

Study of the Impact of the Short-Selling Mechanism on Audit Fees

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Abstract

In recent years, the short-selling mechanism has had an important influence on corporate financing, corporate governance, and audit behavior. Utilizing the 2010 launch of China's margin trading and short-selling pilot as a quasi-natural experiment, a staggered difference-in-differences (DID) framework was utilized to investigate a cohort of A-share non-financial firms spanning 2009 to 2021. Our findings indicate that audit costs tend to be elevated within short-selling frameworks; this mainly stems from heightened audit risks and a broader scope of professional duties. In supplementary heterogeneity examinations, it was observed that the amplifying effect on expenditures is more significant for non-state-owned firms, organizations with a reduced degree of accounting conservatism, and those reviewed by non-Big Four auditing firms. The aforementioned outcomes provide theoretical foundations for optimizing the securities lending architecture and reinforce audit risk evaluations.

Keywords

Short-selling Mechanism; Audit Fees; Difference-in-Differences Model; Audit Risk; Quasi-natural Experiment.

1. Introduction

After the construction of China's stock market in the early 1990s, for a long time, it was a "one-sided market" where only profits from rising prices were available, and there was no mechanism to obtain gains from declines in value. Under the above special circumstances, stock prices fell gradually after the release of bad news. As a result, the following adverse effects occurred: higher risk of an equity price decline, market instability, and more speculative trading by investors. On March 31, 2010, brokerage firms were formally authorised by the authorities to extend credit to clients for the purchase of assets and offer securities for short-selling. Therefore, a "monopolar market" in China's financial sector has been formed, and a short-selling system has been officially introduced.

Short-selling has altered prices and changes to corporate governance in the capital market. How auditors respond to the introduction of short-selling mechanisms, however, remains unclear. Audit costs refer to the relatively stable prices that have emerged in a market economy for auditing services, reflecting both risk assessments and the corresponding amount of labour. At the same time, the public is also paying attention to the accuracy of the company's data. Evaluating how short-selling frameworks influence audit costs is essential for understanding the broader economic implications of short-selling and the development trajectory of the auditing industry.

Conceptually, the two different ways in which short-selling increases audit costs are shown: First, when investors' incentive for short-selling is relatively high, they are more likely to seek out unfavorable corporate data proactively. Therefore, it will be harder for the company to keep hidden problems, and the risks for the auditor will be higher; thus, they will demand higher fees to cover these risks. On the other hand, an external governance mechanism will implement a

short-selling system to prevent management fraud and promote truthful disclosures by the company. Therefore, the overall audit risk is relatively low and will thus be cheaper to audit. However, it has not been determined from empirical evidence whether one of the two reasons is more applicable to this case.

This paper will list the following contents. Because the qualified instruments for margin financing and shorting were not announced promptly at first, a staggered difference-in-differences framework was adopted. Such an approach would assist in identifying whether the rise in auditing costs is linked to the short-selling system more precisely. Research has also determined that short-selling affects audit costs through the following internal channels: changes in audit risk and differences in audit effort. Finally, based on the investigation of multi-dimensional heterogeneity in this paper, the impact of the short-selling mechanism varies among different institutional settings and corporate types. Based on the above results, the following policy recommendations have been put forward in an organised way.

2. Institutional Background and Literature Review

2.1. Development and Expansion of the Margin Trading and Short Selling System

Table 1. Statistics on the Expansion History of Margin Trading and Short Selling Targets in China

Batch	Implementation Date	Number of Eligible Securities	Expansion Size	Major Changes
Pilot launch	March 31, 2010	90	—	First pilot program
First expansion	December 5, 2011	285	+195	Seven ETFs were included
Second expansion	January 31, 2013	500	+215	Six ChiNext stocks were included for the first time Following the expansion, qualified securities for margin financing and short selling represented 87% and 59% of the floating market value, respectively.
Third expansion	September 16, 2013	700	+200	Six ChiNext stocks were included for the first time Following the expansion, qualified securities for margin financing and short selling represented 87% and 59% of the floating market value, respectively.
Fourth expansion	September 22, 2014	900	+200	205 new eligible stocks were added
Fifth expansion	December 7, 2016	950	+50	The count of qualified assets on the Shanghai bourse expanded to 525, whereas the total on the Shenzhen market rose to 425.
Sixth expansion	August 19, 2019	1600	+650	This represented the most substantial expansion throughout history, with notably enhanced coverage for the SME Board and ChiNext.
Seventh expansion	October 24, 2022	2200	+600	The newly added targets were mainly from the manufacturing sector

Data source: Compiled from announcements issued by the China Securities Regulatory Commission and the Shanghai and Shenzhen Stock Exchanges.

The evolution of China's margin financing and short-selling infrastructure has advanced through various phases. On March 31, 2010, these two financial services commenced. The initial cohort of pilot brokerage firms comprised six entities, while the primary list of short-selling options consisted of 90 index constituents from the SSE 50 Index and the Shenzhen Component Index. Following this, the range of securities for margin financing and short-selling has been broadened repeatedly. Table 1 illustrates the entire trajectory of margin trading and short-selling instruments in China as presented.

According to the growth timeline, the pool of qualified instruments has risen from an initial 90 to more than 2,200 now, including the main markets of both the Shanghai and Shenzhen Stock Exchanges. Companies incorporated in this qualified roster at different times constitute the treatment group, and those that were never listed belong to the control group. Therefore, an ideal quasi-natural experimental environment suitable for the application of the staggered difference-in-differences method has been constructed in this study.

At the same time, both China's A-share margin financing and short-selling have been expanding rapidly in volume. As shown in Figure 1, there have been fluctuations in the trading volume of the above-mentioned financial instruments over the past few years.

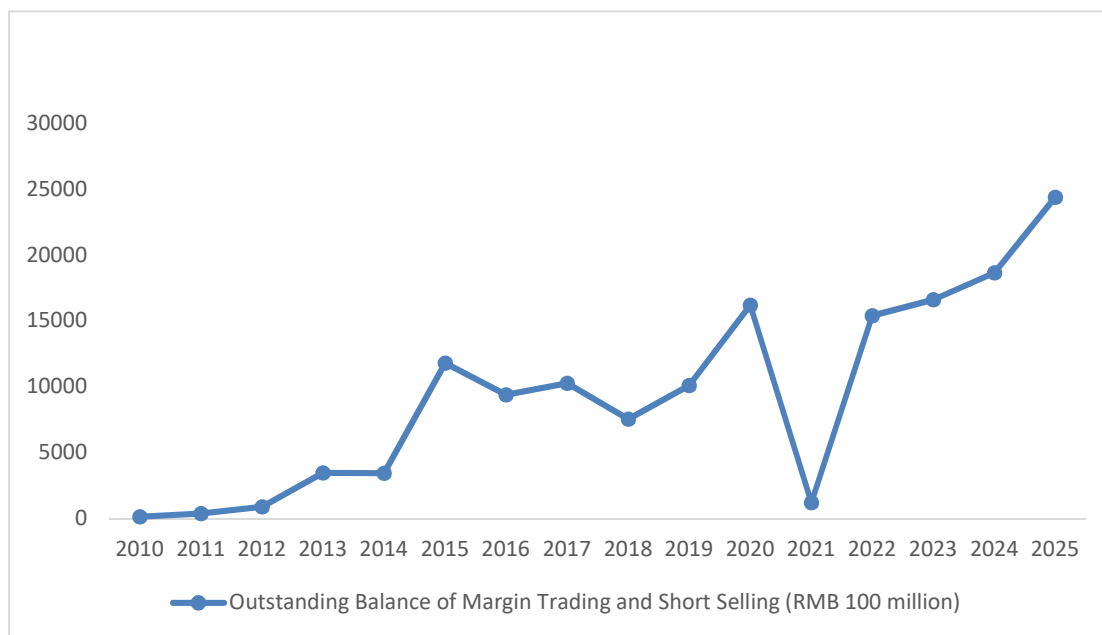


Figure 1. Statistics on the Trading Scale of China's Margin Trading and Short Selling Market, 2010–2024

Data Source: Officially disclosed information released by China Securities Finance Corporation Limited.

An expansion of margin trading and short-selling has increased the scope of market participation. By November 4, 2024, there were 7.0831 million private traders and 52,537 professional entities in the market. The above institutions have offered many policy adjustments for our current study.

2.2. Literature Review

2.2.1. Research on the Economic Consequences of the Short-Selling Mechanism

A variety of academic teams have investigated the monetary ramifications of short-selling mechanisms from multiple viewpoints. Li Zhisheng et al. (2015)[1] examined the capital market perspective utilizing a natural experiment and found that short-selling frameworks improve

the general efficiency of price creation throughout the Chinese stock market. Chen Huili and Liu Feng (2014)[2] studied margin financing together with short-selling inside corporate governance frameworks concerning earnings distortion and noted that these systems promote efficient corporate monitoring. Chu Jian and Fang Junxiong (2016)[3] additionally evaluated the connection between the makeup of China's margin financing and short-selling activities and the possible risks of a stock market implosion. Short selling typically enhances information clarity for enterprises. Specific studies have furthermore shown that it might elevate the quality of disclosures regarding vital auditing risks. Huang Chao and Huang Jun (2016)[4] showed that after the introduction of short-selling, a decrease in stock prices would motivate more investors to scrutinize information indicating the worsening financial condition of a corporation. Therefore, the likelihood of legal responsibility for auditing agencies has increased and, accordingly, the total-audit-fee structure has similarly broadened.

2.2.2. Research on the Determinants of Audit Fees

The origins of audit costs have been an all-encompassing research focus in audit studies for many years. Simunic (1980)[5] developed a price system for audits and proposed that audit costs would be affected by both the scale of the audit and the likelihood of legal disputes. Wu Lina (2003)[6] was one of the first Chinese scholars to find that earnings management and audit fees are related. Liu Bin et al. (2003)[7] gathered annual report information from public firms in Shanghai and Shenzhen to investigate the empirical factors behind elevated audit costs. Over the years, various scholars have expanded the scope of this study to include problems in corporate governance, external supervision and institutions, etc.

2.2.3. Research on the Relationship between the Short-Selling Mechanism and Audit Fees

Lately, numerous researchers have started examining how short-selling mechanisms influence audit expenses. Huang Chao and Huang Jun (2016)[4] viewed the launch of margin trading and short-selling in China as a "natural experiment" and observed that the implementation of a short-selling framework amplified the drop in stock prices and raised shareholders' anticipations regarding unfavorable corporate financial disclosures. This would elevate the legal risks for auditing firms and consequently lead to higher audit expenditures. According to the aforementioned research, it is evident that because of the relatively unstable information disclosure atmosphere within state-owned firms, the influence of short-selling on an increase in audit fees is significantly more intense for such organizations. The four large accounting firms are better able to handle the liability compensation for short-selling and have thus increased the audit fees charged by these firms. Zhao Jingwen (2018)[8] employed the difference-in-differences method and matched samples to study the effect of the short-selling mechanism on audit fees. Based on the above studies, it can be seen that the audit expenses of qualified enterprises have risen since the beginning of the mechanism, and this increase is less obvious when the proportion of analyst coverage is relatively high. When the proportion of ownership is small, this "fee-increasing effect" will not be realised. Yuan Yu (2024)[9] has consistently broadened the dimensions of margin trading and short-selling targets, and consequently a staggered difference-in-differences framework was utilized to examine the influence of the short-selling mechanism on audit expenses. Based on these prior investigations, even though a short-selling framework has been implemented, the vigor and the hazard of audits for public firms have escalated, thereby elevating audit costs. A relatively substantial number of analysts and a superior internal control structure were likewise positively linked with the rise. Chen Mingduan and Guan Xiaoming (2018)[10] constructed a multi-factor regression framework to explore the effect of the local short-selling mechanism on audit risk and the impact of audit risk on audit costs. According to the aforementioned evidence, as the ratio of short-selling climbs, so does the magnitude of audit costs. Cassell and colleagues have

noted in their overseas research that a more robust short-selling pressure is correlated with higher audit costs, and hence short-selling activity may function as an early warning signal of audit risk (2011)[11].

2.2.4. Review of Existing Research

Recently, many scholars have begun to study the impact of short-selling on audit costs, but this research is still in its infancy. Most of the current studies are single-period difference-in-differences models, and thus do not make use of the time-varying nature of the progressive expansion of margin trading and short-selling instruments [12]. Although many previous studies have explored the theoretical paths by which short-selling affects audit expenses, no all-encompassing mechanism-based empirical analysis has been conducted so far. Thirdly, the various effects of short-selling on audit costs for different industries of listed companies have not been studied in detail. Based on the above studies, This article adopts the regulatory characteristic of expanded margin trading alongside short-selling adoption to execute a phased difference-in-differences framework. It determines the internal mechanisms through which short-selling influences audit costs via risk and exertion, and performs various forms of heterogeneous testing.

3. Theoretical Analysis and Research Hypotheses

3.1. The Short-Selling Mechanism and Audit Fees

Integration of a short-selling system will alter auditing costs in the following two ways: a legal risk pathway and an audit exertion route.

Short selling has heightened the litigation risk faced by auditors, as greater scrutiny of corporate disclosures increases the likelihood that audit failures will be detected and penalized. Huang Chao and Huang Jun (2016)[4] have carried out certain research and provided some supporting materials for the above path. They found that the application of the short-selling system increased the risk of a corporate audit failure and thus raised audit fees for accounting firms.

Short selling has reduced information symmetry and increased the difficulty of auditing due to heightened information opacity. Auditors will increase the scope of audit work to address the above risks. Yuan Yu (2024)[9] has also found that, by increasing the number of analysts covering a specific stock and strengthening internal control, The favorable correlation between short-selling frameworks and auditing expenses could be diminished.

Based on the above analysis, this paper proposes Hypothesis 1:

H1: There exists a statistically significant positive association between the adoption of the short-selling mechanism and the level of audit fees paid by firms.

3.2. Heterogeneity Analysis

The influence of short-selling mechanisms on auditing costs shall fluctuate based on the particular circumstances of each firm alongside external variables. The two categories of firms under different governmental frameworks are as follows. Given their different models of ownership, state-owned enterprises are often connected to highly isolated information networks and are relatively unwilling to disclose adverse data. Therefore, the short-selling system will likely increase the audit costs of such entities further. Secondly, companies at different levels of accounting conscientiousness will respond to bad information differently. Companies with less accounting prudence are more likely to delay recognizing losses and thus face higher audit risks under the short-selling system. At the same time, accounting agencies of different sizes respond to the short-selling system differently because of resource availability and professional prestige.

Accordingly, this paper proposes Hypotheses 2a to 2c:

H2a: The cost-raising effect of short-sale regulation is more pronounced for non-state-controlled firms compared to those under state ownership.

H2b: The favorable impact of short-selling mechanisms on audit costs is more pronounced for corporations exhibiting a reduced level of accounting prudence.

H2c: The favorable impact of short-selling regulations on audit expenses is more pronounced for entities which are audited by non-Big Four accounting organizations.

4. Research Design

4.1. Sample Selection and Data Sources

The data in this paper are non-financial publicly listed A-share companies in China from 2009 to 2021, which serve as the research subjects. The criteria for establishing this sample are as follows: (1) Financial enterprises are excluded; that is to say, firms under the CSRC industry code J are not included; (2) ST, *ST, and PT stocks have been omitted; (3) entries with missing essential variables have been removed; and (4) to reduce the impact of extreme values, all numerical variables have been adjusted through winsorization at both the 1% upper and lower percentiles. Therefore, 26,847 firm-year data points have been obtained successfully.

The organizational framework of the information sources for this research is structured as follows. Audit fee details, corporate financial statements, and additional corporate governance information for public firms are accessible within the CSMAR database. Eligibility lists for margin trading and short-selling initiatives are formally announced by the Shanghai and Shenzhen Stock Exchanges. Metrics for the marketization index were gathered from Wang Xiaolu and colleagues' China Provincial Marketisation Index Report.

4.2. Variable Definitions

4.2.1. Explained Variable

Audit costs (LNFEET). Following prior research, this study utilizes the natural logarithm of yearly auditing charges for public corporations to quantify audit expenses. Regarding domestic and overseas listed entities, the natural logarithm of the aggregate internal and external auditing costs is adopted.

4.2.2. Core Explanatory Variable

Short-Selling Mechanism (DID). Considering the phased inclusion of qualified securities within the margin trading and short-selling framework, this study adopts a staggered difference-in-differences approach for evaluation. For entities belonging to the treatment group, the value is assigned 1 during periods following their addition to the list of assets eligible for short selling and 0 prior to that moment. The DID variable for the control group remains constant at 0. This represents the interaction term, and its estimated coefficient demonstrates the impact of the short-selling instrument on audit costs.

4.2.3. Mechanism Variables

The specific variables employed to examine how short-selling constraints affect audit costs within this research are presented below. Primarily, audit risk (LRISK) is reflected through whether a firm receives a non-standard audit opinion. If a company receives an irregular audit report in a particular year, then LRISK is 1; otherwise, it is 0. Second, audit effort (INVEST) is proxied by audit delay, which is the number of days from the balance sheet date to the date when the audit report is signed. A longer audit lag generally indicates that the size of the audit is larger.

4.2.4. Heterogeneity Grouping Variables

To begin with, ownership classification (SOE) equals 1 when the primary controller of the corporation is a state-controlled company, and 0 in all other cases. Furthermore, accounting prudence (CSCORE) is represented by the C-Score metric from the Basu (1997) framework. Companies with yearly industry-averaged revenue or assets or more are categorized into the high-accounting-conservatism category; those with yearly industry-averaged revenue or assets or less are within the low-accounting-conservatism category. Finally, auditor category (BIG4) is 1 when the entity is audited by a Big Four auditing organization and 0 in all other instances.

4.2.5. Control Variables

Drawing from the fundamental audit pricing framework established by Simunic (1980)[13] and subsequent research within China, the control variables adopted in this study are listed below: firm size (SIZE, defined as the natural logarithm of year-end total assets), profitability (ROA, representing net profit relative to total assets), leverage (LEV, calculated as total liabilities over total assets), growth (GROWTH, the operating revenue growth rate), business complexity (INVREC, computed as the sum of inventory and accounts receivable divided by total assets), loss status (LOSS, set to 1 if net profit is negative in the fiscal year and 0 otherwise), audit opinion type (OPINION, 1 for non-standard audit opinions and 0 for standard ones), auditor type (BIG4), listing duration (AGE, the natural logarithm of years since listing), shareholding percentage of the primary shareholder (TOP1), board independence (INDDIR, the ratio of independent directors on the board), year effects (YEAR), and industry effects (INDUSTRY).

4.3. Model Specification

4.3.1. Baseline Regression Model

The roster of qualified instruments for margin financing and shorting was not enlarged simultaneously but incorporated progressively through several successive rounds. Consequently, the conventional two-period DID framework might not be appropriate for precisely identifying the causal influence of this sequential policy implementation. This study adopts a staggered DID approach to investigate the effect of the short-selling facility on auditing charges. The primary regression formulation is presented below:

$$\text{LNFE}_{i,t} = \alpha + \beta \text{DID}_{i,t} + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

where $\text{LNFE}_{i,t}$ is the natural logarithm of audit fees for firm i in year t ; $\text{DID}_{i,t}$ is the main explanatory variable, which indicates whether firm i is included in the list of securities eligible for short selling in year t ; and $X_{i,t}$ is a vector of control variables.

4.3.2. Mechanism Test Model

To test the channels through which the short-selling mechanism affects audit fees, this paper uses the logic of mediation effect testing and constructs the following recursive models:

$$M_{i,t} = \alpha + \beta_1 \text{DID}_{i,t} + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

$$\text{LNFE}_{i,t} = \alpha + \beta_2 \text{DID}_{i,t} + \beta_3 M_{i,t} + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

where $M_{i,t}$ are the mechanism variables, including audit risk (LRISK) and audit effort (INVEST). A substantial mediating effect exists if both β_1 and β_3 are significantly different from zero.

4.3.3. Heterogeneity Analysis Model

To investigate the differential effects of the short-selling mechanism on audit fees, grouped regressions are employed here. Based on the type of heterogeneity to be examined, such as ownership structure or size of auditors, several subsamples of the full sample can be constructed. The base model (1) is then fitted separately to each subsample. Tests for the significance of the difference in estimated coefficients of the main explanatory variable across subsamples are carried out via between-group coefficient difference tests.

The baseline model (1) is specified as follows:

$$\text{LNFE}_{i,t} = \alpha + \beta \text{DID}_{i,t} + \gamma X_{i,t} + \mu_i + \lambda_t + \varepsilon_{i,t}$$

The interpretation of each variable remains consistent with the baseline model. $\text{LNFE}_{i,t}$ denotes the natural logarithm of audit expenditures; $\text{DID}_{i,t}$ is a binary indicator set to 1 for entities listed in securities eligible for short selling, and 0 for others; $X_{i,t}$ represents a matrix of control covariates; μ_i and λ_t signify firm-level and year-level fixed effects, respectively; while $\varepsilon_{i,t}$ denotes the residual error term. Every regression employs firm-level clustered robust standard errors.

If the DID coefficient is noticeably positive within one sub-sample yet non-significant or displays an inverse direction in another, it is reasonable to infer that the impact of short-selling mechanisms on audit costs is heterogeneous.

5. Empirical Results and Analysis

5.1. Descriptive Statistics

Table 2 reports the descriptive statistics of the main variables.

Table 2. Descriptive Statistics

Variable	Observations	Mean	Standard Deviation	Minimum	Median	Maximum
LNFE	26847	13.476	0.815	11.695	13.412	16.115
DID	26847	0.226	0.418	0	0	1
SIZE	26847	22.143	1.287	19.782	21.975	26.048
LEV	26847	0.437	0.207	0.053	0.432	0.890
ROA	26847	0.036	0.062	-0.249	0.036	0.198
GROWTH	26847	0.153	0.341	-0.568	0.103	2.014
INVREC	26847	0.273	0.166	0.008	0.258	0.744
LOSS	26847	0.105	0.307	0	0	1
OPINION	26847	0.032	0.176	0	0	1
BIG4	26847	0.063	0.243	0	0	1
AGE	26847	2.041	0.878	0	2.197	3.219
TOP1	26847	0.339	0.147	0.086	0.318	0.743
INDDIR	26847	0.375	0.053	0.333	0.364	0.571

As shown in the table, the audit fees of listed companies are relatively dispersed, and this is consistent with previous studies; generally speaking, the sample distribution is reasonable.

5.2. Baseline Regression Results

Table 3 reports the estimation results of the baseline regression model.

Table 3. Baseline Regression Results

Variable	(1) LNFE	(2) LNFE
DID	0.062***	0.053***
	(4.87)	(4.31)
SIZE		0.309***
		(17.93)
LEV		0.118***
		(4.03)
ROA		-0.231**
		(-2.28)
GROWTH		0.017
		(1.12)
INVREC		0.198***
		(3.59)
LOSS		0.082***
		(3.37)
OPINION		0.137***
		(3.95)
BIG4		0.241***
		(5.97)
AGE		0.031**
		(1.97)
TOP1		-0.015
		(-0.44)
INDDIR		0.095
		(0.97)
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Industry fixed effects	No	Yes
Observations	26847	26847
R ²	0.637	0.701

Values in brackets are t-statistics. Reported Significance at the 1%, 5% and 10% Levels.

Column (1) incorporates solely firm-level and year-specific fixed effects while excluding additional controls. The calculated coefficient for the primary independent variable within the DID framework is 0.062, and this remains statistically significant at the 1% level. Column (2) incorporates control variables for corporate governance characteristics and industry-level fixed effects. The coefficient for the DID remains 0.053 and stays statistically significant at the 1% level. Based on these findings, the implementation of the short-selling framework has elevated audit expenditures for listed firms by roughly 5.3% to 6.2%, on average. Consequently, Hypothesis 1 is supported; therefore, the short-selling mechanism has effectively increased audit expenses.

The parameters of the auxiliary factors, namely corporate size, operating complexity, debt-to-asset ratio (LEV) and loss situation (LOSS), are all associated with the end variable. Thus, the statistical system of this study is deemed to be appropriate.

5.3. Mechanism Test

To examine how the short-selling mechanism affects audit fees, this paper conducts mechanism tests from two channels: audit risk and audit effort. Table 4 reports the results of the mechanism tests.

Table 4. Mechanism Test Results

Variable	(2) LNFEE	(4) LNFEE
DID	0.041***	0.038***
	(3.87)	(3.51)
LRISK	0.156***	
	(4.23)	
INVEST		0.113***
		(3.94)
Control variables	Yes	Yes
Firm fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Observations	26847	26847
R ²	0.708	0.712
Mediating effect	Significant	Significant

Numbers in brackets are t-values. The degrees of freedom are 1, 5, and 10. The controlling factors are the same as those in the first model, so they will be omitted here for brevity.

As shown in Table 4, column (2) is the DID coefficient after adding the audit risk variables, and it is still highly significant at the 1% level with a value of 0.041. At the same time, the LRISK coefficient of audit risk is 0.156 and exceeds the 0.01 threshold. Column (3) shows that after adding the audit effort variables, the DID coefficient is reduced to 0.038 and remains statistically significant at the 1% level; at the same time, the INVEST coefficient for audit effort reaches 0.113 and is also 1% significant. Both columns have reduced the DID coefficients compared to the basic model, but the mediators are still very statistically significant. Therefore, audit risk and audit effort are acting as partial mediators. Based on the above study, it can be concluded that the short-selling pressure has increased the audit risk and, thus, raised audit expenses and intensity.

5.4. Heterogeneity Analysis

As shown in Table 5, in order to determine whether the impact of the short-selling mechanism on audit costs differs among different types of enterprises, three factors of heterogeneity were studied in this paper: ownership structure, accounting risk and auditor attributes. Based on the actual controlling shareholder identity, the sample has been divided into non-state-owned and state-owned enterprises. Based on the median accounting conservatism scores of the two groups, a low-conservative group and a high-conservative group were formed. These sample divisions are based on whether the entity is audited by a Big Four international accounting firm or not. All categories are analyzed in the same difference-in-differences framework of the main regression, and then between-group coefficient comparisons are carried out to determine if there are any statistically significant differences. Table 5 presents the heterogeneity exploration results of the three separate group divisions mentioned above.

Table 5. Heterogeneity Analysis Results

Variable	(1) Non-SOE	(2) SOE	(3) Low Conservatism	(4) High Conservatism	(5) Non-Big Four	(6) Big Four
DID	0.067***	0.038**	0.071***	0.039**	0.057***	0.035
	(4.52)	(2.38)	(4.69)	(2.51)	(4.63)	(1.46)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	14652	12195	13126	13721	25154	1693
R ²	0.698	0.712	0.693	0.715	0.695	0.736

Note: The values in parentheses are t-statistics. Significance is reported at the 1%, 5%, and 10% levels. The control variables are the same as those in the baseline regression and are omitted for brevity.

5.5. Robustness Tests

The four types of robustness tests were carried out in this study to ensure the reliability of the empirical results. A first, a control group study was conducted. By assuming that the deployment period of the short-selling framework was two years earlier, a simulated treatment variable was constructed for re-estimation. Based on the above results, the coefficient of the placebo DID is 0.008 and still not statistically significant; therefore, it can be inferred that the intervention's effect is due to the actual implementation of this framework, and the impact of unobserved factors has been adequately excluded.

Expand the duration of this research. To circumvent the influence of the 2008 worldwide financial turmoil, the initial period for data collection was shifted to 2010 for a fresh estimation. The DID parameter equals 0.051 and remains extremely substantial at the 1% threshold; consequently, the primary findings stay constant.

Furthermore, the PSM-DID methodology is applied. Propensity score matching techniques are utilized to eliminate selection bias between the treatment and control cohorts by pairing treated firms with comparable control firms, followed by a difference-in-differences evaluation. Following matching, the DID estimate is 0.049 ($p < 0.01$), and this finding has been validated through multiple iterations.

Fourthly, no substitute policy shocks are present. A dummy variable representing the Shanghai-Hong Kong Stock Connect program was incorporated into the framework to consider shifts in financial market liberalization strategies within Shanghai and Hong Kong during that period. The DID coefficient equals 0.052, which is statistically significant at the 1% level, and the magnitude and statistical relevance of the primary explanatory variable remain virtually identical. Consequently, these robustness tests verify that the previous regression findings are stable.

6. Conclusion and Implications

6.1. Main Conclusion

Utilizing the 2010 margin trading and short-selling pilot initiative within China, this study identifies a dataset of non-financial A-share listed firms spanning 2009 to 2021 to serve as a quasi-natural experimental setup. We employ a staggered Difference-in-Differences (DID) framework to comprehensively examine how the short-selling framework influences audit expenditures and the specific pathways through which these influences manifest. The

subsequent are the primary outcomes from the aforementioned investigations. Initially, the implementation of the short-selling framework has elevated the audit costs for listed corporations. After accounting for firm attributes, governance configurations, firm-specific factors and time-fixed variables, this finding remains robust. According to the outcomes of the mechanism analysis, the short-selling system enhances audit costs via two mechanisms: elevated audit risk and intensified audit activities. Ultimately, the fee-increasing impact of the short-selling system is relatively more pronounced for non-state-owned firms, organizations with weaker accounting prudence, and enterprises audited by non-Big Four accounting firms.

6.2. Theoretical Contributions and Practical Implications

The primary theoretical contributions of this research are presented below. Initially, it has broadened the current literature regarding the financial consequences of short-selling prohibitions. While many prior investigations concerning short selling have centered on firm financing, investment and innovation, this work broadens the inquiry into the auditing sector to examine how the short-selling mechanism, as an external governance instrument, influences audit markets at a micro scale through price signals in audit pricing. Furthermore, this inquiry broadens the framework of audit pricing theory. It clarifies whether short-selling regulations elevate audit expenses by heightening audit risk and/or necessitating additional audit efforts, and offers fresh empirical proof for the impact of shifts in the external market landscape on audit pricing. Lastly, considering that the regulation represents a phased advancement in margin trading and short-selling targets, a staggered difference-in-differences methodology is employed here to pinpoint the causal effect more accurately. It serves as a prototypical scenario that may be analyzed via policy evaluation.

This paper offers some actual applications and policy systems. First of all, it has advised that although short-selling mechanisms help to improve the efficiency of price discovery in the capital market, they are also an additional cost to listed companies in terms of audit expenses. Therefore, regulators should strive to ensure that the short-selling mechanism remains both efficient in promoting price discovery and cost-effective for listed companies. The introduction of a short-selling model will thus change the risk-assessment framework for external audit. Assess whether the short-selling activities of a listed company are likely to generate more information risks, and thus modify the audit plan and cost based on a raised audit risk threshold. Finally, due to the mechanism of short selling, the company should be more open about information and more cautious in its accounting. Enhance internal control and strengthen corporate governance to reduce the financial pressure of external supervision.

6.3. Research Limitations and Future Directions

This study has the following deficiencies. At first, as the audit-hour information is not available, audit delay was taken as a proxy for audit intensity in this study. Although the above way has been used to some extent in previous studies, it is still possible that this proxy does not reflect the actual extent of audit effort. The sample in this paper is limited to the Chinese A-share market, and therefore, the external validity of the results has not been verified in other capital systems. Finally, the effect of short-selling restrictions on audit costs may be delayed or prolonged in its change. Therefore, this paper will only focus on the direct results of introducing the short-selling system.

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