The Impact of Major Shareholders' Equity Pledges on Audit Pricing: Empirical Evidence from China's Private Listed Companies

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Abstract. Compared to financing options like bank loans, equity pledge financing is widely recognized among shareholders of listed companies due to its convenience, ability to raise funds at a low cost while retaining control. However, when a company's stock price declines to the liquidation threshold, pledged shareholders face the risk of losing control over their shares, which heightens their motivation to appropriate corporate assets or engage in earnings management to stabilize stock prices. State-owned enterprises benefit from natural political connections with the government, granting them advantages in financing and tax policies, as well as superior margin-call capabilities. Moreover, due to stricter and more complex conditions for equity transfers in state-owned enterprises, pledgees are more inclined to use private negotiation to cover loans. In contrast, private enterprises lack these policy and negotiation advantages, making their controlling shareholders more likely to resort to equity pledges to meet financial needs. However, in the event of a stock price drop, they often lack the capital to adequately cover margin calls, leading them to focus on controlling stock price fluctuations through earnings management. Thus, after pledging equity, private enterprises face intensified risks of asset appropriation and earnings management, prompting auditors to establish higher audit pricing to compensate for additional audit resources and hedge against increased audit risks.This study analyzes the relationship between controlling shareholders' equity pledges and audit pricing using data from China's A-share private listed companies between 2015 and 2020. The findings indicate a significant positive relationship between equity pledges by controlling shareholders and audit pricing, with higher pledging levels leading to increased audit fees. Further analysis reveals that this significant positive relationship only exists in regions with higher marketization and among firms audited by the "Big Ten" accounting firms. The conclusions enrich the literature regarding the economic consequences of equity pledges and factors influencing audit pricing, providing valuable insights for corporate governance and market regulation.

Keywords: Major shareholders' equity pledges; audit pricing; firm size; marketization level.

1. Introduction

According to the statistics from the CSMAR database, between 2015 and 2020, Chinese A-share listed enterprises issued a total of 33,984 announcements regarding new pledges by controlling shareholders, involving 2,242 listed companies. Among them, 1,926 private listed enterprises accounted for 31,955 announcements, demonstrating that equity pledging has become a routine practice for controlling shareholders of private companies.

Following equity pledging, the separation of cash flow rights from control rights fosters the inclination of controlling shareholders to appropriate corporate funds and collude with management in insider trading. According to the "Measures for the Administration of Stock Pledge Loans by Securities Companies" (effective November 2, 2004), pledgees can demand that pledgors top up collateral when stock prices fall to the warning line, and they have the right to sell pledged shares if prices drop below the liquidation line. Consequently, when stock prices decline, controlling shareholders face the risk of forced liquidation. In such scenarios, pledged shareholders often resort to earnings management and strategic market value management to release "good news" to stabilize stock prices and retain control, exacerbating financial and operational risks while heightening

information asymmetries between small and large shareholders, as well as between the company and external financial report users.

Practically, the State Council highlighted the risks of stock pledging in its October 2020 opinions on improving the quality of listed companies. As of December 28, 2023, data from iFinD indicated that 45.63% of A-share stocks are pledged, with over a hundred controlling shareholders in a full-pledge state. Many of these companies, such as Ningke Biological, have reported significant performance declines; the company's controlling shareholder holds 200 million shares, 29.2% of total shares, all pledged, with a 72.18% drop in revenue for the first three quarters of 2023.

China established a risk-based audit model in 2006, where factors influencing audit pricing include resource investment, risk premiums, and expected profits. Given the escalating risks of asset appropriation and earnings management post-equity pledge, auditors tend to increase their input and elevate risk premiums, resulting in higher audit fees.

This research is significant for two reasons. First, it investigates the relationship between equity pledges by controlling shareholders and audit pricing from the perspective of private enterprises, further exploring the heterogeneity of this relationship across different firm sizes and marketization levels. This broadens the scope of research on the economic consequences of controlling shareholders' equity pledges and the factors that influence audit pricing. Second, it provides theoretical and practical insights for listed companies and regulatory bodies, revealing that equity pledging intensifies financial and operational risks, consequently raising audit prices. Companies should closely monitor and communicate with controlling shareholders capable of asset appropriation and earnings management, reinforcing internal oversight to mitigate the risks associated with equity pledges.

From a regulatory standpoint, findings show that auditors scrutinize equity pledge risks and reflect these in higher audit pricing. As such, regulatory authorities could utilize accounting firms as intermediaries to formulate and implement more rational policies.

2. Literature Review

2.1. Economic Consequences of Controlling Shareholders' Equity Pledge

Equity pledging by controlling shareholders refers to a financing method where major shareholders pledge their company shares to banks or financial institutions to borrow funds. In the Chinese market, where stocks are often issued at a premium, the pledge value exceeds nominal value, meeting shareholders' need for low-cost financing. According to the "Interpretation of Several Issues Regarding the Guarantee Law" (issued December 8, 2000), pledgees only enjoy legal interests from pledged shares without retaining control rights, allowing pledge shareholders to maximize their economic potential while retaining control [1]. Thus, equity pledging has become an essential financing method for shareholders of listed companies.

Beyond meeting financing needs, controlling shareholders may also choose equity pledging for low-cost asset appropriation, interest transfer, or to buy back shares to maintain or enhance control [2,3,4]. Additionally, the separation of control rights and cash flow rights post-pledging exacerbates the motivation for controlling shareholders to appropriate corporate assets while fostering speculation [5]. The motivations for equity pledging may initially be questionable or may deteriorate over time, but they increase the risk of asset appropriation and impairment of interests.

Although equity pledging is viewed as a personal choice by shareholders, the announcements can intensify stock price volatility [6]. When stock prices fall to the liquidation line, pledgees may demand additional collateral or enforce margin calls, but shareholders often lack sufficient funds or shares to provide as collateral [7], leading to heightened risks of control transfer. Once pledged shares are liquidated, any announcement that controlling shareholders are reducing their holdings is perceived negatively by external investors, driving down stock prices and significantly increasing the risk of a stock price collapse [8,9,10]. Given the substantial "shell value" of listed companies, controlling shareholders will strive to maintain control, often resorting to real earnings management [11,12], covert M&A strategies for market cap management [13], strategically lowering the readability of

annual reports [4], or disclosing more forward-looking information to convey "good news" and conceal "bad news," thus stabilizing stock prices.

Due to the short development time of the equity pledge market in China and the insufficient disclosure of pledge-related information, equity pledging undoubtedly exacerbates corporate risks and agency issues. Simultaneously, the earnings management and strategic market value management practices by controlling shareholders post-pledging reinforce barriers to information disclosure between firms and external investors, resulting in higher financing constraints and increased financing costs during debt financing [3,7], heightening financial risk for corporations. Compared to state-owned enterprises that enjoy the "paternalistic effect" and "soft budget constraints," the impact of equity pledging by controlling shareholders on financial risk is even greater for private listed firms [11].

In summary, controlling shareholders, after pledging equity, are both capable and inclined to appropriate corporate assets for personal gain and to manipulate earnings management to stabilize stock prices and mitigate risks of control transfer, a characteristic that is particularly pronounced in private enterprises. Nonetheless, some studies suggest that equity pledging by controlling shareholders can have certain governance effects [14]. When pledge levels are low, the interests of enterprises and controlling shareholders are intertwined, prompting controlling shareholders to be more actively involved in governance and enhancing enterprise value.

2.2. Factors Influencing Audit Pricing

Simunic [15] pioneered the audit pricing model, identifying audit costs, expected profits, and estimated losses as three major factors affecting audit fees. Subsequent scholars have enriched the research on these influencing factors.

From a corporate perspective, significant factors impacting audit pricing include asset size, business complexity, short-term solvency, internal controls, R&D expenditures, capitalization, and fair value measurement characteristics [16,17,18,19,20]. Additionally, the high social status of a company contributes to resource, information, and reputational advantages, thereby reducing operational risks and improving earnings quality, which can decrease the audit effort and fees charged by auditors [21].

From the angle of corporate governance, high-education employees and executives with military backgrounds can enhance information disclosure quality and reduce agency costs, but this requires a foundation of quality internal controls [22,23]. The convergence effects of equity incentive policies can improve corporate control environments [24]. The presence of political connections, independent director numbers, and board diligence [25] also optimize corporate governance structures; these features reduce audit risks and subsequently lower audit pricing.

From other perspectives, higher audit fees suggest that auditors provide greater assurance of financial statements [26]. Firms audited by specialists often incur higher audit fees that align with the costs incurred by the auditors [27]. The brand premium of accounting firms, the type of audit opinion, marketization levels, and the stringency of regulatory enforcement also affect audit pricing [28,29,30,31].

Most literature discusses the impact of these factors solely on current audit pricing. Given the phenomena of "low-cost client acquisition" in the auditing industry and variations in client initiation costs, accounting firms often need to recoup costs over multiple periods. Therefore, auditors may set higher audit prices at the beginning of their term to ensure they recover costs [32].

2.3. Research on the Relationship between Controlling Shareholders' Equity Pledges and Audit Pricing

Recent years have seen the literature regarding the relationship between controlling shareholders' equity pledging and audit pricing gradually expand. Controlling shareholders typically pledge equity to meet their own funding needs rather than for corporate operational financing, yet the resulting earnings management and default risks are borne by the enterprise [33]. Based on the "deep pockets"

principle, after a company's operational failures, investors tend to seek compensation from audit firms perceived as having sufficient financial capacity [34]. Pledging significantly increases the business and audit risks auditors face. Consequently, auditors will perform more rigorous audit procedures, increase risk premium levels, set higher audit prices, and are more likely to issue non-standard audit opinions [33,34,35,36]. These relationships are more pronounced in private enterprises, regions with lower marketization, and companies with lower information transparency [35], as well as for firms audited by non-Big Four accounting firms, companies with stronger investor protections [37], and those with high equity concentration [34].

3. Theoretical Analysis and Hypothesis Proposal

According to existing research, audit pricing hinges on two primary factors: audit input and risk premiums [21,22,38]. Modern risk-based audit risk models measure audit risk by the product of risks associated with material misstatements and examination risks. When material misstatement risk is high, auditors increase their audit input to reduce examination risk; however, even with such measures, audit risk cannot always be reduced to expected levels. Consequently, auditors may adjust risk premiums to compensate for failing to issue appropriate audit opinions or losses stemming from poor performance of the audited company.

Controlling shareholders' equity pledges primarily affect audit pricing through the following two pathways:

(1) Equity pledging serves as a significant signal of financial distress for controlling shareholders [39]. Statistics from CSMAR indicate that among announcements of equity pledges by private enterprise controlling shareholders from 2015 to 2020, there were 419 instances where the pledged funds were partially or wholly invested back into the listed companies, accounting for merely 1.31% of all pledge announcements. Controlling shareholders pledge equity mainly to alleviate their personal funding needs. On one hand, the decision to use equity pledging for financing may well be preparatory for depleting the company; on the other hand, after equity pledging, the separation of cash flow rights from control rights exacerbates agency problems between controlling shareholders and minority shareholders. This separation leads to more aggressive behaviors by controlling shareholders, such as overly investing in enterprises or holding short-term speculative financial assets [5], worsening both financial and operational risks and increasing audit risks for auditors.

(2) Equity pledging may exacerbate the company's earnings management behavior. The risk of control transfers arises from a decline in stock prices; to minimize this risk, controlling shareholders need to gain investor recognition and support. Compared to actively participating in corporate governance and enhancing enterprise value to release positive news, manipulating earnings is simpler and typically yields more pronounced results. Thus, controlling shareholders are likely to prefer the latter. However, earnings management behaviors inflate the risk of material misstatements in financial statements, reducing acceptable examination risks for auditors. In an effort to keep audit risks within reasonable limits, auditors will become more diligent, implement more audit procedures, and maintain a healthy skepticism regarding the company's internal controls. Given the controlling shareholders' positions of power, the feasibility of colluding with management to manipulate the company is relatively high. Even after increasing audit input, auditors cannot ensure that remaining audit risks stay within manageable bounds, which heightens the chances of penalties, compensations, and reputational losses faced by accounting firms, leading auditors to charge higher risk premiums.

In summary, equity pledges by controlling shareholders increase the likelihood of hollowing out enterprises and engaging in earnings management, raising audit risks and costs. Thus, auditors will charge higher audit fees. The following hypothesis is proposed:

H1: Ceteris paribus, there is a positive relationship between controlling shareholders' equity pledges and audit pricing.

4. Research Design

4.1. Measurement of Controlling Shareholders' Equity Pledge

This study employs two methods to measure the equity pledge variable of controlling shareholders:

Controlling Shareholders' Equity Pledge (pld_dum) is a dummy variable that takes a value of 1 if an equity pledge exists at the end of the year for a listed company; otherwise, it takes a value of 0.

(2) Degree of Controlling Shareholders' Equity Pledge (pld_rate) is a continuous variable ranging from 0 to 1, measuring the proportion of the number of shares pledged by controlling shareholders relative to their total shareholdings. A higher pledge degree signifies an increased separation of cash flow rights from control rights, lowering the costs associated with potential depletion of the enterprise and signifying a more pronounced inclination for such motives. Additionally, after the pledged equity is liquidated, controlling shareholders might face changes in control, with newly appointed controlling shareholders possessing limited knowledge about the company's operations, potentially negatively impacting performance [40]. Increased risks for the enterprise will incline auditors to charge higher audit fees.

4.2. Model Specification and Variable Definitions

To test the proposed hypotheses, this study constructs the following model. The definitions of the variables are outlined in Table 1:

$$lnfee = \beta_0 + \beta_1 pld + Controls + Year + Industry + \varepsilon \quad (1)$$

(1) Auditing firm Size: Large audit firms are typically more professional and independent, providing higher quality audits and reducing the probability of information distortion [7]. This study adopts the criteria of whether a firm is one of the domestic "Top Ten" firms as a standard for measuring firm size, based on the following reasoning: First, the audit quality of domestic "Top Ten" accounting firms is superior to that of the Big Four and their domestic members. Second, according to CSMAR, between 2015-2020, the percentage of A-share listed companies audited by the international Big Four was only 6.7%, and merely 1.76% of private enterprises included. As the sample involves domestic A-share private listed companies, using domestic "Top Ten" firms to measure firm size is more appropriate for this study. The "Top Ten" accounting firms refer to the top ten firms listed in the annual report published by the Chinese Institute of Certified Public Accountants.

(2) Following other studies [16,25,3], this paper selects company size (size), current ratio (current), debt ratio (lev), return on total assets (roa), loss status (loss), growth potential (growth), inventory ratio (inv), accounts receivable ratio (rec), board independence (indepen), ownership concentration (cr1), dual positions (dual), marketization level (score), and type of audit opinion (opinion) as control variables, as detailed in Table 1.

Table 1. Variables and Definitions

Variable Name	Variable Symbol	Variable Definition
Audit Pricing	lnfee	Logarithm of the current period's domestic audit fee
Controlling Shareholder Equity Pledge	pld_dum	Dummy variable; 1 if there's a controlling shareholder pledge at period-end, otherwise 0
Degree of Controlling Shareholder Equity Pledge	pld_rate	Proportion of pledged shares to total shares held by controlling shareholders
Company Size	size	Logarithm of total assets at year-end
Current Ratio	current	Current assets / current liabilities at year-end
Debt Ratio	lev	Total liabilities / total assets at year-end
Return on Assets	roa	Net profit / average total assets
Loss Status	loss	Dummy variable; 1 if net profit is negative at year-end, otherwise 0
Growth Potential	growth	(Total revenue this year - total revenue last year) / total revenue last year
Inventory Ratio	inv	Net inventory at year-end / total assets at year-end
Accounts Receivable Ratio	rec	Net accounts receivable at year-end / total assets at year-end
Board Independence	independ	Number of independent directors / total number of board members
Ownership Concentration	cr1	Proportion of shares held by the largest shareholder
Dual Positions	dual	Dummy variable; 1 if the roles of chairman and CEO are held by the same person, otherwise 0
Marketization Level	score	Measured using data from the "Marketization Index Report by Province in China (2021)" compiled by Wang Xiaolu et al.; missing data for 2020 replaced with averages from the prior three years
Auditing Firm Size	big10	Dummy variable; 1 if the firm's auditor is one of the top ten firms listed by the Chinese Institute of Certified Public Accountants, otherwise 0
Audit Opinion Type	opinion	Dummy variable; 1 if the issued audit opinion is an unqualified opinion, otherwise 0
Yearly Variable	Year	Year dummy variable
Industry Variable	Industry	Dummy variable based on the classification standard from the 2012 version of the CSRC's industry classifications

4.3. Sample Selection and Data Sources

According to the "Administrative Measures for the Charging of Accounting Firm Services," issued by the National Development and Reform Commission and the Ministry of Finance in 2010, the fees for accounting firms conducting audits and issuing reports are subject to government-guided pricing. However, to foster better development within the audit service sector and leverage market resources, the NDRC issued a notification in 2014, allowing seven services, including those provided by accounting firms, to be free from price controls where competitive conditions exist. The introduction of this notification marked a milestone in China's audit service industry; hence, this study uses 2015 as the initial year for the sample and collects data from private listed companies on the Shanghai and Shenzhen A-share markets from 2015 to 2020, with the following data processing: (1) ST company data were deleted; (2) data from financial industry-listed companies were excluded; and (3) samples with missing values were removed.

To minimize the impact of outliers, all continuous variables were winsorized at the 1% and 99% percentiles.

The marketization index data used in this study comes from the "Marketization Index Report by Province in China (2021)" compiled by Wang Xiaolu et al. The data on controlling shareholders' equity pledges (pld_dum and pld_rate), return on assets (roa), current ratio (current), as well as data on board independence (indepen), audit opinion type (opinion), and other relevant financial data are sourced from the CSMAR database, with data processing and analysis conducted using STATA software.

5. Research Design

5.1. Descriptive Statistical Analysis

Table 2 presents the descriptive statistics for all variables, where the maximum and minimum values of audit pricing (lnfee) are 15.274 and 12.612 respectively, with a mean of 13.666 (approximately 4.3 million, 300 thousand, and 860 thousand after conversion), indicating significant

variability in pricing among auditors for different companies. The average for controlling shareholders' equity pledging (pld_dum) is 0.593, revealing that 59.3% of controlling shareholders employ equity pledging for financing. The mean and the first quartile for the degree of controlling shareholders' equity pledge (pld_rate) are 0.321 and 0.61, indicating an average pledge degree of 32.1%, with over a quarter of private enterprise controlling shareholders pledging more than half of their shares. In the descriptive statistics for control variables, the average ownership concentration (cr1) is 0.318, with the largest shareholder holding an average of 31.8% of shares, reaching a maximum of 0.685, highlighting a pronounced concentration of ownership. The current ratio (current) and company size (size) exhibit standard deviations of 2.573 and 1.069, respectively, indicating significant differences in size and debt repayment capabilities among firms. The average for the loss indicator (loss) is 0.095, meaning 9.5% of the observed samples reported losses. The average board independence (indepen) is 0.379, with a minimum of 0.333, as most firms conformed to the guideline stipulating at least one-third independent directors. The mean for firm size (big10) is 0.573, revealing that 57.3% of companies were audited by the top ten accounting firms in China. The audit opinion type (opinion) has a mean of 0.965, indicating that 3.5% of firms received non-standard opinions. The dual position (dual) indicator shows a mean of 0.408, indicating that 40.8% of firms had a dual CEO and chairman. Additionally, in the subsequent regression analysis, all independent variables' variance inflation factors (VIF) are less than 10, indicating no serious multicollinearity issues.

Table 2. Descriptive Statistics

VarName	Obs	Min	P25	Mean	Median	P75	Max	SD
lnfee	11,715	12.612	13.305	13.666	13.592	13.998	15.274	0.538
pld_dum	11,715	0.000	0.000	0.593	1.000	1.000	1.000	0.491
pld_rate	11,715	0.000	0.000	0.321	0.194	0.610	1.000	0.352
size	11,715	19.876	21.090	21.873	21.758	22.514	25.251	1.069
current	11,715	0.445	1.327	2.793	1.915	3.240	16.171	2.573
lev	11,715	0.054	0.222	0.375	0.359	0.506	0.862	0.189
roa	11,715	-0.315	0.020	0.049	0.050	0.086	0.240	0.077
loss	11,715	0.000	0.000	0.095	0.000	0.000	1.000	0.293
growth	11,715	-0.590	-0.014	0.189	0.119	0.285	2.757	0.433
inv	11,715	0.000	0.061	0.130	0.105	0.165	0.611	0.108
rec	11,715	0.001	0.064	0.144	0.127	0.203	0.482	0.105
indepen	11,715	0.333	0.333	0.379	0.364	0.429	0.556	0.051
opinion	11,715	0.000	1.000	0.965	1.000	1.000	1.000	0.183
big10	11,715	0.000	0.000	0.573	1.000	1.000	1.000	0.495
cr1	11,715	0.089	0.214	0.318	0.300	0.401	0.685	0.133
score	11,715	1.120	9.060	9.787	10.260	10.800	11.490	1.394
dual	11,715	0.000	0.000	0.408	0.000	1.000	1.000	0.491

5.2. Main Regression Results

Table 3 presents the regression results for the relationship between controlling shareholders' equity pledges and audit pricing. The coefficients for both pld_dum and pld_rate are significantly positive at the 1% level. This affirms that auditors consider the effects of controlling shareholders' equity pledges on audit risk when determining audit pricing. Firms with controlling shareholders who have equity pledges incur higher audit fees, with greater pledge levels correlating to higher fees, thus supporting Hypothesis H1.

The regression results for control variables indicate that size, lev, loss, growth, rec, big10, dual, and score are positively correlated with audit pricing, while current, roa, inv, and opinion are negatively correlated. The positive coefficients for size, rec, and growth suggest that auditors impose higher pricing for more complex audit engagements. The negative coefficient for current and the positive for lev indicate that auditors charge higher fees for firms with increasing debt risks. The negative coefficient for roa suggests that higher asset utilization leads to more orderly operations and reduced audit pricing. The positive coefficient for dual indicates reduced board oversight effectiveness due to dual roles, with the chairman potentially abusing power and leading to poorer

performance, consequently resulting in higher audit fees charged by auditors for poorly performing firms. The positive coefficient for big10 reflects the brand premium charged by accounting firms, while the negative coefficient for opinion is due to the need for auditors to obtain more evidence to support non-standard opinions, leading to adjustments in audit pricing to account for the accompanying costs and risks. The coefficient for indepen is not significant, potentially due to the compliance with guidelines that only stipulate having one-third independent directors without genuinely enhancing board independent functionality. The non-significance of cr1 could stem from the concentration of ownership alleviating principal-agent problems, thereby exacerbating secondary agency issues between larger and smaller shareholders.

Table 3. Main Regression Results

VarName	(1)	(2)
	lnfee	lnfee
pld_dum	0.025***	
	(3.409)	
pld_rate		0.042***
		(3.857)
size	0.333***	0.332***
	(78.717)	(78.753)
current	-0.013***	-0.013***
	(-7.328)	(-7.453)
lev	0.079**	0.074**
	(2.430)	(2.280)
roa	-0.434***	-0.425***
	(-6.099)	(-5.937)
loss	0.067***	0.067***
	(4.050)	(4.038)
growth	0.031***	0.031***
	(3.285)	(3.256)
inv	-0.191***	-0.189***
	(-4.875)	(-4.826)
rec	0.102***	0.105***
	(2.740)	(2.823)
indepen	-0.057	-0.053
	(-0.869)	(-0.812)
opinion	-0.096***	-0.094***
	(-4.423)	(-4.296)
big10	0.083***	0.084***
	(11.861)	(11.897)
dual	0.017**	0.017**
	(2.418)	(2.481)
score	0.039***	0.039***
	(13.952)	(14.074)
cr1	-0.003	0.004
	(-0.103)	(0.153)
_cons	5.985***	5.983***
	(58.637)	(58.653)
Year	Yes	Yes
Industry	Yes	Yes
N	11,715	11,715
r2_a	0.539	0.540

5.3. Heterogeneity Analysis

5.3.1 "Top Ten" Auditing Firms vs. Non-"Top Ten" Auditing Firms

As shown in Table 4, samples are grouped by whether the auditing firm is one of the domestic "Top Ten." Among firms audited by domestic "Top Ten" firms, a significant positive correlation exists between controlling shareholders' equity pledging and audit pricing, whereas in firms not audited by these top firms, the coefficient for equity pledging is not significant. This suggests that the influence of controlling shareholders' equity pledging on audit pricing is present only in enterprises audited by domestic "Top Ten" firms, likely because large firms are more sensitive to pledge risks and reflect these through greater audit investments and pricing premiums. Moreover, based on the "deep pockets" theory, although auditors perform their duties correctly and issue fair opinions, external investors often attribute losses to the auditors' supposed negligence, leading to lawsuits against the firms. Furthermore, when large firms issue inappropriate opinions, the reputational and client losses can be severe, which increases their risk awareness during audits [37]. Consequently, large firms are likely to identify signs of shareholder depletion and risks of earnings management more effectively and proactively increase audit inputs and risk premiums in response.

Table 4. "Top Ten" Auditing Firms vs. Non-"Top Ten" Auditing Firms

VarName	(1)	(2)	(3)	(4)
	Non-Top Ten	Top Ten	Non-Top Ten	Top Ten
pld_dum	0.015	0.032***		
	(1.297)	(3.361)		
pld_rate			0.021	0.066***
			(1.313)	(4.571)
size	0.315***	0.347***	0.315***	0.347***
	(48.689)	(62.652)	(48.352)	(62.981)
current	-0.013***	-0.013***	-0.013***	-0.013***
	(-4.780)	(-5.490)	(-4.858)	(-5.569)
lev	0.051	0.094**	0.049	0.084**
	(1.035)	(2.219)	(0.989)	(1.991)
roa	-0.662***	-0.230**	-0.658***	-0.207**
	(-6.161)	(-2.444)	(-6.104)	(-2.183)
loss	0.035	0.090***	0.035	0.091***
	(1.448)	(3.936)	(1.431)	(3.972)
growth	0.030**	0.035***	0.030**	0.035***
	(2.124)	(2.744)	(2.118)	(2.691)
inv	-0.128**	-0.237***	-0.127**	-0.233***
	(-2.242)	(-4.480)	(-2.223)	(-4.406)
rec	0.005	0.187***	0.006	0.190***
	(0.087)	(3.853)	(0.106)	(3.930)
indepen	0.071	-0.166*	0.075	-0.165*
	(0.720)	(-1.890)	(0.753)	(-1.874)
opinion	-0.153***	-0.024	-0.151***	-0.020
	(-5.107)	(-0.760)	(-5.058)	(-0.633)
dual	0.005	0.000	0.009	0.012
	(0.118)	(0.001)	(0.199)	(0.344)
score	0.038***	0.035***	0.038***	0.036***
	(8.938)	(9.634)	(8.954)	(9.866)
cr1	0.027**	0.006	0.027**	0.006
	(2.471)	(0.654)	(2.524)	(0.659)
_cons	6.390***	5.765***	6.393***	5.750***
	(40.638)	(41.893)	(40.495)	(41.868)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	5,003	6,712	5,003	6,712
r2_a	0.497	0.569	0.497	0.570

5.3.2 Level of Marketization

This study categorizes samples with a marketization index above the mean as a high marketization group, while those below are classified as a low marketization group. Results shown in Table 5 indicate that the significant positive relationship between controlling shareholders' equity pledges and audit pricing exists only in the high marketization group. This may be attributed to factors such as different price levels across regions affecting baseline audit pricing and the more robust legal frameworks in high-market areas which bolster both formal (regulatory) and informal (media) oversight. Auditors of companies in these high-market areas face greater psychological pressure and risks of penalties and reputational damage [17]. Finally, from a corporate perspective, the development of the securities market in high-market regions is more mature, with stricter restrictions and disclosure requirements for equity pledges, reducing the feasibility of controlling shareholders hollowing out companies through pledging or managing earnings to stabilize stock prices, as well as lowering the likelihood of selecting non-"Top Ten" audit firms to avoid non-standard opinions.

Table 5. Level of Marketization

VarName	(1) Low level of marketization	(2) High level of marketization	(3) Low level of marketization	(4) High level of marketization
pld_dum	0.011	0.033***		
	(0.944)	(3.492)		
pld_rate			0.025	0.054***
			(1.553)	(3.740)
size	0.331***	0.340***	0.331***	0.340***
	(52.342)	(59.287)	(52.311)	(59.336)
current	-0.014***	-0.012***	-0.014***	-0.012***
	(-5.512)	(-4.749)	(-5.555)	(-4.864)
lev	0.054	0.069	0.050	0.064
	(1.121)	(1.562)	(1.044)	(1.447)
roa	-0.660***	-0.270***	-0.652***	-0.256***
	(-6.030)	(-2.934)	(-5.920)	(-2.774)
loss	0.024	0.105***	0.024	0.105***
	(0.951)	(4.822)	(0.949)	(4.835)
growth	0.047***	0.019	0.047***	0.019
	(3.581)	(1.406)	(3.556)	(1.370)
inv	-0.368***	-0.017	-0.366***	-0.015
	(-6.196)	(-0.329)	(-6.153)	(-0.298)
rec	0.134**	0.124**	0.135**	0.130***
	(2.384)	(2.480)	(2.399)	(2.581)
indepen	-0.043	-0.142*	-0.042	-0.139*
	(-0.412)	(-1.731)	(-0.395)	(-1.698)
opinion	-0.116***	-0.076**	-0.114***	-0.072**
	(-3.677)	(-2.505)	(-3.638)	(-2.394)
cr1	0.030	-0.020	0.034	-0.011
	(0.758)	(-0.554)	(0.861)	(-0.310)
dual	0.025**	0.006	0.025**	0.007
	(2.248)	(0.686)	(2.278)	(0.739)
big10	0.100***	0.047***	0.101***	0.047***
	(9.409)	(4.965)	(9.449)	(4.968)
_cons	6.325***	6.309***	6.331***	6.307***
	(44.000)	(42.315)	(44.099)	(42.262)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	5,400	6,315	5,400	6,315
r2_a	0.532	0.553	0.532	0.554

5.4. Robustness Tests

(1) Instrumental Variable Method

While this study has controlled for company financial ratios, governance characteristics, and auditor firm features, audit pricing and controlling shareholder equity pledging may still be influenced by omitted variable bias. To address this issue, this study use the average pledge level of controlling shareholders in the province of the company (ivpld_pro, measuring the average pledge ratio among controlling shareholders of A-share listed companies in the same province) as instrument variables for both pld_dum and pld_rate. The two-stage least squares (2SLS) method is employed to alleviate endogeneity issues. When measuring equity pledging using pld_dum and pld_rate, Hausman test chi-square values are 4.49 and 3.83, respectively, both rejecting the exogeneity hypothesis at the 5% and 10% levels. The minimum characteristic roots in weak instrument tests are 29.70 and 84.448, both exceeding the critical value of 8.96 under 15% bias. Thus, appropriate instrumental variables are chosen. The regression results are presented in the first four columns of Table 6 where both pld_dum and pld_rate show a significant positive correlation with ivpld_pro at the 1% level. In the second-stage regression, coefficients for pld_dum and pld_rate remain significantly positive at the 5% level, indicating that the significant positive correlation between controlling shareholders' equity pledges and audit pricing persists after mitigating omitted variable effects; thus, the hypothesis H1 is supported.

(2) Propensity Score Matching (PSM)

The equity pledge behavior of controlling shareholders in listed companies may be influenced by specific company characteristics that lead to biased empirical outcomes. To address this, this study constructs a logit model for controlling shareholders' equity pledges (pld_dum), using company size (size), debt ratio (lev), growth potential (growth), duality (dual), ownership concentration (cr1), as well as year (year) and industry (industry) as covariates to estimate the propensity scores for equity pledging. Matched non-pledged samples are selected through 1:1 nearest-neighbor matching without replacement based on these scores. The balance test results indicate that the standardized bias (%bias) for covariates in the treated group and control group dropped below 10% after matching, with t-values exceeding the critical value of 1.96, indicating effective matching. Regression analysis of the matched sample yields results in columns 5 and 6 of Table 6, where both pld_dum and pld_rate coefficients remain significantly positive at the 1% level, indicating that after addressing sample selection concerns, there is still a significant positive correlation between controlling shareholders' equity pledges and audit pricing, corroborating the earlier findings and supporting hypothesis H1.

Table 6. IV-2SLS and PSM

VarName	IV				PSM	
	(1)	(2)	(3)	(4)	(5)	(6)
	pld_dum	lnfee	pld_rate	lnfee	lnfee	lnfee
ivpld_pro	0.522***		0.614***			
	(5.449)		(9.190)			
pld_dum		0.332**			0.020***	
		(2.136)			(2.721)	
pld_rate				0.282**		0.037***
				(2.242)		(3.169)
size	0.062***	0.314***	0.042***	0.322***	0.321***	0.321***
	(12.501)	(29.815)	(12.104)	(48.602)	(65.749)	(65.644)
current	-0.019***	-0.007**	-0.007***	-0.012***	-0.015***	-0.015***
	(-8.450)	(-2.005)	(-4.204)	(-5.749)	(-8.270)	(-8.288)
lev	0.070*	0.056*	0.152***	0.036	0.042	0.042
	(1.859)	(1.650)	(5.797)	(0.999)	(1.129)	(1.124)
roa	-0.988***	-0.133	-0.820***	-0.229*	-0.407***	-0.399***
	(-11.556)	(-0.786)	(-13.742)	(-1.859)	(-5.293)	(-5.157)
loss	-0.072***	0.089***	-0.038***	0.076***	0.071***	0.071***
	(-3.517)	(4.346)	(-2.686)	(4.450)	(3.937)	(3.929)
growth	0.073***	0.009	0.052***	0.019*	0.019*	0.019*
	(6.938)	(0.655)	(7.081)	(1.784)	(1.665)	(1.688)
inv	0.018	-0.196***	-0.039	-0.179***	-0.203***	-0.200***
	(0.367)	(-4.786)	(-1.145)	(-4.563)	(-4.477)	(-4.400)
rec	0.231***	0.034	0.070**	0.091**	0.114***	0.115***
	(4.952)	(0.639)	(2.135)	(2.362)	(2.754)	(2.801)
indepen	0.219***	-0.121	0.049	-0.062	0.014	0.017
	(2.599)	(-1.546)	(0.826)	(-0.913)	(0.193)	(0.239)
opinion	0.150***	-0.142***	0.022	-0.098***	-0.143***	-0.141***
	(5.937)	(-4.527)	(1.270)	(-4.801)	(-5.675)	(-5.600)
big10	-0.044***	0.096***	-0.033***	0.091***	0.072***	0.071***
	(-4.934)	(9.669)	(-5.285)	(11.195)	(9.471)	(9.459)
dual	0.017*	0.012	0.000	0.017**	0.013*	0.014*
	(1.851)	(1.523)	(0.046)	(2.426)	(1.771)	(1.812)
score	-0.014***	0.044***	-0.014***	0.043***	0.038***	0.038***
	(-4.085)	(11.468)	(-6.090)	(12.434)	(12.434)	(12.501)
cr1	0.028	-0.013	-0.151***	0.038	-0.017	-0.012
	(0.830)	(-0.464)	(-6.421)	(1.179)	(-0.595)	(-0.405)
Constant	-0.865***	6.198***	-0.560***	6.069***	6.294***	6.293***
	(-6.601)	(40.728)	(-6.129)	(54.200)	(52.637)	(52.643)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes	Yes	Yes
N	11,715	11,715	11,715	11,715	9,540	9,540
r2_a	0.117	0.472	0.162	0.520	0.486	0.487

(3) Substituting Explanatory and Dependent Variables

To consider the effect of inflation on annual audit pricing, this study adopts the consumer price index (CPI) as a variable for measuring inflation, adjusting each year's audit pricing accordingly. The regression results in columns 1 and 2 of Table 7 reveal that the coefficients for pld_dum and pld_rate remain significantly positive at the 1% level, indicating a significant positive relationship between controlling shareholders' equity pledges and audit pricing under unchanged conditions. Moreover, substituting controlling shareholders' equity pledge scale (pld_scale, measuring the pledged shares' proportion to total company shares, sourced from the CSMAR database) for the explanatory variable yields significant positive correlations for pld_scale in relation to lnfee at the 1% level in column 3 of Table 7, indicating larger equity pledge scales correlate with higher audit pricing. Thus, irrespective of whether the explanatory or dependent variable is replaced, the results align with previous findings, thereby supporting hypothesis H1.

Table 7. Substituting Variables

VarName	(1)	(3)	(5)
	lnfee_adjust	lnfee_adjust	lnfee
pld_dum	0.023***		
	(3.332)		
pld_rate		0.041***	
		(3.956)	
pld_scale			0.120***
			(3.801)
size	0.314***	0.313***	0.333***
	(78.522)	(78.543)	(78.907)
current	-0.012***	-0.013***	-0.014***
	(-7.267)	(-7.384)	(-7.541)
lev	0.079***	0.075**	0.073**
	(2.576)	(2.419)	(2.244)
roa	-0.405***	-0.394***	-0.425***
	(-6.039)	(-5.855)	(-5.926)
loss	0.062***	0.062***	0.068***
	(3.945)	(3.939)	(4.085)
growth	0.033***	0.032***	0.032***
	(3.544)	(3.506)	(3.304)
inv	-0.179***	-0.177***	-0.191***
	(-4.809)	(-4.760)	(-4.886)
rec	0.093***	0.096***	0.107***
	(2.640)	(2.718)	(2.861)
indepen	-0.057	-0.054	-0.053
	(-0.926)	(-0.873)	(-0.808)
opinion	-0.087***	-0.084***	-0.094***
	(-4.245)	(-4.121)	(-4.296)
big10	0.079***	0.079***	0.084***
	(11.897)	(11.944)	(11.920)
dual	0.016**	0.016**	0.017**
	(2.420)	(2.483)	(2.491)
score	0.037***	0.037***	0.039***
	(14.027)	(14.162)	(14.109)
cr1	-0.001	0.006	-0.029
	(-0.027)	(0.235)	(-1.033)
_cons	6.406***	6.405***	5.990***
	(66.354)	(66.394)	(58.679)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
N	11,715	11,715	11,715
r2_a	0.716	0.716	0.539

6. Conclusions and Recommendations

This paper takes the private listed companies on the Shanghai and Shenzhen A-share markets in China from 2015 to 2020 as samples to study the relationship between the equity pledge of controlling shareholders and audit pricing. After considering the endogeneity problem and the impact of inflation on audit pricing, the conclusion still holds: there is a significant positive relationship between the equity pledge of controlling shareholders and audit pricing. The equity pledge of controlling shareholders will intensify the motivation of shareholders to embezzle the enterprise and engage in earnings management, increasing the audit risk. To address this risk, auditors will adopt measures

such as expanding the scope of testing and increasing the number of audit procedures to obtain sufficient evidence to support the audit opinion and charge higher audit fees to compensate for the audit input and expected losses.

Based on the above, this paper conducts a grouped regression on the samples by the scale of the accounting firm hired by the enterprise and the degree of marketization of the region where the firm is located. The regression results show that the equity pledge of controlling shareholders and audit pricing are only significantly positively correlated within the top ten accounting firms in China and the high marketization group. This is because large-scale accounting firms are more sensitive to the pledge risk of enterprises and reflect it through increased audit input and higher risk premiums. Enterprises located in regions with a high degree of marketization have higher psychological pressure and expected losses for auditors, who will be more diligent to reduce the inspection risk and charge higher audit fees.

For enterprises, although the China Securities Regulatory Commission has required enterprises to disclose information such as the pledgor, pledgee, pledge ratio, and number of pledged shares, it has not alleviated the information asymmetry between enterprises and external investors. External investors tend to interpret equity pledges as negative information, exacerbating the decline in stock prices and triggering irrational investment, embezzlement, and earnings management by controlling shareholders. Therefore, enterprises should improve their internal governance structure, balance the power constraints of various positions, and strengthen the disclosure of information on the equity pledges of controlling shareholders to prevent excessive power of controlling shareholders. Secondly, the China Securities Regulatory Commission issued guidelines for independent directors of enterprises as early as 2001, and in 2022, it clearly stipulated in the "Rules for Independent Directors of Listed Companies" that the board of directors of listed companies should include at least one-third independent directors. However, in the initial sample data of this paper, there are still some enterprises with a proportion of independent directors less than one-third, and most enterprises have only just exceeded the one-third line. Therefore, enterprises should actively respond to the suggestions and regulations of regulatory authorities, appropriately increase the number of independent directors, and fully utilize their functions to ensure the independence of the board of directors.

For the government, it is necessary to improve the legal system and strengthen market supervision, and accelerate the process of marketization in various regions. This paper finds that when auditing enterprises in high marketization regions, auditors will be more diligent and provide high-quality audit reports due to psychological pressure and expected future losses. At this time, a sound legal system and efficient supervision can directly restrain enterprises and indirectly regulate their operations and internal person behaviors through auditors' audits. In addition, auditors' responses to the risks of controlling shareholders' equity pledges are reflected in audit input and audit pricing, and larger accounting firms are more sensitive to this risk. The government should encourage listed enterprises to hire the top ten accounting firms in China for audits, which can effectively reflect enterprise risks and alleviate the information asymmetry between enterprises and external financial statement users. Finally, the government should appropriately increase the penalties for illegal and non-compliant behaviors. From the perspective of "rational people", controlling shareholders pursue the maximization of private interests. When the cost of achieving private interests is high, it can effectively curb the opportunistic behavior of controlling shareholders. The main shortcomings of this paper are as follows: Firstly, this paper only empirically analyzes the relationship between the equity pledge of controlling shareholders and audit pricing, and discusses its mechanism through literature review. However, it does not further explore the specific path of this relationship through empirical analysis, which is not deep enough. Secondly, although this paper alleviates the endogeneity problem of variables by using the instrumental variable method and propensity score matching method, it cannot guarantee that the endogeneity problem has been completely eliminated. Thirdly, since the top ten domestic accounting firms list published by the China Institute of Certified Public Accountants changes every year and the release time is inconsistent, when using this list to measure the scale of accounting firms, there will be a lack of comparability between different years

and a certain time lag. This paper has not yet found a suitable way to solve this problem. Finally, when conducting heterogeneity tests, there may be a problem of improper selection of grouping criteria for the degree of marketization, which causes deviations in the results. Future research should find a more reasonable way to measure variables on the basis of solving the endogeneity problem and further explore the mechanism of the impact of the equity pledge of controlling shareholders on audit pricing.

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