with lower fraud risk. This result highlights the critical role of WAP in strengthening audit quality through higher professional skepticism, greater independence and more conservative audit judgments. Female audit partners appear more resistant to client pressure and more willing to demand sufficient audit evidence, thereby improving the credibility of financial reporting (Abdelfattah et al., 2021; Ittonen et al., 2013; Mnif & Cherif, 2022).

More importantly, the interaction analyses affirm H3, demonstrating that WAP significantly strengthen the negative relationship between ACGD and fraud risk. This finding underscores that value of multi-level gender diversity, where governance oversight at the audit committee level is reinforced by rigorous execution at the audit partner level (McLaughlin et al., 2021). The synergy between ACGD and WAP enhances audit scepticism, oversight intensity and independence, resulting in more effective fraud detection and prevention. These results align with critical quality theory and resource dependence theory, which suggest that diverse governance actors provide complementary resources and perspectives that improve decision-making quality (Kanter, 1977; Pfeffer & Salancik, 1978).

The findings also suggest important boundary conditions. Prior research indicates that the effectiveness of governance mechanisms, including board and audit oversight, may vary depending on ownership concentration and political connections, which are prevalent in emerging markets such as China (Fan et al., 2007; Firth et al., 2011). In firms with highly concentrated ownership structures or strong political ties, dominant shareholders or political influence may constrain the monitoring role of audit committees and external auditors, potentially weakening the effectiveness of gender-diverse audit committees and women audit partners in fraud mitigation (Chaney et al., 2011; Gul et al., 2010). This underscores the importance of considering institutional and firm-specific contexts when evaluating the governance implications of gender diversity.

From a policy perspective, the findings carry important regulatory implications. Regulators may consider introducing clearer gender diversity guidelines or recommended thresholds for audit committee composition, particularly given that female representation in audit committees is currently low (20.93%) and falls below the effective "critical mass" of 30%. In addition, enhanced disclosure requirements related to audit partner characteristics, including gender, could improve transparency and allow stakeholders to better assess audit quality.

Drawing on comparative evidence from other emerging markets, prior studies suggest that the effectiveness of gender diversity policies depends strongly on institutional conditions, with incentive-based and disclosure-oriented approaches often viewed as more feasible in contexts where rigid quota mandates face structural and cultural constraints (Abdullah & Ku Ismail, 2013; Terjesen et al., 2015).

Despite these policy implications, practical constraints remain significant. The pipeline of female audit partners is still limited, and cultural norms and institutional practices may hinder women's progression to senior audit roles. At the firm level, promoting gender diversity at both audit committee and partner levels should therefore be viewed not merely as a compliance exercise, but as a strategic imperative for enhancing governance and mitigating fraud risk. Audit firms and corporations may need to invest in long-term capacity-building efforts, including targeted training, structured mentorship programmes, and leadership development initiatives, to support women's career advancement. Prior research suggests that such initiatives can enhance audit quality, strengthen professional independence, and improve investor confidence (Miglani & Ahmed, 2019). This study contributes to the literature by advancing understanding of how gender diversity operates across multiple governance levels to reduce fraud risk. By integrating audit committee oversight and audit partner execution, the findings extend existing governance research and provide new insights into the mechanisms through which diversity enhances audit quality in emerging markets.

Future research could extend this in several directions. Cross-country studies may help assess whether the observed relationships hold in different institutional settings. In addition, future studies could explore the role of AI-aided fraud detection and big-data analytics in complementing human judgement and professional scepticism in audits. Additionally, examining other dimensions of diversity, such as experience, expertise, and tenure may provide deeper insights into governance effectiveness (Ghafran & O'Sullivan, 2017).

Overall, this study reinforces the critical role of gender diversity in reducing fraud risk and enhancing audit quality. By documenting both the individual and synergistic effects of ACGD and WAP in reducing fraud risk, this study advances the governance and auditing literature by demonstrating how multi-level gender diversity enhances professional scepticism, oversight effectiveness, and auditor independence. These findings provide valuable guidance for policymakers, regulators, and corporate leaders aiming to strengthen fraud prevention mechanisms and improve corporate governance outcomes. More broadly, the evidence underscores the importance of embedding gender diversity across governance and audit structures as a key institutional mechanism for fostering a robust, credible, and trustworthy financial reporting system.

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