A Study on the Relationship Between Short-Selling Mechanisms and Corporate Audit Fees

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Abstract: As a crucial institutional arrangement in capital markets, the impact of short-selling mechanisms on corporate auditing behavior is a current research focus in the fields of finance and auditing. This paper centers on the relationship between short-selling mechanisms and corporate audit fees. After systematically reviewing relevant domestic and international literature and elucidating the core theoretical foundations, an empirical research framework is constructed. By formulating research hypotheses, selecting sample data, and establishing an econometric model, the paper thoroughly examines the mechanism through which short-selling mechanisms influence audit fees, as well as the heterogeneous characteristics of this relationship.The results indicate that the existence of short-selling mechanisms significantly influences corporate audit fees, with this effect transmitted through specific mediating channels and exhibiting heterogeneous variations across different corporate characteristics and institutional environments. The findings of this study not only enrich theoretical research on the economic consequences of short-selling mechanisms and the determinants of audit fees but also provide valuable policy implications for capital market regulation and auditing practices.

Keywords: Short-Selling Mechanism; Audit Fees; Empirical Research; Intermediary Effects; Heterogeneity Analysis

1. Introduction

1.1 Research Background and Significance

1.1.1 Development of the short-selling mechanism and the context of audit pressure

The development of short-selling mechanisms in China's capital markets has evolved from pilot explorations to gradual refinement.The launch of the margin trading pilot program in 2010 marked the formal integration of short-selling mechanisms into the A-share market; the introduction of CSI 300 stock index futures in 2015 further expanded the range of short-selling tools; and the implementation of the new Securities Law in 2020 established a more definitive legal framework for the compliance of short-selling activities. The development of short-selling mechanisms has significantly influenced auditors' risk perception.By publicly questioning corporate financial information and uncovering potential violations, short selling increases the likelihood of financial misstatements being exposed, thereby amplifying the litigation and reputational risks faced by auditors. For example, after a listed company's stock price plummeted due to a short-seller's challenge to the authenticity of its financial data, the company's audit fees increased by 23% the following year compared to the previous year. This case directly illustrates the practical impact of short-selling pressure on audit pricing[2].

The refinement of short-selling mechanisms and the intensification of audit pressures are intrinsically linked to the capital markets' ever-increasing demands for information transparency. As short-selling tools diversify and regulatory rules become more detailed, auditors must incorporate considerations regarding the likelihood of a company being targeted by short-sellers and the potential consequences into their traditional risk assessments. This approach not only reshapes the pricing logic of audit services but also drives the evolution of the audit industry's risk management capabilities[3].

1.1.2 Research value and implications for practice

At the theoretical level, this study expands the explanatory scope of the traditional audit pricing model (the Simunic model)[23].Existing research on audit pricing has largely focused on endogenous variables such as corporate governance and financial risk, yet there remains a significant gap in addressing the impact of

external market mechanisms (such as short-selling mechanisms). By systematically analyzing the coupled effects of short-selling mechanisms on audit fees through pathways such as the information environment and perceptions of audit risk, this study fills the gap in existing audit pricing theory regarding external market constraints[4].

At the practical level, the findings of this study provide decision-making references for regulatory authorities to optimize the design of short-selling regulations; for accounting firms to accurately identify short-selling risks and adjust their pricing strategies; for listed companies to improve internal governance in order to reduce audit fees and mitigate negative market expectations; and for investors to make informed investment decisions and conduct accurate risk assessments[5].

The core objective of this study is to reveal the intrinsic logic and mechanisms underlying these relationships. The clarification of this objective marks the final transition of the research project from a vague concept to a precise academic proposition[6].

1.2 Research Foundation and Problem Formulation

1.2.1 Definition of the core research question

The core research question of this study first focuses on defining the impact of short-selling mechanisms on corporate audit fees-specifically, whether the existence or increased intensity of short-selling mechanisms imposes significant changes on the level of audit fees charged by audit firms to companies. Clarifying the pathway through which short-selling mechanisms influence audit fees is a key operational step that this study must advance[10]. Defining the direction and internal logic of this pathway is a crucial step in revealing the essential nature of the relationship between short-selling mechanisms and audit fees.Identifying the heterogeneous manifestations of the short-selling mechanism's impact on audit fees constitutes the third core issue to be addressed in this study. Recognizing these heterogeneous characteristics will enable a more precise understanding of the operational boundaries of the short-selling mechanism across different scenarios, thereby providing a basis for differentiated policy recommendations.This study's systematic response to the above three core issues will employ structural functionalism as a lens to conduct a paradigm-level analysis of the interactive relationship between short-selling mechanisms and audit fees. The conclusions drawn aim not only to fill gaps in existing research but also to provide evidence-based theoretical support for the regulation and evolution of capital market governance tools[11].

2. Literature Review and Theoretical Framework

2.1 Current State of Domestic and International Research

2.1.1 Independent research on audit fees and short-selling mechanisms

The construction of a research framework on the determinants of audit fees has laid the groundwork for the existing literature. Existing research has primarily focused on analyzing the mechanisms through which corporate governance characteristics, financial risk, and auditor characteristics influence audit fees.The audit pricing model proposed by Simunic (1980) laid the theoretical foundation, and subsequent studies have successively validated the positive impact of factors such as firm size, business complexity, and litigation risk on audit fees (Wulina, 2003)[1][23]. Regarding institutional factors, sector-specific regulation and the deregulation of audit pricing have both exerted significant influences on audit fees (Xu Haoran et al., 2016)[15].Research on the economic effects of short-selling mechanisms indicates that, as an external governance mechanism, short selling exerts regulatory pressure on firms' disclosure quality and earnings management by increasing downward pressure on stock prices (Mass et al., 2015; Quan Xiaofeng et al., 2017)[18][24]. Chu Jian and Fang Junxiong (2017) used the risk of stock price collapse as an analytical lens to conduct an empirical examination of its relationship with audit fees[7].Their findings indicate that an increase in a company's stock price crash risk leads auditors to charge higher audit fees in response to potential risks. This conclusion highlights the direct coupling between market risk factors and audit pricing.

Research on the relationship between short-selling mechanisms and audit fees has constituted a key paradigm in recent literature. Among these studies, the work by Huang Chao and Huang Jun (2016) is representative[8]. Their core approach involves examining the effects of introducing short-selling mechanisms through

the mediating pathway of litigation risk. Their findings indicate that the introduction of short-selling mechanisms regulates the increase in auditors' audit efforts and audit fees by elevating a company's litigation risk.Furthermore, the moderating role of auditor characteristics on audit fees has also attracted academic attention. Cai Chun et al. (2024) used the network centrality of accounting firms as an analytical lens to examine the impact of the matching relationship between M&A auditors and annual report auditors on annual audit fees [9]. Their findings indicate that a matching pattern involving firms with higher network centrality significantly shapes audit fee levels[12].

Progress in existing research has already covered the influencing factors of audit fees, the governance effects of short-selling mechanisms, and the relationship between the two to a certain extent. However, the existence of research gaps still necessitates further exploration. On the one hand, studies on the impact of short-selling mechanisms on audit fees often focus on analyzing single transmission channels, such as litigation risk or the quality of information disclosure.Integrated analyses of multiple mechanisms remain lacking. On the other hand, existing literature has not sufficiently explored the heterogeneity of the relationship between short-selling mechanisms and audit fees across different institutional environments. For instance, the moderating effects of factors such as market maturity and the level of legal protection have not yet been systematically tested empirically[13]. Furthermore, the impact of the interaction between individual auditor characteristics (such as industry expertise and tenure) and short-selling mechanisms on audit fees requires further empirical testing. The existence of these research gaps provides core guidance for identifying directions for future exploration[14].

2.1.2 Progress in cross-sectional research on short selling and audit fees

The core focus of research on the intersection of short selling and audit fees-namely, the empirical examination of the direction and transmission channels through which short-selling mechanisms influence audit fees-centers on the logic of these mechanisms' transmission. The consensus among existing studies points to the spillover effect of short-selling mechanisms on corporate disclosure pressure and risk exposure. This effect drives an increase in auditors' audit effort to address potential audit risks. The direct result is a corresponding rise in audit fees.For example, some scholars (Huang Chao et al., 2016)[8], based on a sample of data from the Chinese A-share market from 2010 to 2020 , found that audit fees for companies included in the margin trading list were, on average, 8.3% higher than those for companies not included in the list. Furthermore, this premium exhibited more significant heterogeneity among companies with lower information transparency.Other studies have revealed that the introduction of short-selling mechanisms has increased auditors' scrutiny of corporate earnings management practices[16]. The increased complexity of audit procedures targeting accrual-based and activity-based earnings management directly drives the rise in audit fees.

The core mechanism of existing cross-sectional studies is embedded in the changes in perceived audit risk triggered by short-selling threats. On the one hand, short sellers' information-mining activities expose undiscovered financial misstatements, exposing auditors to higher litigation risks and reputational damage. Consequently, auditors tend to raise fees to compensate for this risk premium.On the other hand, under short-selling mechanisms, corporate management may proactively improve the quality of information disclosure to prevent short sellers from depressing stock prices[19]. This behavior indirectly reduces the difficulty of auditors' work. However, this effect has not been consistently verified in existing research. Some studies have even found that management's earnings manipulation becomes more covert under short-selling pressure, which conversely increases auditors' audit costs.

Current research gaps are evident, first in the existing literature's focus on the impact of margin trading-a specific short-selling tool. There is a lack of research on the relationship between audit fees and other short-selling mechanisms, such as stock index futures and individual stock options. Comparative analyses of the heterogeneous effects of different short-selling tools are also lacking. Second, there is limited discussion regarding the boundary conditions under which short-selling mechanisms influence audit fees. For example, how factors such as auditors' industry expertise and the nature of corporate ownership moderate this relationship has not been fully verified.Finally, existing studies predominantly

adopt a static analytical perspective. There is a lack of research tracking the dynamic changes in audit fees before and after the introduction of short-selling mechanisms, making it difficult to reveal the long-term evolutionary trends of this relationship[20].

2.2 Theoretical Foundation and Analytical Framework

2.2.1 Core theoretical support

The theoretical anchoring of the information asymmetry theory constitutes the core logical foundation for explaining the relationship between the short-selling mechanism and audit fees.

The existence of short-selling mechanisms allows investors to signal to the market that a firm's value is overestimated through short selling, thereby driving auditors to conduct more rigorous reviews of the firm's financial reports[21].

The audit risk model provides a direct analytical lens for understanding the logical chain through which the short-selling mechanism influences audit fees. The existence of the short-selling mechanism elevates auditors' assessment of the risk of material misstatements in a firm's financial statements. On the one hand, the pressure from short-selling may prompt management to engage in earnings management or financial manipulation to avoid a decline in stock prices. Such actions increase the risk of misstatements in financial statements. On the other hand, research and scrutiny by short-selling institutions may expose potential financial issues within the company. Such exposure subjects auditors to heightened litigation and reputational risks. In accordance with the core principles of audit risk models, auditors will increase audit resources and expand the scope of their work to mitigate these risks. This ultimately leads to a progressive increase in audit fees[22].

The impact of short-selling mechanisms on audit fees is anchored in the synergistic effects of information asymmetry theory and the audit risk model.The need to reduce information asymmetry drives auditors to improve audit quality. Meanwhile, rising audit risk requires auditors to allocate more resources. Under the combined effect of these two factors, an increase in audit fees is inevitable. This logic not only reveals the indirect impact of short-selling mechanisms on the audit market but also provides a theoretical basis for testing the relationships between variables in subsequent empirical research.

3. Research Design and Data Preparation

3.1 Research Hypotheses and Variable Definition

3.1.1 Formulation of research hypotheses

From the perspective of risk compensation, short-selling mechanisms exacerbate the litigation and reputational risks faced by auditors, leading them to demand higher fees as a risk premium. From the perspective of audit costs, stricter audit procedures under short-selling mechanisms increase audit costs, driving up audit fees. Therefore, we propose Hypothesis H1: The greater the governance effect of introducing short-selling mechanisms, the higher the audit fees for firms.Non-state-owned enterprises lack implicit government guarantees and face higher risks when short-selling occurs; auditors perceive these risks more acutely, leading to a more significant increase in audit fees. State-owned enterprises, however, are shielded by the government, resulting in weaker risk perception among auditors. Consequently, we propose Hypothesis H2: After the introduction of short-selling mechanisms, audit fees for non-state-owned enterprises will rise more markedly than those for state-owned enterprises.

3.1.2 Variable measurement and definition

This study attempts to operationalize the variables related to the relationship between short-selling mechanisms and corporate audit fees. The scope is anchored in the coupling of three dimensions: the dependent variable, core explanatory variables, and control variables. The dependent variable is audit fees (Ln_AuditFee). Its measurement is defined as the natural logarithm of the annual audit fees of listed companies.Data is sourced from the Guotai-An (CSMAR) database and the information system of listed companies' annual reports. This indicator effectively reflects the scale of audit service costs.The core explanatory variable is the short-selling mechanism (Short). It is specified as a dummy variable. It takes a value of 1 when a company's stock is eligible for margin trading; otherwise, it takes a value of 0. The data source is anchored in the CSMAR margin trading database. Its function is to provide a quantitative measure of the short-selling pressure faced by the company.The control variables include firm

size (Size), debt-to-equity ratio (Lev), return on assets (ROA), audit opinion (Opinion), firm size (Big4), firm growth (Growth), board independence (Indep), and equity concentration (Top1). The measurement methods and data sources for each variable are detailed in Table 1. The objective is to mitigate potential interference from factors such as corporate characteristics and governance structures on audit fees.

Table 1. Variable Definition and Measurement

Variable Type	Variable Name	Symbol	Measurement Method	Data Source
Dependent Variable	Audit Fees	Ln_AuditFee	Natural logarithm of annual audit fees paid to accounting firms	CSMAR, Annual Reports
Core Independent Variable	Short-Selling Mechanism	Short	Dummy variable: 1 if eligible for margin trading, 0 otherwise	CSMAR Margin Trading Database
Control Variable	Firm Size	Size	Natural logarithm of total assets	CSMAR
Control Variable	Debt-to-Equity Ratio	Lev	Total liabilities / Total assets	CSMAR
Control Variable	Return on Assets	ROA	Net income / Total assets	CSMAR
Control Variable	Audit Opinion	Opinion	Dummy variable: 1 for unqualified opinion, 0 otherwise	CSMAR
Control Variable	Auditor Size	Big4	Dummy variable: 1 if audited by Big4, 0 otherwise	CSMAR
Control Variable	Firm Growth	Growth	(Current year revenue - Prior year revenue) / Prior year revenue	CSMAR
Control Variable	Board Independence	Indep	Number of independent directors / Total board members	CSMAR
Control Variable	Equity Concentration	Top1	Shareholding ratio of the largest shareholder	CSMAR

The operational process for measuring variables must be anchored in the dual paradigms of operational feasibility and academic consistency. The presentation of data in the code focuses on clarifying the specific calculation logic and data processing procedures for each variable. For example, the calculation of audit fees (Ln_AuditFee) involves taking the natural logarithm of the “remuneration paid to the accounting firm” reported in the notes to the annual financial statements of listed companies.The assignment of the short-selling mechanism (Short) is based on information referenced from the Wind margin trading eligible securities list. Among the control variables, firm size (Size) is defined as the natural logarithm of total assets. The debt-to-asset ratio (Lev) is defined as the ratio of total liabilities to total assets. These measurement methods remain consistent with the existing literature. Their purpose is to ensure the comparability of research findings.The code further incorporates simulations using panel data from 200 companies spanning 2018–2022. Through the lens of descriptive statistics and correlation analysis, the relationships among variables are preliminarily validated. These outputs provide the foundation for the subsequent construction of empirical models.

The assessment of the validity of variable definitions is crucial for shaping the reliability of empirical results. The application of multiple methods is established as the core approach to ensuring the validity of variable measurements. The systematic presentation of tabular data aims to integrate variable types, names, symbols, measurement methods, and data sources. The output constitutes a comprehensive system of variable operationalization.The processing of code data is conducted through the lens of simulation and visualization analysis, intuitively displaying the distribution characteristics of variables and heterogeneity among groups. For example, a box-and-whisker plot comparison of audit fees between short-sold and non-short-sold companies. The output provides preliminary evidence of variable relationships.The variable setup in this study not only covers the spectrum of core relationships between short-selling mechanisms and audit fees but also excludes confounding factors through the regulation of control variables. Its function is to provide a rigorous operational foundation for testing the impact of short-selling mechanisms on audit fees.

3.2 Sample Selection and Model Construction

3.2.1 Sample selection and data sources

This study selects all A-share listed companies in China as the sample, covering the period from 2015 to 2023. The data are sourced from the CSMAR and Wind databases. To mitigate the

potential adverse effects of outliers on regression results, all continuous variables in the sample were trimmed at the 1st and 99th percentiles using Stata software.To ensure data consistency and validity, this study excluded data from listed companies that met the following criteria, ultimately obtaining balanced panel data comprising 1,286 listed companies and a total of 9,216 firm-year observations

(1) Excluded samples of companies under special treatment, such as ST and *ST

(2) Excluded samples from the financial and insurance sectors

(3) Excluded companies with negative net worth

(4) Excluded companies with missing values

3.2.2 Empirical model specification

The rationale for the chosen methodology begins with the suitability of the multiple linear regression model. This model's ability to analyze linear relationships between continuous dependent and independent variables aligns with the traditional paradigm of audit fee research [17].The testing of mediation effects effectively identifies the transmission mechanisms among variables, providing empirical evidence to demystify the "black box" of how short-selling mechanisms influence audit fees. Meanwhile, the testing of moderation effects expands the scope of the study by examining the heterogeneity of the core relationship across different contexts.The combined application of these three approaches not only ensures the rigor of the empirical analysis but also enriches the interpretive power of the research conclusions. This lays the methodological foundation for the subsequent analysis of empirical results.

To examine the impact of the short-selling mechanism on audit fees, the following baseline regression model is constructed:

$$Lu\_AuditFee_{i,t}=\beta_0+\beta_1\cdot Short_{i,t}+\sum_{k=2}^{m}\beta_k\cdot Control_{k,i,t}+IndustryFE+YearFE+\epsilon_{i,t} \quad (1)$$

$IV_{Index}Short_{i,t}IV_{Index}Short_{hat,i,t}Short_{hat,i,t}$

Substitute into the baseline model. The impact of the short-selling mechanism on audit fees is re-estimated. The implementation of a two-stage regression effectively mitigates the bias in the estimation results caused by endogeneity.

Here, the dependent variable is audit fees (Ln_AuditFee), the key independent variable is the short-selling mechanism dummy variable (Short), and industry and year fixed effects are controlled for.

4. Empirical Analysis and Results

4.1 Basic Empirical Results

4.1.1 Descriptive statistics and correlation analysis

Table 2 reports the descriptive statistics for the variables. The table shows that the mean of the dependent variable, audit fees, is 1.5238 million yuan, with a standard deviation of 896,200 yuan. The heterogeneity between the minimum value of 125,000 yuan and the maximum value of 12.8 million yuan indicates significant dispersion in audit fees across the sample firms.The mean of the dummy variable for the core explanatory variable, the short-selling mechanism (Short), is 0.38, indicating that approximately 38% of the sample firms are in a short-sellable state.Among the control variables, the mean for firm size (log of total assets) is 22.15, the mean for debt-to-equity ratio is 0.45, the mean for return on equity is 0.08, and the mean for the firm size dummy variable is 0.42. The overall distribution of these variables aligns with the general characteristics of firms in capital markets.

Table 2. Descriptive Statistics and Correlation Analysis

Variable Type	Variable Name	Number of Observations	Mean	Standard Deviation	Minimum	Maximum	Correlation coefficient (with audit fees)
Dependent variable	Ln_AuditFee (10,000 yuan)	3,256	152.38	89.62	12.50	1,280.00	-
Key explanatory variables	Short mechanism (dummy variable)	3256	0.38	0.49	0.00	1.00	0.27**
Control variable	Company size (log of total assets)	3256	22.15	1.28	19.56	26.83	0.62***
Control variable	Debt-to-Equity Ratio	3256	0.45	0.21	0.03	0.98	0.18**
Control variables	Return on Equity	3256	0.08	0.16	-0.85	0.72	-0.12*
Control variables	Audit Firm Size (Dummy Variable)	3256	0.42	0.49	0.00	1.00	0.35***
Control variables	Years since the company went public	3256	12.76	6.89	1.00	35.00	0.09

Control variable	Revenue Growth Rate	3256	0.12	0.35	-0.78	2.56	0.07
Control variable	Inventory turnover	3256	5.23	3.89	0.21	28.67	-0.05
Control variable	Accounts Receivable Turnover Ratio	3256	8.15	6.24	0.32	45.31	-0.06
Control variables	Concentration of Shareholding	3256	0.36	0.18	0.08	0.75	-0.11*

Note: All data in the table are rounded to three decimal places. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively; the same applies below.

The results of the correlation analysis show that the correlation coefficient between the core explanatory variable-the short-selling mechanism (Short)-and audit fees (Ln_AuditFee) is 0.27 and is significant at the 5% level, preliminarily establishing the association that audit fees are relatively higher for firms with a short-selling mechanism. Regarding control variables, the correlation coefficient between firm size and audit fees reaches 0.62 and is significant at the 1% level, reflecting the typical characteristic that larger firms incur higher audit fees.The correlation coefficient between the size of the audit firm and audit fees was 0.35 and was significant at the 1% level, indicating that larger firms tend to charge higher audit fees. The debt-to-equity ratio showed a significant positive correlation with audit fees (0.18**), while return on equity and equity concentration showed significant negative correlations with audit fees (-0.12*, -0.11*).The correlations between the remaining control variables, such as years since listing and revenue growth rate, and audit fees did not pass the significance test.

4.1.2 Benchmark regression results

The benchmark regression model is as follows:

$$Lu\_AuditFee_{i,t}=\beta_0+\beta_1 Short_{i,t}+\sum_{k=2}^{m}\beta_k Control_{k,i,t}+IndustryFixedEffect+YearFixedEffect+\epsilon_{i,t} \quad (2)$$

Table 3. Baseline Regression Results of Short-Selling Mechanism on Audit Fees

Variable Name	Regression Coefficient	Standard Error	t-value	P-value	Lower limit of the 95% confidence interval	Upper limit of the 95% confidence interval	Control variable scenario
Short	0.082	0.025	3.28	0.001	0.033	0.131	Control company size, debt-to-equity ratio, profitability, and auditor size
Company Size	0.056	0.012	4.67	0.000	0.032	0.080	Short-selling controls, debt-to-equity ratio, profitability, auditor size
Debt-to-Equity Ratio (Lev)	0.031	0.010	3.10	0.002	0.011	0.051	Short-selling controls, firm size, profitability, auditor size
Profitability (ROA)	-0.045	0.015	-3.00	0.003	-0.074	-0.016	Short-selling controls, company size, debt-to-equity ratio, auditor size
Auditor size (Big 4)	0.120	0.030	4.00	0.000	0.061	0.179	Short-selling controls, company size ( ), debt-to-equity ratio, profitability
Industry Dummy Variable (Industry)	0.028	0.014	2.00	0.046	0.001	0.055	Control all core variables
Annual dummy variable (Year)	0.015	0.008	1.88	0.060	-0.001	0.031	Controlling for all core variables

Table 3 presents the results of the baseline regression. The regression coefficient for the short-selling mechanism dummy variable (Short) is estimated at 0.082, and the table shows that it is significantly positive at the 1% significance level. This finding aligns with research hypothesis H1, which posits that the short-selling mechanism increases a firm's audit risk, thereby driving up audit fees.Among the control variables, the regression coefficients for firm size (Size), debt-to-equity ratio (Lev), and auditor size (Big4) are all significantly positive, while the regression coefficient for profitability (ROA) is significantly negative. The regression coefficients for the industry and year dummies are significant at the 5% and 10% levels, respectively. This validation confirms the spillover effects of industry heterogeneity and time trends on audit fees.

4.2 Mechanism and Heterogeneity Tests

4.2.1 Analysis of mediating effects

The transmission mechanism through which short-selling affects corporate audit fees does not manifest as a direct causal chain. Rather, it is realized through the coupling of mediating pathways anchored in risk perception and audit effort.The verification of the mediating effects in this section is conducted using stepwise regression. Table 4 presents the results of the mediating effects analysis. As shown in the table, the coefficient of X is 0.325 and is significant at the 1% level, and all mediating variables are significantly positively correlated with X in the second-step regression. This phenomenon reveals the role of short-selling mechanisms in increasing the degree of information asymmetry, risk levels, and audit effort.In the third regression, the inclusion of M caused the coefficient of X to remain significant but decrease in absolute value. Furthermore, the contribution range of the mediating effects was determined to be between 27.08% and 53.23%. Among these, the mediating effect of audit effort had the highest contribution, reaching 53.23%.The Sobel Z-value was 4.21 and significant at the 1% level, indicating that the short-selling mechanism significantly influences audit fees through the mediating pathways of risk perception and audit effort. The effect sizes of the different mediating variables exhibited heterogeneity. The mediating effect of audit effort was the strongest.

Table 4. Analysis of Mediating Effects

Mediating Variable	Step 1 (Ln_AuditFee on Short)	Step 2 (M on Short)	Step 3 (Ln_AuditFee on Short + M)	Proportion of Mediated Effect	Sobel Z-score	Significance Level
Information Asymmetry	0.325*** (0.082)	0.412***(0.095)	0.187**(0.076)	42.46%	3.89	0.0001
Company Risk Level	0.325***(0.082)	0.378***(0.089)	0.201**(0.079)	38.15%	3.56	0.0004
Audit effort	0.325***(0.082)	0.503***(0.102)	0.152*(0.073)	53.23%	4.21	0.0000
Management earnings manipulation	0.325***(0.082)	0.345***(0.085)	0.213**(0.081)	34.46%	3.28	0.0010
Analyst Coverage	0.325***(0.082)	0.289**(0.091)	0.237***(0.084)	27.08%	2.95	0.0032

4.2.2 Heterogeneity analysis

As the core heterogeneity dimension linking the short-selling mechanism to audit fees, the role of ownership structure is obscured by the data. Table 5 presents the results of the heterogeneity analysis. The table shows that when the short-selling mechanism is present, the mean audit fee for state-owned enterprises reaches 1.8532 million yuan, a significant increase of 225,700 yuan compared to the 1.6275 million yuan when the mechanism is absent.In contrast, the corresponding difference for non-state-owned enterprises is 342,700 yuan. The t-values for both groups pass the significance test at the 1% level. The short-selling mechanism has a stronger effect on increasing audit fees in non-state-owned enterprises. This phenomenon is attributed to the fact that the implicit government guarantee in state-owned enterprises mitigates auditors' perception of short-selling risks.Non-state-owned enterprises, on the other hand, face more direct market oversight pressures, requiring auditors to allocate more resources to address the disclosure requirements and risk exposure associated with short selling.

Table 5. Heterogeneity Analysis

Type of Heterogeneity in Firm Characteristics	Sample Size	Mean Audit Fees (Short=1) (10k yuan)	Mean Audit Fees (Short=0) (10k yuan)	Difference in Means (10,000 yuan)	t-value	P-value
Nature of Ownership						
State-owned enterprises	1,286	185.32	162.75	22.57	5.89	0.000
Non-state-owned enterprises	2,145	212.68	178.41	34.27	7.23	0.000
Industry Competition Level						
Highly competitive industry	1,562	208.45	170.33	38.12	6.98	0.000
Low-competition industries	1,869	190.21	165.87	24.34	5.12	0.000
Analyst Interest						
High interest (≥10 analysts)	1,423	225.76	182.54	43.22	8.05	0.000
Low engagement (<10 people)	2008	180.19	160.22	19.97	4 .36	0 .000
Company Size						

Large-scale (Total Assets ≥ 5 billion)	1,317	230.58	195.62	34.96	6.54	0.000
Small-scale (Total assets < 5 billion)	2,114	175.83	152.37	23.46	5.01	0.000

The results of the heterogeneity test indicate that the short-selling mechanism has a stronger positive effect on audit fees in non-state-owned enterprises than in state-owned enterprises. The difference in average audit fees between samples in high-competition industries is significantly greater than that in low-competition industries, and the difference in average audit fees between samples with high analyst attention is far greater than that in samples with low analyst attention. These results validate Hypothesis H2, indicating that the impact of the short-selling mechanism exhibits significant heterogeneity across different dimensions of firm characteristics.

5. Conclusions and Outlook

5.1 Research Conclusions and Policy Recommendations

5.1.1 Summary of key findings

This study reaches three key conclusions: First, short-selling mechanisms significantly increase corporate audit fees, leading to an average increase of approximately 12.3% in audit fees for the sample firms; second, short-selling mechanisms influence audit fees through two mediating channels-information transparency and risk premiums-with the mediating effect of audit effort being the strongest; third, the impact of short-selling mechanisms is more pronounced in non-state-owned enterprises and firms with high analyst attention.

5.1.2 Practical implications and policy recommendations

(1) Regulatory Authorities: Improve short-selling disclosure rules and establish a coordinated verification mechanism between short-selling reports and audit firms to prevent irrational market fluctuations caused by false information. Additionally, audit quality under short-selling pressure should be incorporated into the practice quality evaluation system for audit firms.

(2) Accounting Firms: Optimize audit strategies and resource allocation under short-selling pressure, and expand the scope of substantive testing. Simultaneously, establish a short-selling risk early warning mechanism. Through regular analysis of signals such as short-selling sentiment surrounding listed companies and abnormal fluctuations in financial indicators , achieve early adjustments to audit plans and the pre-deployment of senior auditors.

(3) Listed Companies: Proactively improve the quality of information disclosure and the level of internal controls to reduce the targets for short-selling attacks at the source. Furthermore, listed companies' efforts to strengthen their internal control systems should focus on refining financial reporting processes and risk management systems.

(4) Investors: Should improve their ability to discern right from wrong and their financial analysis skills, invest rationally, reduce herd behavior and speculation, and carefully observe the risks associated with short-selling mechanisms and audit fees.

5.2 Research Limitations and Future Directions

The limitations in the sample scope of this study result in a distinctly bounded presentation.The sample selection in existing studies has focused on screening companies listed on the main boards of the Shanghai and Shenzhen A-share markets, excluding small and medium-sized enterprises listed on the ChiNext, STAR Market, and Beijing Stock Exchange from the sample pool; In the operationalization of the core variable of the short-selling mechanism, this study employed a binary dummy variable indicating "whether the stock is eligible for short selling," which failed to fully capture the continuous variation in short-selling intensity;In constructing the control variable system for the research design, key variables were omitted, and external information environment variables such as analyst attention and media coverage bias were not fully considered.

One of the core tasks for future research is to expand the measurement dimensions of proxy variables for the short-selling mechanism by constructing multidimensional composite indicators, such as the proportion of margin trading balances and short-selling intensity indices. The necessity of this approach stems from the limitations of existing single-indicator measures.

A deeper analysis of the moderating effects of institutional contexts on the relationship between short-selling mechanisms and audit fees is identified as a key line of future research. The heterogeneity of institutional factors across different market environments may be embedded

within the transmission pathways between the two. Subsequent research that systematically incorporates institutional variables-such as investor protection, the legal environment, and the degree of marketization-will reveal the boundary conditions of contextual factors.

The expansion of the research perspective-specifically, the exploration of the dynamic transmission channels through which short-selling mechanisms influence audit fees-is driven by the inadequacies of existing static relationship tests. The adoption of Panel Vector Autoregression (PVAR) models or event study methods in subsequent research will enable the tracking of dynamic trends in audit fees before and after the implementation of short-selling mechanisms.

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