JOURNAL OF EASTERN EUROPEAN AND CENTRAL ASIAN RESEARCH
Vol.11 No.3 (2024)

INSTITUTIONAL INVESTOR ASSOCIATION AND STOCK PRICE CRASH RISK: EVIDENCE FROM CHINA

Li Zhao
International College of Digital Innovation, Chiang Mai University, Chiang Mai, Thailand
School of Business, Chengdu University, Chengdu, 610106, China

Nathee Naktnasukanjn
International College of Digital Innovation, Chiang Mai University, Chiang Mai, Thailand

Ahmad Yahya Dawod
International College of Digital Innovation, Chiang Mai University, Chiang Mai, Thailand

Xuemei Zhang
Social Science Department, Chengdu University, Chengdu, China

ABSTRACT

This study investigates the relationship between institutional investor association and stock price crash risk, using data from all listed non-financial sector companies in the Chinese capital market. The findings indicate a significant positive correlation between institutional investor association and stock price crash risk. Moreover, property rights and agency costs play significant moderating roles in this relationship. Specifically, the impact of institutional investors on stock price crash risk is more pronounced in non-state-owned enterprises (non-SOEs) than in state-owned enterprises (SOEs). Furthermore, this impact is more pronounced in firms with high agency costs and prominent agency problems compared to firms with low agency costs. This research contributes to financial regulators being able to identify better and prevent stock price crashes, ensuring the stability of investors' returns from their invested enterprises.

Keywords: Investor Association; Stock Price Crash; Property Rights; Agency Cost; Principal-Agent

DOI: https://doi.org/10.15549/jeecar.v11i3.1586

INTRODUCTION

Since the start of the 21st century, the global real economy and financial markets have experienced escalating volatility. Maintaining stability in the capital markets has drawn increasing attention from people around the world, as the stock market has become a more important factor in individual investments, corporate financing, and promoting orderly capital flow in society. Due to its significance,

however, every major fluctuation in the stock market can have a significant impact on a national economy. Events like the stock market crash in 2008 and the situation in which thousands of stocks hit their lower limit in the second half of 2015 resulted in severe economic losses for both listed companies and investors and also had negative implications for social stability. Global financial markets also were significantly and permanently impacted by the COVID-19 pandemic outbreak that occurred in late 2019. The virus spread quickly over the world, resulting in significant economic disruptions, heightened volatility, and hitherto unheard-of levels of uncertainty; the probability of a stock price crash increased as a result (Nhamo et al., 2020). Indeed, in 2020, stock markets in over 10 countries experienced circuit breakers, which are triggered when prices fall precipitously and quickly.

On February 3, 2020, the first day of trading in China, the Shanghai Stock Exchange saw 3,000 stocks hit their lower limit, with the index falling by 229.92 points, a decline of 7.72%. This marked the most significant single-day decline in the five years since the 2015 stock market crash. In 2023, during its annual work conference, the China Securities Regulatory Commission (CSRC) proposed fully implementing a registration-based system for stock issuance (Liu et al., 2020). According to the overall implementation plan approved by the central leadership and the State Council, efforts will be made to solidly and meticulously carry out tasks such as formulating and revising institutional rules, transferring firms in the approval process, preparing technical systems, transforming supervision, and preventing corruption and risks. The aim is to mobilize the entire system to smoothly implement this significant reform that affects the overall capital market. Steady progress will be made in opening up the capital market and deepening connectivity with overseas markets. The importance of a stable stock market in preventing and resolving significant financial risks, therefore, is self-evident.

This study focuses on all non-financial sector listed firms in the Chinese capital market from 2004 to 2021. Drawing on Crane's (2019) approach, it constructs an institutional investor network based on whether two randomly selected institutional investors jointly hold shares in a listed company. Subsequently, the study identifies groups within this network formed by institutional investor associations. The research findings reveal: ① a significant positive correlation between the proportion of institutional investor association holdings and a company's future stock price crash risk; and ② the nature of property rights and corporate agency costs significantly moderate the impact of institutional investor association holdings on a company's future stock price crash risk. Notably, the influence of institutional investor holdings on a company's future stock price crash risk is more pronounced in privately owned enterprises and higher agency cost environments.

LITERATURE REVIEW AND HYPOTHESIS

Institutional investor association and stock price crash risk

Classical theories in financial investment science tend to treat informed traders as homogeneous individuals whose trading behaviors are independent. However, in 2020, stock markets in over 10 countries experienced circuit breakers, which are triggered by rapid and precipitous price declines. These theories do not account for cooperation or herding effects among informed traders (Kyle, 1985). In reality, institutional investors, as informed traders, tend to share information and act collectively, influencing the stock prices of companies. This raises the question: how does the association of institutional investors affect the future risk of a company's stock price crash compared to the independence of institutional investors?

First, institutional investors are linked to each other in a committee-like group; each institution, as a member of the committee, must comply with the common rules, and the committee as a whole must send a unified voice to the outside world. Consequently, this unavoidably diminishes the autonomy of individual institutions, thereby diminishing the effectiveness of incorporating private information from each member into stock prices. This occurs through a reduction in competitive transactions among institutions, adversely affecting the efficiency of stock price information, which will lead to an increase in the probability that bad news about the company will be concealed, accumulated, and released centrally, and the degree of information asymmetry of the company will be further strengthened. When bad news accumulates to a

certain extent and has to be released, institutional investors, as informed traders, tend to learn in advance that the bad news is exposed. To avoid potential huge losses caused by a significant drop in the stock price, they as a group tend to flee (sell), prompting the stock price to plunge in the short term and causing a severe stampede, which enhances the possibility of a future price crash.

Second, institutional investors primarily rely on two governance mechanisms, namely "exit threat" and "voice," to influence the corporations in which they hold stocks. "Voice" as a governance mechanism requires institutional investors to have a long-term value investment perspective. In U.S. capital markets, institutional investors can reduce the efficiency of the "exit threat" governance mechanism while enhancing the effectiveness of "voice." However, in the specific context of the Chinese Capital Market, institutional investors generally have lower overall ownership and tend to be short-sighted. Therefore, compared to "voice," institutional investors in China are more capable and willing to exercise the governance mechanism of "exit threat." When institutional investors form alliances, though, the important governance mechanism of "exit threat" is weakened, and the ability of institutional oversight to improve corporate governance systems is reduced. As a result, Hypothesis 1 is as follows.

Hypothesis 1(H1): The higher the proportion of institutional investors associated, the higher the future stock price crash risk.

The moderator role of property rights

Combined with the specific situation of China, state-owned enterprises (SOEs) occupy a considerable proportion and play an essential role in the national economy. Moreover, the state is the actual helmsperson of SOEs and can supervise and control them using administrative orders, and the major shareholders of the state inevitably constrain institutional investors' supervision of their shareholdings in SOEs. Institutional investors in China are late in their development, and their shareholdings are low, so it is difficult for them to compete with the large state-owned shareholders. Therefore, institutional investors have more influence on the corporate governance and stock price of private enterprises than SOEs. Because SOEs play a dual role in maintaining social stability and profitability in the national economy, the performance of SOEs is inconsistently evaluated. The inconsistent evaluation criteria may, to a certain extent, lead to a more serious "insider governance" problem, which leads to Hypothesis 2.

Hypothesis 2(H2): The positive effect of institutional investor association on future stock price crash risk is more significant in non-state-owned enterprises (non-SOEs) than in state-owned enterprises (SOEs).

The moderator role of agency costs

According to principal-agent theory, there will be an agency problem of moral hazard and adverse selection between management and shareholders. Management will deliberately conceal bad news for reasons such as performance evaluation, option exercise, or job promotion, and the more severe the agency problem, the greater the risk of such concealment and the more pronounced the external governance role that institutional investors can play. Therefore, if an institutional investor association can improve corporate governance and reduce the risk of a firm's future stock price crash, this effect is more pronounced in firms with high agency costs; similarly, if an institutional investor association exacerbates the risk of a firm's future stock price crash, this effect is magnified in firms with high agency costs. This leads to Hypothesis 3.

Hypothesis 3(H3): The impact of institutional investor association on future stock price crashes is more significant in enterprises with high agency costs than in enterprises with low agency costs.

The three hypotheses are summarized in Figure 1.

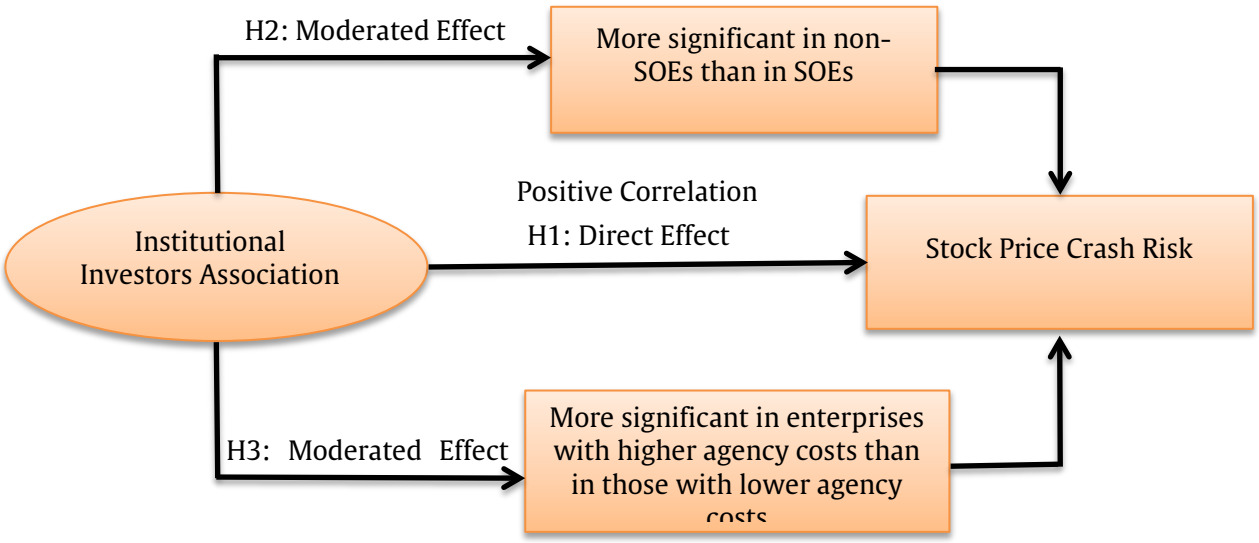

Figure 1: Hypothesis framework.
Source: authors' finding.

DATA AND METHODOLOGY

Data and sample selection

The sample initially included all A-share Chinese firms listed on the Shenzhen and Shanghai stock exchanges spanning the period from 2004 to 2021. Detailed data about institutional investors were obtained from the China Financial Database (WIND), while other data were collected from the China Stock Market and Accounting Research Database (CSMAR). Stata 17 (statistical software for data science) was used for the empirical analysis.

The sample data selection process adhered to specific industry criteria to ensure accuracy and reliability. First, financial listed firms were excluded, followed by the removal of missing or anomalous data. Furthermore, ST (Special Treatment), *ST (A Shares with Special Treatment), and PT (Particularly Troubled) samples, along with companies experiencing operational issues, were omitted due to their consecutive losses and significant impact of major information on stock prices, as well as their distinct 5% fluctuation limit which differs from regular stocks. Moreover, observations with fewer than 30 annual weekly returns and missing variables were also excluded. Consequently, 16,878 firm-year observations remained in the final sample. Additionally, to mitigate the impact of extreme outliers on study outcomes, all continuous variables were minorized at the head and tail 1% positions.

Definition of variables

Dependent Variable: stock price crash risk

Referring to the literature, including Kim et al. (2011), Cheng et al. (2020), Feng et al. (2022), and Wu et al. (2022), this paper constructs stock price crash data using three key indicators: NCSKEW, DUVOL, and CRASH_COUNT, as depicted in Figure 2. NCSKEW and DUVOL, widely adopted in academia, are selected to quantify stock price crash risk. These two indicators positively correlated with stock price crash risk, reflecting higher crash risk as NCSKEW and DUVOL values increase. According to Callen and Fang's (2015) methodology, the difference between the frequency of upward and downward movements in stock returns CRASH_COUNT serves as a robustness test proxy for a firm's potential stock price crash risk. This variable demonstrates a positive correlation with stock price crash risk, indicating a higher frequency of crashes with larger CRASH_COUNT values (Li et al. 2022).

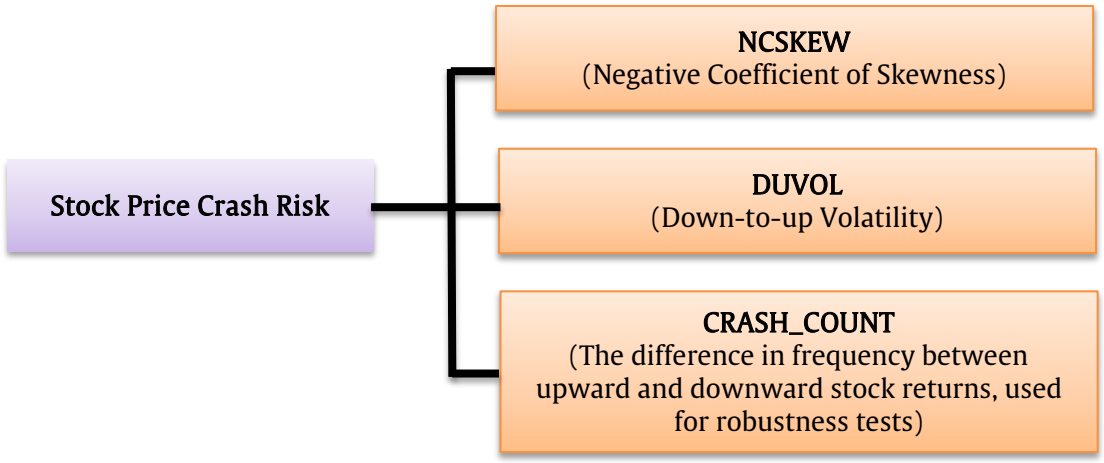

Figure 2: Quantification of stock price crash risk as a Dependent Variable.
Source: authors' finding.

Independent Variable: Institutional investor association

Drawing on Bajo et al. (2020), an institutional investor network is constructed based on whether any two institutional investors jointly hold a significant number of stocks in any one firm, and then groups of institutional investors are identified from the network. Expressly: assuming two institutions are i and j respectively, if the number of stocks of at least one listed company jointly held by i and j as a percentage of the number of stocks outstanding at the end of quarter t is greater than or equal to 5%, i and j have established an association, $X_{i,j} = 1$; otherwise $X_{i,j} = 0$. On this basis, an adjacency matrix A representing two institutional investors is constructed. Subsequently, employing Equation (1), the institutional investor association network is derived from matrix A to compute the ratio of institutional investor group shareholding denoted as $CliqueOwnership_{i,t}$.

$$CliqueOwnership_{i,t} = \sum_{j=1}^{N} \lambda_{i,j,t} . CliqueInstitution_{j,t} \quad (1)$$

$CliqueOwnership_{i,t}$ signifies the ratio of institutional investors' group shareholdings among institutions holding stocks in firm *i* in year *t*. It operates as a binary variable: it equals 1 when institution *j* is part of an association group; otherwise, it is 0. $\lambda_{i,j,t}$ represents the proportion of stocks of firm *i* held by institution *j* relative to the outstanding stocks of firm *i* in year *t*. In addition, CliqueHerfindahl and CliqueOwnTop1 quantify the concentration within institutional investor associations. CliqueHerfindahl signifies the Herfindahl index, calculated by summing the squared shareholdings of all group members. CliqueOwnTop1 indicates the most prominent shareholding among the group members. Figure 3 depicts the quantification of institutional investor association as an independent variable.

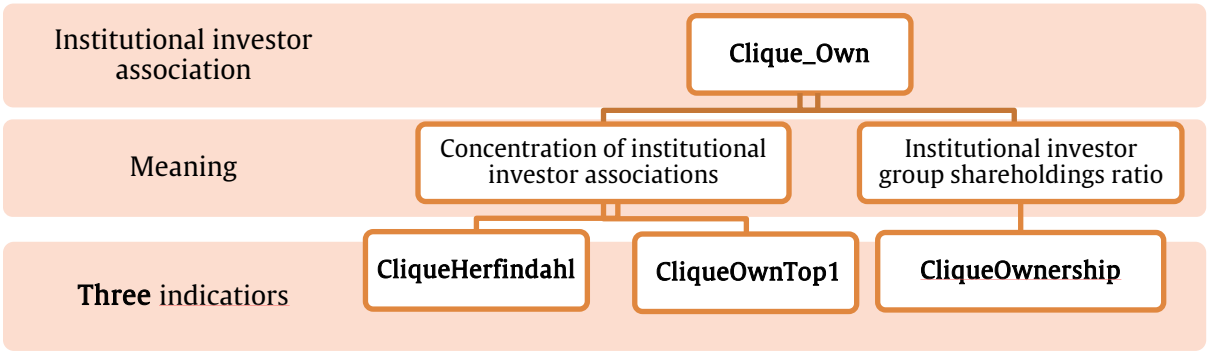

Figure 3: Quantification of Institutional Investor Affiliation as an Independent Variable.
Source: authors' finding.

Drawing on previous studies (Xu et al., 2023; Huacheng Wang et al., 2015; Liu & Huang, 2019), this paper includes the following control variables in the regression analysis: the average excess turnover rate ($OTurnover_{i,t}$); the negative return skewness coefficient ($NCSKEW_{i,t}$); firm size ($SIZE_{i,t}$); the standard deviation of the firm's annual weekly return ($Sigma_{i,t}$); stock net asset book-to-market ratio ($BM_{i,t}$); stock annual average weekly return ($Ret_{i,t}$); information asymmetry ($AbsACC_{i,t}$); debt ratio ($Lev_{i,t}$); and return on assets ($ROA_{i,t}$).

Table 1 provides comprehensive definitions of these variables.

Table 1：Variable Definitions

Type of Variable	Variable Name	Symbol	Explanation of Variable
Dependent variable	Stock price crash risk in period t+1	Crash_Risk	1) NCSEKW: Calculated using the weighted average of comprehensive income and market capitalization. 2)DUVOL: Upside-downside volatility ratio of returns. 3)CRASH_COUNT: Measures the difference in one-year stock returns of the target company, which is positively correlated with stock price crash risk.
Independent variable	Institutional investor association	Clique_Own	Whether two institutional investors jointly hold a significant number of shares in a firm.
Mediator variables	Property rights	SOE	If the target company is a state-owned enterprise, SOE = 1; otherwise, SOE = 0.
	Agency costs	ME	If above the industry average Management Expense Ratio, ME = 1, otherwise, ME = 0.
Control variables	The negative coefficient of skewness in period t	NCSKEW	Detailed calculations are shown in Equation 3
	The average excess turnover rate	OTurnover	Trading Volume/Number of Outstanding Stocks
	Firm size	SIZE	Natural logarithm of the total number of company employees
	The standard deviation of the firm's annual weekly return	Sigma	$SQRT(\frac{\sum(\text{weekly returns} - \text{average return})^2}{number\ of\ week - 1})$
	Stock net asset book-to-market ratio	BM	Book Value of Equity / Market Capitalization
	Stock average annual weekly return	Ret	Total annual return / Number of weeks in a year
	Information asymmetry	AbsACC	formation asymmetry between affiliated stitutional investors and individual investors
	Debt ratio	Lev	Total Debt / Total Assets
	Return on Assets	ROA	Net Profit / Total Assets
	Industry and year	YearD/IndusttryD	Industry and year-fixed effects （dummy variables）

Source: authors' finding.

Models for empirical analysis

To test hypothesis 1, The following regression model (2) was established as follows:

$$Crash\_Risk_{i\,t+1} = \beta_0 + \beta_1 \text{Clique\_Own}_{i,t} + \beta_2 \text{Control}_{i,t} + \Sigma\text{IndustryD} + \Sigma\text{YearD} + \varepsilon_{i,t} \quad (2)$$

$Crash\_Risk_{i,t+1}$ represents the price crash risk of stock i in period t+1, replaced by $NCSKEW$ and $DUVOL$ in period $t+1$, and robustness tested with $CRASH\_COUNT$; $\text{Clique\_Own}_{i,t}$ represents three indicators measuring institutional investor association, replaced by $\text{CliqueOwnership}_{i,t}$, $\text{CliqueHerfindahl}_{i,t}$, and $\text{CliqueOwnTop1}_{i,t}$ to replace them, respectively. $\text{Control}_{i,t}$ is a set of control variables. Additionally, annual fixed effects $IndustryD$ and industry-specific fixed effects $YearD$ was controlled for using the China Securities Regulatory Commission (CSRC) industry code. $\varepsilon_{i,t}$ indicates a random event.

To test hypothesis 2, The following regression model (3) was established as follows:

$$Crash\_Risk_{i,t+1} = \beta_0 + \beta_1 \text{Clique\_Own}_{i\,t} + \beta_2 \text{SOE}_{i,t} + \beta_3 \text{SOE}\cdot\text{Clique\_Own}_{i,t} + \Sigma\text{IndustryD} + \Sigma\text{YearD} + \varepsilon_{i\,t} \quad (3)$$

The effect of institutional investor association on the future stock price crash risk of firms is more significant in non-SOEs relative to SOEs. To test hypothesis 2, a dummy variable SOE (Property Right) is constructed: if the target firm is a state-owned enterprise, SOE = 1; otherwise, SOE = 0. Hypothesis 2 is proved if the results of the regression indicate that β_3 is significantly negative.

To test hypothesis 3, The following regression model (4) was established as follows:

$$Crash\_Risk_{i,t+1} = \beta_0 + \beta_1 \text{Clique\_Own}_{i,t} + \beta_2 \text{ME}_{i,t} + \beta_3 \text{ME}\cdot\text{Clique\_Own}_{i,t} + \Sigma\text{IndustryD} + \Sigma\text{YearD} + \varepsilon_{i\,t} \quad (4)$$

The effect of institutional investor association on future stock price risk is more significant in firms with high agency costs than in firms with low agency costs. According to previous research (Ang et al., 2000; Jiang et al., 2020), the Management Expense Ratio is used to measure agency costs. The more prominent a firm's agency problem is, the higher is the Management Expense Ratio, and the Management Expense Ratio is compared with the average Management Expense Ratio of its industry: if it is greater than the average Management Expense Ratio of its industry, ME = 1; otherwise, ME = 0. Hypothesis 3 is proved if the results of the regression indicate that β_3 is significantly positive.

EMPIRICAL RESULTS

Descriptive Statistics

Table 2 reveals that the mean values of NCSKEW_{t+1} and DUVOL_{t+1} are -0.2272 and -0.1543, respectively, indicating that higher values correspond to a more left-skewed return distribution and increased stock price crash risk. The standard deviations for NCSKEW_{t+1} and DUVOL_{t+1}, at 0.6675 and 0.4715, respectively, suggest considerable variability in crash risk across the sample firms, aligning with findings from prior research.

The standard deviation of CRASH_COUNT_{t+1} is 0.5342, suggesting infrequent crashes. The average percentages of CliqueOwnership, CliqueHerfindahl, and CliqueOwnTop1 from 2004 to 2021 are 8.46%, 0.89%, and 4.71%, respectively, indicating an increase in their stock shares yet still significantly lower than those in developed Western capital markets.

Table 2: Descriptive statistics of main variables

Variables	N	Mean value	Intermediate values	Standard deviation	Minimum value	Maximum value
NCSKEW_{t+1}	16877	-0.2272	-0.1990	0.6675	-2,2629	1.6331
DUVOL_{t+1}	16875	-0.1543	-0.1526	0.4715	-1.3547	1.0660
CRASH_COUNT_{t+1}	16877	-0.1365	0.0000	0.5342	-2.0000	2.0000
Clique Ownership	16878	0.0846	0.0296	0.1241	0.0000	0.5800
Clique Heifindahlt	16878	0.0089	0.0005	0.0212	0.0000	0.1210

Table 2: Continued

Clique OwnToplt	16878	0.0471	0.0194	0.0651	0.0000	0.3064
Clique OwnRatiot	16878	0.5237	0.5739	0.3934	0.0000	1.0000
Clique HeifindahlRatiot	16847	0.0370	0.0073	0.0683	0.0000	0.4358
Clique OwnTopRatiot	16878	0.3750	0.3153	0.3344	0.0000	1.0000
$NCSKEW_t$	16878	-0.2451	-0.2116	0.7092	-3.9267	6.1580
$OTurnover_t$	16636	-0.3693	-0.0899	0.9849	-4.2470	0.7553
$Sigma_t$	16878	0.0512	0.0481	0.0199	0.0193	0.1236
Ret_t	16878	-0.0018	-0.0026	0.0075	-0.0187	0.0233
$Size_t$	16878	21.9139	21.7311	1.2248	19.7050	25.7746
BM_t	16878	0.5540	0.5359	0.2513	0.0981	1.1162
Lev_t	16878	0.4524	0.4580	0.2029	0.0511	0.8919
ROA_t	16877	0.0401	0.0373	0.0530	-0.1835	0.1936
$AbsACC_t$	16878	0.0966	0.0646	0.1092	0.0011	0.6948

Source: analysis result.

Hausman test

Table 3 presents the results of the Hausman test for the fixed-effects and random-effects models. The test statistic of 1264 with 10 degrees of freedom and a p-value of 0 strongly rejects the null hypothesis of model equivalence. This suggests that the fixed-effects model is more appropriate for the data than the random-effects model.

The "Difference" column shows the differences in coefficient estimates between the two models. Notably, for most variables, the differences are not significant, indicating that there is no serious endogeneity problem. However, for the "Ret" variable, the difference in coefficient estimates (-1.068) is large and statistically significant. This indicates that the "Ret" variable may be subject to endogeneity.

Table 3: Hausman test

Variables	**(b)**	**(B)**	**(b-B)**	**Sqrt(diag(Vb -VB))**
Coefficients	fe	re	Difference	S.E.
CliqueOwnership	0.430	0.555	-0.125	0.035
NCSKEW	-0.075	0.030	-0.105	0.003
OTurnover	0.019	0.022	-0.004	0.002
Sigma	-2.992	-2.569	-0.424	0.190
Ret	-0.727	0.341	-1.068	0.256
Size	-0.044	-0.048	0.004	0.007
BM	-0.542	-0.399	-0.142	0.023
Lev	-0.003	0.070	-0.073	0.047
ROA	-0.343	-0.371	0.028	0.085
AbsACC	0.153	0.149	0.004	0.025
Test statistic	1264			
P-value (Prob>chi2)	0			

Note: S.E.: Standard Errors associated with the differences.

Source: analysis result.

Multiple Regression Analysis

Hypothesis 1 Regression results and analysis

Table 4 illustrates the impact of institutional investor association on stock price crashes. NCSKEW and DUVOL serve as metrics to quantify the stock price crash. Meanwhile, CliqueOwnership, CliqueHerfindahl, and CliqueOwnTop1 are utilized as measures for institutional investor association. The regression coefficient is 0.5562 for CliqueOwnership and NCSKEW, and 0.3907 for CliqueOwnership and DUVOL. Both sets of data are statistically significant at the 1% level. Similarly, the regression coefficient is 1.9924 for CliqueHerfindahl and NCSKEW, and 1.4722 for CliqueHerfindahl and DUVOL, both significant at the 1% level. In addition, the regression coefficient is 0.8949 for CliqueOwnTop1 and NCSKEW, and 0.6009 for CliqueOwnTop1 and DUVOL, both significant at the 1% level.

The regression results indicate a significant positive relationship between institutional investor association and stock price crashes. This suggests that institutional investors, rather than fulfilling an external monitoring role in stock price crashes, undermine the efficiency of stock price information by hindering competition among themselves and preventing adverse news from influencing stock prices. This supports the validity of hypothesis 1.

Table 4: Multiple Regression for Hypothesis 1

Variables	(1)	(2)	(3)	(4)	(5)	(6)
	NCSKEW	DUVAL	NCSKEW	DUVAL	NCSKEW	DUVAL
CliqueOwnership	0.5562***	0.3907***				
	(11.4474)	(11.3229)				
NCSKEW	0.0356***	0.0242***	0.0417***	0.0282***	0.0382***	0.0263***
	(4.6654)	(4.4903)	(5.4529)	(5.2433)	(5.0147)	(4.8853)
OTurnover	-0.0016	-0.0041	-0.0025	-0.0047	-0.0020	-0.0045
	(-0.2280)	(-0.8750)	(-0.3669)	(-0.9863)	(-0.2857)	(-0.9581)
Sigma	0.8930**	0.3718	0.9410**	0.4038	0.8550**	0.3496
	(2.1289)	(1.2352)	(2.2325)	(1.3353)	(2.0348)	(1.1586)
Ret	2.0232**	1.4183**	2.6593***	1.8338***	2.2973***	1.6497***
	(2.3722)	(2.3125)	(3.1323)	(3.0021)	(2.6989)	(2.6986)
Size	-0.0304***	-0.0310***	-0.0161**	-0.0213***	-0.0220***	-0.0246***
	(-4.2382)	(-6.0599)	(-2.2953)	(-4.2830)	(-3.1516)	(-4.9195)
BM	-0.2218***	-0.1400***	-0.2869***	-0.1834***	-0.2600***	-0.1697***
	(-5.4906)	(-4.7895)	(-7.2414)	(-6.3939)	(-6.5646)	(-5.9038)
Lev	-0.0379	-0.0454*	-0.0397	-0.0467*	-0.0362	-0.0443*
	(-1.0898)	(-1.8254)	(-1.1301)	(-1.8644)	(-1.0390)	(-1.7770)
ROA	-0.2796**	-0.2412***	-0.1583	-0.1597*	-0.2394**	-0.2072**
	(-2.3100)	(-2.7824)	(-1.3025)	(-1.8345)	(-1.9723)	(-2.3787)
AbsACC	0.1203**	0.0512	0.1186**	0.0497	0.1126**	0.0460
	(2.5417)	(1.4928)	(2.4949)	(1.4452)	(2.3819)	(1.3422)
CliqueHerfindahl			1.9924***	1.4722***		
			(7.6470)	(7.7817)		
CliqueOwnTop1					0.8949***	0.6009***
					(10.0822)	(9.5387)
Constant	0.4990***	0.5831***	0.2457*	0.4123***	0.3424**	0.4641***
	(3.4883)	(5.7412)	(1.7434)	(4.1335)	(2.4439)	(4.6532)
Observations	16,634	16,632	16,634	16,632	16,634	16,632
R-squared	0.085	0.087	0.082	0.084	0.084	0.085

Note: ***, ** and * represent 1%, 5% and 10% significance levels, respectively, with corresponding t-values provided in parentheses.

Source: analysis result.

Hypothesis 2 Regression results and analysis

Hypothesis 2 examines the moderating effect of property rights nature, specifically positing that the correlation between institutional investor association and a firm's risk of future stock price crashes is more pronounced in non-SOEs than in SOEs. The presence of substantial SOE shareholders and policy directives within SOEs constrain the impact of institutional investors on firms. Due to space constraints, only CliqueOwnership is employed in the regressions to gauge institutional investor association (additional regressions for CliqueHerfindahl and CliqueOwnTop1 yield equally significant results).

The interaction term between CliqueOwnership and SOE shows a significant negative effect. As shown in Table 5, The coefficients for this interaction with NCSKEW, DUVAL, and CRASH_COUNT are -0.2089 (significant at 1%), -0.1105 (significant at 5%), and -0.178 (significant at 1%), respectively. This implies that the presence of SOEs mitigates the impact of institutional investor associations on the risk of future stock price crashes. Hypothesis 2 has been rigorously tested.

Table 5: Multiple Regression for Hypothesis 2

Variables	(1)	(2)	(3)
	NCSKEW	DUVAL	CRASH_COUNT
CliqueOwnership	0.6717***	0.4518***	0.4589***
	(11.3080)	(10.3679)	(9.5399)
c.CliqueOwnership#c.SOE	-0.2089***	-0.1105**	-0.1780***
	(-3.3090)	(-2.3090)	(-3.5079)
NCSKEW	0.0351***	0.0239***	0.0140**
	(4.6001)	(4.4389)	(2.2822)
OTurnover	-0.0000	-0.0033	-0.0017
	(-0.0051)	(-0.7018)	(-0.2858)
Sigma	0.8369**	0.3420	0.8098**
	(1.9933)	(1.1354)	(2.4489)
Ret	2.0325**	1.4233**	0.8481
	(2.3833)	(2.3210)	(1.2204)
Size	-0.0281***	-0.0297***	-0.0132**
	(-3.8834)	(-5.7744)	(-2.2025)
BM	-0.2256***	-0.1421***	-0.1117***
	(-5.5848)	(-4.8566)	(-3.5295)
Lev	-0.0341	-0.0434*	-0.0039
	(-0.9810)	(-1.7454)	(-0.1422)
ROA	-0.2862**	-0.2446***	-0.1386
	(-2.3628)	(-2.8223)	(-1.4568)
AbsACC	0.1185**	0.0501	0.0750**
	(2.5055)	(1.4640)	(1.9985)
Constant	0.4508***	0.5577***	0.1476
	(3.1321)	(5.4525)	(1.2425)
Observations	16,634	16,632	16,634
R-squared	0.086	0.087	0.046

Note: ***, ** and * represent 1%, 5% and 10% significance levels, respectively, with corresponding t-values provided in parentheses.

Source: analysis result.

Hypothesis 3 Regression results and analysis

Hypothesis 3 further investigates the moderating effect of agency costs, suggesting that the influence of institutional investor associations on the risk of future stock price crashes is more pronounced in firms characterized by high agency costs and prevalent Principal-agent problems, as opposed to firms with lower agency costs. Heightened agency costs within a firm signal a more substantial principal-agent problem, providing institutional investors with greater opportunities to exert influence. Due to the constraints in the available space, the analysis relies solely on CliqueOwnership to quantify institutional investor associations in the regressions, although additional regressions for CliqueHerfindahl and CliqueOwnTop1 yield similarly significant results. This study prioritizes the examination of CliqueOwnership and SOE in evaluating the moderating effects to enhance the robustness of the results.

Table 6 reveals a notably positive and significant interaction between CliqueOwnership and ME. The coefficients for this interaction with NCSKEW, DUVAL, and CRASH_COUNT are 0.1710 (significant at 1%), 0.1032 (significant at 5%), and 0.1364 (significant at 1%), respectively. These findings suggest that heightened agency problems within a firm correspond to an increased influence of institutional investor association on the firm's future stock price crash risk, thus supporting the validation of hypothesis 3.

Table 6: Multiple Regression for Hypothesis 3

Variables	(1)	(2)	(3)
	NCSKEW	DUVAL	CRASH_COUNT
CliqueOwnership	0.4814***	0.3456***	0.3009***
	(8.6922)	(8.6697)	(6.7143)
c.CliqueOwnership#c. ME	0.1710***	0.1032**	0.1364***
	(2.8814)	(2.3489)	(2.8137)
NCSKEW	0.0354***	0.0240***	0.0142**
	(4.6312)	(4.4591)	(2.3177)
OTurnover	-0.0014	-0.0040	-0.0028
	(-0.2052)	(-0.8557)	(-0.4891)
Sigma	0.8683**	0.3570	0.8379**
	(2.0701)	(1.1865)	(2.5345)
Ret	2.0581**	1.4394**	0.8680
	(2.4108)	(2.3461)	(1.2475)
Size	-0.0295***	-0.0304***	-0.0145**
	(-4.0962)	(-5.9312)	(-2.4379)
BM	-0.2216***	-0.1400***	-0.1083***
	(-5.4807)	(-4.7838)	(-3.4250)
Lev	-0.0312	-0.0414*	-0.0018
	(-0.8940)	(-1.6581)	(-0.0641)
ROA	-0.2675**	-0.2339***	-0.1233
	(-2.2088)	(-2.6958)	(-1.2972)
AbsACC	0.1222***	0.0523	0.0780**
	(2.5800)	(1.5259)	(2.0791)
Constant	0.4753***	0.5688***	0.1698
	(3.3170)	(5.5844)	(1.4450)
Observations	16,634	16,632	16,634
R-squared	0.085	0.087	0.045

Note: ***, ** and * represent 1%, 5% and 10% significance levels, respectively, with corresponding t-values provided in parentheses.
Source: analysis result.

Robustness test

Substitution of key variables

Table 7 presents the relationship between FCRASH_COUNT and explanatory variables, affirming the model's robustness with CRASH_COUNT as a proxy for Crash Risk (Wu et al. 2022). Model 1 demonstrates a significant positive correlation between CRASH_COUNT and CliqueOwnership, with a regression coefficient of 0.3606, supporting hypothesis 1 In Model 2, the addition of CliqueHerfindahl results in a significant relationship, evidenced by a coefficient of 1.3484, reinforcing hypothesis 2 Model 3, replacing CliqueHerfindahl with CliqueOwnTop1, establishes a considerable correlation, with a coefficient of 0.6201, validating hypothesis 3.

Table 7: Substitution of variables CRASH_COUNT to Crash Risk

Variables	(1)	(2)	(3)
	FCRASH_COUNT	FCRASH_COUNT	FCRASH_COUNT
CliqueOwnership	0.3606***		
	(8.9934)		
NCSKEW	0.0144**	0.0182***	0.0156**
	(2.3501)	(2.9630)	(2.5599)
OTurnover	-0.0030	-0.0035	-0.0030
	(-0.5103)	(-0.5984)	(-0.5230)
Sigma	0.8576***	0.8871***	0.8267**
	(2.5969)	(2.6802)	(2.5000)
Ret	0.8401	1.2274*	0.9622
	(1.2091)	(1.7724)	(1.3830)
Size	-0.0152**	-0.0063	-0.0106*
	(-2.5740)	(-1.0880)	(-1.8383)
BM	-0.1084***	-0.1488***	-0.1291***
	(-3.4326)	(-4.8303)	(-4.1894)
Lev	-0.0072	-0.0084	-0.0060
	(-0.2602)	(-0.3013)	(-0.2167)
ROA	-0.1330	-0.0572	-0.1151
	(-1.3991)	(-0.6052)	(-1.2127)
AbsACC	0.0766**	0.0753**	0.0712*
	(2.0382)	(2.0023)	(1.8966)
CliqueHerfindahl		1.3484***	
		(6.4214)	
CliqueOwnTop1			0.6201***
			(8.4657)
Constant	0.1886	0.0300	0.1002
	(1.6096)	(0.2617)	(0.8766)
Observations	16,634	16,634	16,634
R-squared	0.045	0.043	0.045

Note: ***, ** and * represent 1%, 5% and 10% significance levels, respectively, with corresponding t-values provided in parentheses.
Source: analysis result.

CONCLUSIONS

To examine the impact of institutional investors on companies' future stock price crash risk. From the perspective of institutional investors, they are affiliated, and independent investors are not. First, a significant positive correlation between institutional investors and stock price crashes was found, indicating that the

higher the degree of association, the greater the risk of future stock price crashes for the company. This suggests that institutional investors do not fulfill an external monitoring role from the perspective of stock price crashes. On the contrary, they impede competition among institutional investors, obstruct the impact of negative news on stock prices, and diminish stock price information efficiency. Second, the potential moderating effects of property rights in the context of China were examined. The results show that the impact of institutional investors on future stock price crash risk is more significant in non-SOEs than in SOEs. In SOEs, the presence of state-owned controlling shareholders and policy-driven directives suppress the influence of institutional investors on the company. Furthermore, the study connects with classical agency theory, assessing the moderating role of agency costs. The findings indicate that the impact of institutional investors on future stock price crash risk is more pronounced in enterprises with high agency costs and prominent agency problems compared to those with lower agency costs. Finally, the paper provides useful suggestions for national financial regulatory authorities in mitigating stock price crashes and offers insights for future scholars studying stock price crashes.

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ABOUT THE AUTHORS

Xumei Zhang, email: 276863381@qq.com (Corresponding Author)

Li Zhao is currently a lecturer at Chengdu University, China. She received a Bachelor's in Accounting from Huazhong University of Science and Technology in 2008, followed by a Master of Business Administration from Chongqing University of Technology in 2010. She is currently pursuing a Ph.D. in Digital Innovation and Financial Technology at Chiang Mai University starting in 2020. Her research interests include Quantitative Finance, General Finance, Portfolio Management, and Statistical Finance.

Dr. Nathee Naktnasukanjn is a lecturer at the International College of Digital Innovation, Chiang Mai University, Thailand. He got a D.B.A. (Doctor of Business Administration) in finance from the JDBA program joined by Thammasat University, Chulalongkorn University, and the National Institute of Development Administration(NIDA).

Asst. prof. Dr. Ahmad Yahya Dawod is currently a lecturer at the International College of Digital Innovation at Chiang Mai University, Thailand. He received his Ph.D. degree in Information Science and Technology from the National University of Malaysia in 2018 with the topic "Hand gesture recognition based on isolated and continuous sign language." He also graduated with his Master's degree in computing and informatics from the Multimedia University of Malaysia and his Bachelor's degree in computer science from the University of Mustansirya of Iraq. His research includes machine learning, pattern recognition, computer vision, robotics, and artificial intelligence. He had published 40 articles up to date with more than a hundred citations.

Prof. Dr. Xuemei Zhang has been a Full Professor at Chengdu University, China, since 2009. She completed her Ph.D. in engineering, specializing in systems engineering, at Southwest Jiaotong University in 2011. Additionally, she obtained a Master's degree in business management from the same university. With prior experience as Vice Dean of Southwest Jiaotong University's School of Tourism from 2001 to 2009, she passed extensive administrative expertise to her current role. Notably, in November 2020, she assumed the role of Director of Chengdu University's Social Science Department. Beyond her academic responsibilities, Xuemei Zhang is recognized as an expert in assessing science and technology projects in Sichuan Province, Chongqing, Suzhou, and Chengdu. She also served as an expert evaluator for the Social Science Awards in Sichuan Province and as a consultant to the Leshan Science and Technology Advisory Panel.