Internal control and stock price crash risk: from the perspective of major shareholders' shareholding

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Abstract. Taking the listed enterprises in China from 2013 to 2021 as the research object, based on the mediating effect of the shareholding of major shareholders, the study is about the influence mechanism of internal control quality on the risk of corporate stock price crashes. the article talks about the influence mechanism of internal control quality on the risk of corporate stock price crashes. The results show that improving the internal control quality of listed companies is helpful to reduce the risk of stock price crash; *High quality internal control reduces the risk of stock price crash by significantly increasing the shareholding of major shareholders. The results show that improving the internal control quality of listed companies is helpful to reduce the risk of stock price crash; High quality internal control reduces the risk of stock price crash by significantly increasing the shareholding ratio of major shareholders. The shareholding ratio of major shareholders has partial mediating effect.* Based on the empirical results, (1) Enterprises may reduce stock price crash risk by adjusting the ownership structure; (2) The appropriate adjustment of equity structure tends to reduce the risk of stock price crash and thus maintain market stability.

Keywords: major shareholder shareholding; internal control; stock price crash risk

1 Introduction

Internal control in listed companies has gained significant attention as a crucial aspect of corporate governance, enhancing operational efficiency and effectivenes. The rising frequency of stock price fluctuations in China has led to increased interest in predicting and quantifying stock price crash risk. The impact of internal control on this risk has been widely acknowledged(Gennotte & Leland, 1990). Major shareholders with standard internal control systems tend to invest in companies with high-quality internal control, which enhances transparency and supervisory measures, mitigating agency problems. The article expands the understanding of internal control's influence on stock price collapse risk and provides valuable insights for market regulation. Additionally, it reinforces existing theories and strengthens the link between internal control and stock price collapse risk.

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2 Literature review

2.1 Internal controls

China's ongoing efforts to regulate internal control in enterprises aim at standardization and improvement. However, due to the diverse industry landscape and management practices, the existing guidelines may not cover all aspects comprehensively. Feng et al. (2012)have explored the merging trend of internal control and social responsibility, assessed its impact on stock price collapse risks, and identified common failure causes with improvement suggestions. Shareholding of major shareholders

In China, shareholders owning over 10% of shares have proposal rights in meetings, yielding significant influence and impacting financials. Research on big shareholders' holdings can be categorized into three types:

2.2 Major shareholders' holdings

Major shareholders' nature and control method impact stock prices. The largest shareholder, is associated with higher firm value, stronger profitability, and more effective corporate governance. Factors like equity balance degree, concentration, number of big shareholders, and the proportion of the largest shareholder's holdings influence firm performance, cost allocation, and M&A goodwill(Huang et al., 2022; Wang & Li, 2022). Major shareholders' increases cause stock price fluctuations due to information asymmetry(Fang & Sun, 2018). Announcements of such increases signal undervaluation, leading to short-term price rises and positive wealth effects(Fang, 2010). Major shareholders' reduction of shareholdings and "hollowing out" have garnered scholarly attention. "Hollowing out" refers to transferring assets and profits for controlling shareholders' gain(Johnson et al., 2000). Risk of stock price collapse

According to Li & Myers (2006), low firm transparency causes information accumulation and information asymmetry between inside and outside the firm. Kothari et al. (2009) also suggest that management's tendency to hide bad news increases the risk of stock price crashes due to internal and external information mismatch.

At the firm level, executive compensation management and integrity significantly impact stock price collapse risk. Kim et al. (2011) found CFO's option sensitivity to stock price positively relates to crash risk, demanding better governance to maintain integrity. CEO holding internal debt lowers the firm's stock crash risk.

At the individual level, executive competence, social experience, and personality traits influence stock price crash risk. Demerjian et al. (2013) shown competent management leads to accurate accruals estimates, reducing the risk. Overconfidence of executives slightly increases stock price crash risk..

3 Research hypotheses

By combing the literature related to internal control, share price collapse risk and majority shareholders' ownership, the study argues that firms' strengthening of internal

control can reduce share price collapse risk by increasing the percentage of majority shareholders' ownership.

3.1 The relationship between internal controls and the risk of stock price collapse

Firms can enhance internal control and management quality, improving information transparency and reducing agency costs. Transparent corporate information and timely disclosure of news reduce the risk of stock price collapse and dramatic swings, reducing the likelihood of crashes. Hypothesis H1: Listed companies' internal control quality negatively impacts their stock price crash risk.

3.2 The mediating role of major shareholders' shareholding on the relationship between internal control and stock price crash risk

Enhanced internal control improves operational efficiency and positively affects major shareholders' shareholding through "supervisory effect" and "less expropriation effect". Hypothesis H2: The quality of internal control of listed companies negatively affects the risk of stock price collapse by adjusting the shareholding ratio of major shareholders.

4 Study design

4.1 Sample Sources and Data

The study used data from China's A-share listed companies during the period 2013 to 2021 as the initial sample. To mitigate the influence of extreme data, we truncated continuous variables at the 1st and 9th percentiles.

4.2 Indicator Selection and Variable Measurement

Explained variable: risk of stock price collapse

Based on Hutton et al. (2009) 's study, this paper draws on most previous scholars' metrics, which measures the risk of stock price collapse through the negative stock return skewness coefficient (***NCSKEW***) and the ratio of upward and downward volatility of returns (***DUVOL***). In particular, the negative return skewness coefficient describes the extent to which the company's stock deviates negatively from market returns. The formula for the negative return skewness coefficient is:

$$NCSKEW_{i,t} = -\frac{n(n-1)^{3/2}\sum W_{i,t}^{3}}{(n-1)(n-2)(\sum W_{i,t}^{2})^{3}/2} \quad (1)$$

The formula for the ratio of upward and downward fluctuations in returns is:

$$DUVOL_{i,t} = \ln \frac{(n_u-1)\sum down W_{i,t}^2}{(n_d-1)\sum up W_{i,t}^2} \quad (2)$$

where.$\boldsymbol{W_{i,t}}$ is the weekly specific return of firm $\boldsymbol{i}$ in period $\boldsymbol{t}$, and $\boldsymbol{n_u}$ represents the number of trading weeks in which stock $\boldsymbol{i}$ has above average returns in a given year;$\boldsymbol{n_d}$ represents the number of trading weeks in which stock $\boldsymbol{i}$ has returns below the mean in a given year. The higher the ratios, the higher the risk of stock price collapse.

Explanatory variables: quality of internal controls

DIB's risk control evaluation index is used for listed Chinese companies to measure the quality of corporate internal control.

Control Variables

Drawing on existing studies, this paper controls for the negative return skewness coefficient (***NCSKEW***), the ratio of upward and downward fluctuations in returns (***DUVOL***), the proportion of majority shareholders' ownership (***TOP***), and the quality of internal controls (***Toc***). Meanwhile, in order to better test the role of majority shareholders' ownership ratio in the relationship between internal control and stock price crash risk, this paper also adds gearing ratio (***Lev***), firm nature (***Soe***), firm size (***Size***), and return on total assets (***Roa***) as new control variables. See Table 1 for variable symbols with corresponding names and definitions.

Table 1. Definition of variables

Variable type	variable symbol		variable name	Variable Definition
explanatory variable	$Risk\_C_{t+1}$	$NCSKEW_{t+1}$	Negative return skewness coefficient	The inverse of the ratio of the inverse of the third-order quotient of moments of the firm's weekly returns to the third power of the standard deviation of weekly returns, see text and equation (1) for the algorithm
		$DUVOL_{t+1}$	Ratio of upward and downward fluctuations in yields	Negative return skewness coefficient for company stock in year t+1, see text and equation (1) for algorithm
explanatory variable	Toc_t		Quality of internal control	DIB China IPO Risk Control Evaluation Index for year *t*
intermediary variable	TOP_t		Shareholding ratio of major shareholders	Shareholding of the company's largest shareholder in year *t*
irrelevant variable	$Ctrl_t$	Lev_t	gearing	Total liabilities/total assets of stock *i* in year *t*
		Soe_t	Nature of business	Dummy variable, 1 if stock *i* corresponds to a listed company that

				is a state-owned enterprise, 0 otherwise
		$Size_t$	Enterprise size	The natural logarithm of stock *i*'s total assets in year *t*
		Roa_t	return on total assets	Net profit/total assets of stock *i* in year *t*

4.3 Modeling

On the basis of the theoretical analysis mentioned above, we set up an econometric model (3) for benchmark regression test:

$$Risk\_C_{i,t} = \alpha_0 + \alpha_1 Toc_{i,t} + \alpha_2 TOP_{i,t} + \beta_1 Lev_{i,t} + \beta_2 Soe_{i,t} + \beta_3 Size_{i,t} + \beta_4 Roa_{i,t} + \varepsilon_{Risk\_C} \quad (3)$$

An econometric model (4) is set up on top of the baseline model (3) for the mediation effect test:

$$TOP_{i,t} = \gamma_0 + \gamma_1 Toc_{i,t} + \beta_1' Lev_{i,t} + \beta_2' Soe_{i,t} + \beta_3' Size_{i,t} + \beta_4' Roa_{i,t} + \varepsilon_{TOP} \quad (4)$$

In the model, ***i*** represents firms, ***t*** represents year, and ***ε*** is the error term. The explanatory variables ***Risk_C*** represent ***NCSKEW*** and ***DUVOL*** in period ***t***, which measure the risk of stock price collapse. The model also controls for the gearing ratio (***Lev***), dummy variables (***Soe***), firm size (***Size***), and property rights attributes (***Soe***, taking values of 0 or 1). The main focus is on the regression coefficients ***α1*** and ***γ1***. A negative ***α1*** suggests that improved internal control reduces the risk of stock price collapse, while a non-zero ***γ1*** indicates the impact of internal control on the proportion of major shareholders' shareholding, warranting further testing.

5 Empirical results

5.1 Descriptive statistical analysis

Table 2 presents the descriptive statistics of the main variables in the paper. The distribution of all other variables is within reasonable range.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max.
NCSKEW	25733	-.333	.746	-2.538	1.802
DUVOL	25733	-.216	.49	-1.429	1.064
Toc	24920	6.467	.143	5.708	6.697
TOP	25733	.336	.148	.003	.900
Lev	25733	.428	.204	.06	.907
Soe	25733	.342	.474	0	1
Size	25733	22.294	1.297	19.888	26.302
Roa	25733	.032	.069	-.322	.192

5.2 Correlation analysis

Table 3 shows significant correlations between the main variables. Both stock price crash risk indicators are in good agreement (correlation coefficient ≈ 0.886). The proportion of majority shareholders' ownership (***TOP***) is negatively correlated with crash risk (***NCSKEW*** and ***DUVOL***), consistent with previous finding. Similarly, internal control quality (***Toc)*** is negatively correlated with crash risk, supporting hypothesis H1.

Table 3. Correlation statistics

	NCSKEW	DUVOL	Toc	TOP	Lev	Soe	Size	Roa
NCSKEW		.886***	-.035***	-.005*	-.015**	-.023***	-.006	.020***
DUVOL	.886***		-.043***	-.006*	-.013**	-.015**	-.018***	.010
Toc	-.035***	-.043***		-.151***	-.029***	.064***	.179***	.411***
TOP	-.005*	-.006*	-.151***		.048***	.227***	.163***	.127***
Lev	-.015**	-.013**	-.029***	.048***		.259***	.499***	-.416***
Soe	-.023***	-.015**	.064***	.227***	.259***		.351***	-.141***
Size	-.006	-.018***	.179***	.163***	.499***	.351***		-.037***
Roa	.020***	.010	.411***	.127***	-.416***	-.141***	-.037***	

Note : Lower triangles are Pearson's correlation coefficients, upper triangles are Spearman's correlation coefficients; ***, **, and * represent significance at the 1%, 5%, and 10% levels, respectively.

5.3 Regression analysis

Benchmark regression tests

Columns (1) and (2) of Table 4 report the results of the univariate test of hypothesis H1. The coefficient of internal control quality (***Toc***) in model (3) is negative and significant at the 1% level, indicating that internal control quality can significantly affect the risk of stock price collapse. It is initially hypothesized that increasing the number of variables can effectively increase the fit of the model. The low R^2 does not affect the conclusions of this paper.

Table 4. Regression analysis

	(1)	(2)	(3)
VARIABLES	NCSKEW	DUVOL	TOP
Toc	-0.125***	-0.086***	5.113***
	(-3.530)	(-3.700)	(7.702)
Lev	-0.005	0.005	-2.351***
	(-0.146)	(0.231)	(-4.005)
Soe	-0.035***	-0.008	4.745***
	(-3.021)	(-1.024)	(22.214)
Size	0.001	-0.008**	1.000***
	(0.266)	(-2.504)	(11.033)
Roa	0.101	-0.006	27.291***
	(1.182)	(-0.114)	(17.166)
Constant	0.316	0.419***	-21.006***
	(1.336)	(2.702)	(-4.751)
Observations	24,920	24,920	24,920
R-squared	0.034	0.040	0.156

Note: ***, ** and * represent significant at the 1%, 5% and 10% levels, respectively.

Tests for mediating effects

Column (3) of Table 4 reports the results of the univariate test of the quality of firms' internal control (***Toc***) on the percentage of majority shareholders' ownership (***TOP***). In addition, an increase in corporate financial leverage (***Lev***) significantly reduces the proportion of majority shareholders' ownership, which is consistent with the principle of risk aversion and increases the reliability of model (4).

5.4 Hypothesis testing

Test of hypothesis H1

From Table 4, the regression coefficients of internal control (***Toc***) on the risk of stock price collapse (***NCSKEW, DUVOL***) are all negative and significant at 1% level. It implies that hypothesis H1 is valid.

Testing of hypothesis H2

From Table 4, the regression coefficient of corporate internal control quality (***Toc***) on the proportion of majority shareholders' ownership (***TOP***) is positive, supporting hypothesis H2. This suggests that as internal control improves, the proportion of majority shareholders' ownership decreases. It indicates an overall improvement in internal control quality in Chinese listed companies over the past decade, leading to more reasonable equity distribution.

According to Feng et al. (2012), major shareholders' shareholding negatively impacts stock price collapse risk through the "monitoring effect" and the "less-shorting effect".

6 Conclusions

The study reveals two key findings: 1) Improving internal control quality in listed firms reduces the risk of stock price collapse. 2) High-quality internal control reduces the risk by increasing the shareholding of major shareholders. The study extends the understanding of internal control's role in the stock price collapse risk mechanism and explores the mediating effect of major shareholders' shareholding. It provides valuable insights for listed companies' risk management. Based on these findings, the paper suggests: 1) Continuously enhance internal control systems and evaluation mechanisms to improve control effectiveness. 2) Implement mechanisms to supervise and regulate major shareholders' shareholding, limiting their significant investment and divestment to reduce the risk of stock price collapse.

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