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The Role of Internal Control on the Impact of Common Institutional Ownership on Stock Price Crash Risk — Evidence from China's A-share Market

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Abstract— Stock price crash risk poses a threat to the stability of emerging capital markets, and this is particularly prominent in China' s A-share market–characterized by both weak investor protection mechanisms and dynamic institutional changes . Given this context, this study takes 1,318 Chinese A-share non-financial listed firms from 2013 to 2022 as the sample and comprehensively applies the System Generalized Method of Moments (System GMM), Bai-Perron multiple structural break test, Error Correction Model, and Granger causality test to explore the stock price crash risk-mitigating effect of common institutional ownership and the moderating role of internal control quality . The study finds that there are two significant structural breakpoints in the sample period (end of 2018 and mid-2020), dividing the research period into three phases; CIO' s risk-mitigating effect strengthens significantly phase by phase, and IC' s complementary moderating role also intensifies synchronously with institutional improvement. Additionally, the ECM verifies a stable long-term equilibrium relationship among the three variables, with the system converging rapidly to equilibrium after short-term deviations. Furthermore, the Granger causality test shows that CIO only becomes a significant Granger cause for suppressing crash risk after 2019, and IC further reinforces this causal chain. Breakpoint sensitivity tests, alternative indicator tests, and alternative model tests all confirm the robustness of the conclusions. This study extends the institutional complementarity theory, addresses the limitations of previous static analyses, and provides practical insights for regulatory authorities to seize the window of institutional reform and optimize market governance.

Keywords: Common institutional ownership; Internal control quality; Stock price crash risk; structural breakpoint.

I. INTRODUCTION

Stock price crash risk refers to the sudden and sharp decline in a firm's stock price triggered by the concentrated release of hidden negative information, a concept clearly defined by Jin & Myers (2006). It is not only a core source of market volatility but also a key constraint on the sustainable development of emerging economies. China's A-share market has distinct characteristics: the efficiency of investor protection is only 60% of that in mature markets, retail investor participation exceeds 60%, and institutional reforms are frequent. Previous events such as the 2015 stock market fluctuation and the 2021 default of high-leverage enterprises have all highlighted the impact of crash risk on market confidence. Therefore, identifying effective governance mechanisms has become a core concern of both academia and policy circles.

Common institutional ownership (CIO), relying on cross-institutional information sharing and collaborative supervision, can theoretically resolve the "free-rider dilemma" of individual institutional investors. It inhibits crash risk by improving information transparency and strengthening supervision intensity, a theoretical logic supported by the research of Admati & Pfleiderer (2009). Early empirical studies, such as Gaspar et al. (2005), have also confirmed that CIO can effectively reduce managerial opportunistic behavior. However, most of these studies adopt static empirical designs and ignore the profound institutional changes in China's capital market over the past decade—such as the implementation of the *New Securities Law* in 2019, which significantly strengthened information disclosure obligations; the post-pandemic policy adjustments in 2020, which raised corporate governance requirements; and the strengthened supervision in 2021 to curb short-term speculative behavior of institutions. These changes are likely to trigger structural mutations in the relationship between CIO and crash risk, making it difficult for static analyses to capture the dynamic evolution of governance effects.

There are still two major gaps in existing research: First, the research on the moderating role of internal control quality (IC) is insufficient. As a core mechanism of internal governance, IC improves information credibility by standardizing business processes and managing risks, a role verified by Doyle et al. (2007). Previous studies, such as Jiang et al. (2010), only mention that there may be a complementary effect between IC and CIO, but fail to answer "whether this complementarity changes with the institutional environment"—for instance, whether the stricter external supervision after 2019 enhances IC's amplifying effect on CIO's impact. This makes it difficult to clarify the boundary conditions of CIO's governance value. Second, the causal identification is not rigorous enough. The correlation between CIO and crash risk may be disturbed by endogeneity; for example, high-quality firms are more likely to attract CIO investment while also having lower crash risk. Although some studies use

System GMM to alleviate this problem, few have verified the causal relationship between the two and its stage dependence, which undoubtedly weakens the reliability of policy implications derived from empirical conclusions.

Based on the above research gaps, this study focuses on three key questions: First, does CIO's risk-mitigating effect exhibit structural changes? If so, what are the key breakpoints and driving factors? Second, how does IC moderate the relationship between CIO and crash risk? Does this moderating effect have stage differences? Third, does CIO have a causal impact on crash risk? Does this causal relationship depend on the institutional environment and IC level?

II. METHODOLOGY & DATA RESOURCE

II.I. METHODOLOGY

China's A-share market has undergone multiple rounds of critical institutional changes from 2013 to 2022, encompassing the implementation of the new Securities Law in 2019, the exogenous shock of the COVID-19 pandemic in 2020, and the intensified supervision over corporate governance in 2021. Such external shocks may trigger structural mutations in the relationship between "common institutional ownership and stock price crash risk," necessitating the adoption of dynamic analysis methods to capture the period-specific heterogeneity inherent in this relationship.

From the perspective of methodological adaptability, the System Generalized Method of Moments (System GMM) is well-suited to address endogeneity issues—specifically including the potential bidirectional causal relationship between common institutional ownership and stock price crash risk—while simultaneously characterizing the dynamic persistence of stock price crash risk (i.e., the path-dependent effect of lagged one-period crash risk on the current period's risk level). In contrast, structural break analysis enables the decomposition of heterogeneous differences in governance effects across distinct institutional environments, thereby avoiding the limitation of pooled full-sample regression that obscures the evolution of effects during critical periods due to neglecting inter-period variations.

To fully depict the dynamic linkage mechanism among variables, this study further incorporates the analytical dimension of long-term equilibrium and short-term adjustment mechanisms. By constructing an Error Correction Model (ECM), the research framework is refined to ensure that the conclusions are more aligned with the actual operating laws of China's capital market.

II.II. BASELINE DYNAMIC MODEL FORMULA

$$CR_{i,t} = \alpha_{i,t} + \beta_1 CIO_{i,t} + \beta_2 IC_{i,t} + \beta_3 (CIO_{i,t} * IC_{i,t}) + \gamma CR_{i,t-1} + X_{i,t}\delta + \varepsilon_{i,t} \quad (1)$$

Where:

$CR_{i,t}$ is the explained variable (stock price crash risk), measured by negative return skewness (NCSKEW) and down-to-up volatility ratio (DUVOL).

$CIO_{i,t}$ is the core explanatory variable (common institutional ownership), measured respectively by the logarithm of the number of common institutions (CIO1) and the average ratio of common institutional shareholdings (CIO2).

$IC_{i,t}$ is the moderating variable (internal control quality), measured by the Dibo Internal Control Index for Chinese listed companies; $CIO_{i,t} * IC_{i,t}$ is the interaction term of the two variables, used to test the moderating effect.

$CR_{i,t-1}$ is the one-period lagged stock price crash risk, which controls for the dynamic persistence of risk.

$X_{i,t}$ represents the set of control variables, including firm size (Size), leverage (Leverage), book-to-market ratio (BM), and stock price volatility (Sigma).

$\alpha_{i,t}$ denotes firm and time fixed effects; and $\varepsilon_{i,t}$ is the random error term.

II.III. STRUCTURAL BREAK PHASED MODEL (SUBSAMPLE REGRESSION)

Based on the results of structural break detection, the full sample is divided into multiple phases, and the above baseline model is regressed in phases. The key focus is to compare the differences in coefficients of β_1 (main effect of common institutional ownership) and β_3 (moderating effect of internal control quality) across different phases, so as to reveal the impact of institutional environment changes on governance effects. The model form is consistent with the full-sample baseline model, with only the sample period adjusted.

II.IV. ERROR CORRECTION MODEL FORMULA

To characterize the long-term equilibrium and short-term adjustment relationships among variables, an Error Correction Model (ECM) is constructed:

$$\Delta CR_{i,t} = \alpha + \lambda\, ECM_{i,t-1} + \sum_{k=1}^{p} \theta_k \Delta CIO_{i,t-k} + \sum_{k=1}^{p} \phi_k \Delta IC_{i,t-k} + \sum_{k=1}^{p} \phi_k \Delta (CIO * IC)_{i,t-k} + \mu_{i,t} \qquad (2)$$

Where

Δ denotes the first difference of variables.

$ECM_{i,t-1}$ is the error correction term, derived from the residuals of the long-term cointegration equation of common institutional ownership (CIO), internal control quality (IC), and stock price crash risk (CR).

λ is the adjustment coefficient—if significantly negative, it indicates that the system will converge to the equilibrium state when there is a short-term deviation from the long-term equilibrium.

p is the lag order, determined by the AIC and HQ criteria.

$\mu_{i,t}$ is the random error term.

III. DATA SOURCES

The sample includes non-financial A-share listed companies in China from 2013 to 2022. After excluding ST, *ST companies, and those with missing key data, a total of 13,180 firm-year observations from 1,318 companies are obtained. The data sources of core variables are as follows: Common institutional ownership (CIO1/CIO2) is obtained from the "Institutional Ownership - Co-ownership Topic" in the CSMAR database, where CIO1 is the logarithm of the annual number of common institutions plus 1 (to mitigate right skewness), and CIO2 is the annual average of quarterly common institutional shareholding ratios; Stock price crash risk (NCSKEW/DUVOL) is calculated based on weekly return data from the Wind database; Internal control quality (IC) is measured by the Dibo Internal Control Index of Chinese listed companies (range: 0–941.31); Control variables are all from the CSMAR database, where firm size is the logarithm of total assets, leverage is the asset-liability ratio, and stock volatility is the annualized standard deviation of weekly returns.

IV. EMPIRICAL ANALYSIS

IV.I. BREAKPOINT DETECTION AND BASIC TESTS

IV.I.I. PREPARATION OF MODEL

Before conducting core empirical tests, three key data preprocessing steps are implemented to ensure the reliability and validity of the analysis: First, a stationarity test is conducted. The Augmented Dickey-Fuller (ADF) unit root test is applied to all continuous variables. The results show that after first differencing, variables including common institutional ownership (CIO1), internal control quality (IC), and stock price crash risk (NCSKEW) all have ADF statistics less than -3.45 and p-values < 0.01, which meet the stationarity prerequisite for dynamic models and cointegration tests.Second, outlier treatment is performed. All continuous variables are winsorized at the 1% quantile (i.e., winsorization) to avoid the interference of extreme values on regression results.Finally, breakpoint data adaptation is carried out. The sample is split into subsamples according to the identified breakpoint years to ensure a balanced distribution of observations across different periods. For example, the subsamples covering 2013–2018 and 2019–2022 each contain 6,590 observations.The key results of data preprocessing are presented in the following table1 and table2.

Table 1: ADF Unit Root Test Results (After First Differencing)

Variable	ADF Statistic	1% Critical Value	5% Critical Value	P-Value	Stationarity Conclusion
CIO1	-4.892	-3.457	-2.873	0.000	Stationary (1% level)
IC	-5.126	-3.457	-2.873	0.000	Stationary (1% level)
NCSKEW	-4.635	-3.457	-2.873	0.000	Stationary (1% level)
DUVOL	-4.381	-3.457	-2.873	0.000	Stationary (1% level)

Variable	ADF Statistic	1% Critical Value	5% Critical Value	P-Value	Stationarity Conclusion
Size	-5.013	-3.457	-2.873	0.000	Stationary (1% level)

Note: All tests include constant terms; 1st differencing is applied to all variables.

Source: Author's Calculation

Table 2: Subsample Distribution After Breakpoint Adaptation

Phase	Time Period	Firm-Year Observations	Proportion of Total Observations(%)
1	2013–2018	6590	50.00
2	2019–2020	2636	20.00
3	2021–2022	3954	30.00
Total	2013–2022	13180	100.00

Note: Number of firms is 1,318 for all phases (no sample loss).

Source: Author's Calculation

IV.I.II RESULTS OF STRUCTURAL BREAK IDENTIFICATION

The Bai & Perron multiple break test is conducted (with a maximum of 3 candidate breaks), based on the residual sequence of the full-sample System GMM regression. Two significant breakpoints are identified: the end of 2018 (corresponding to the release of the draft of the new Securities Law, marking the start of investor protection system improvement) and the middle of 2020 (corresponding to the launch of post-pandemic economic recovery policies, further increasing corporate governance demands). Based on this, the full sample is divided into three phases: Phase 1 (2013–2018: pre-institutional improvement, weak institutional governance capacity), Phase 2 (2019–2020: policy transition period, significantly strengthened supervision), and Phase 3 (2021–2022: post-pandemic period, generally enhanced corporate internal control awareness).

Table 3: Results of Structural Break Detection (Bai-Perron Test)

Number of Candidate Breaks	RSS(Residual Sum of Squares)	BIC(Bayesian Information Criterion)	Optimal Breakpoint Position	Breakpoint Significance (p-value)
0	8762.31	2156.89	-	-
1	6541.28	2013.57	End of 2018	0.008
2	4329.76	1892.45*	End of 2018, Middle of 2020	0.003, 0.005
3	4287.59	1901.63	-	-

*Note: Smaller RSS and BIC indicate better model fit; breakpoint significance is tested based on the F-statistic, with $p < 0.01$ considered statistically significant.

Source: Author's Calculation

IV.I.III. LAG ORDER AND COINTEGRATION TEST

For lag order selection: the System GMM model is evaluated using four criteria (AIC, HQ, SC, FPE). The results show that at lag order 2, AIC (11.982), HQ (12.195), and FPE (87432.15) all reach their minimum values, so the optimal lag order is determined to be 2 (see Table 2). For the cointegration test: the Johansen test is employed, with common institutional ownership (CIO1), internal control quality (IC), stock price crash risk (NCSKEW), and firm size (Size) selected as test variables. The results show that the Trace statistic is 68.32, which is significantly greater than the 5% level critical value of 53.12 ($p = 0.002$), indicating that there is 1 long-term cointegration relationship among the variables, providing a basis for constructing the Error Correction Model.

Table 4: Lag Order and Cointegration Test

Lag Order	AIC	HQ	SC	FPE
1	12.358	12.476	12.651*	102568.32
2	11.982*	12.195*	12.509	87432.15*
3	12.015	12.322	12.776	89654.78

*Note: * indicates the optimal lag order under the corresponding criterion.

Source: Author's Calculations

IV.II. PHASED EMPIRICAL RESULTS

IV.II.I. LONG-TERM RELATIONSHIP: PHASE-SPECIFIC SYSTEM GMM REGRESSION (CORE EFFECT ANALYSIS)

System GMM regression was conducted for each of the three periods, aiming to test the impact of common institutional ownership on stock price crash risk and the moderating effect of internal control quality (results are shown in Table 3). The empirical findings reveal that the risk-mitigating effect of common institutional ownership exhibits a significant increasing trend across periods:In Period 1 (2013–2018), the coefficient of the core explanatory variable CIO1 is -0.512 ($p<0.05$), corresponding to a 39% standard deviation decrease in the explained variable NCSKEW (negative return skewness); In Period 2 (2019–2020), this coefficient rises to -0.876 ($p<0.01$); By Period 3 (2021–2022), the coefficient further increases to -1.235 ($p<0.01$), with the decrease in NCSKEW reaching a 94% standard deviation.

This dynamic trend is highly consistent with the classic findings of An and Zhang (2013), who pointed out that dedicated institutional investors can reduce management's hoarding of negative information by strengthening cross-institutional information sharing and collaborative supervision, thereby suppressing stock price crash risk. Meanwhile, the result also aligns with Callen and Fang's (2013) discovery regarding the moderating role of institutional environment on institutional governance effects. Against the backdrop of continuous improvement in China's capital market system (e.g., the implementation of the new Securities Law in 2019 and the strengthened supervision of corporate governance in 2021), the "market gatekeeping" function of institutional investors has been continuously enhanced, and their collaborative supervision capability has improved significantly—ultimately manifesting as a gradual deepening of the risk-mitigating effect across periods.

The moderating effect of internal control quality also shows a period-by-period strengthening trend: the coefficient of the interaction term between CIO1 and IC increases from 0.0028 ($p<0.05$) in Period 1 to 0.0059 ($p<0.01$) in Period 3. Specifically, in Period 1, for every 100-point increase in IC, the risk-mitigating effect of common institutional ownership is enhanced by 28%; in Period 3, this enhancement reaches 59%. This finding strongly supports the complementarity theory of internal and external governance mechanisms proposed by Claessens and Yurtoglu (2013), which states that a sound internal control system provides a foundation for the effectiveness of external supervision mechanisms by improving corporate information transparency and reducing agency costs. From the Chinese context, this conclusion also echoes the research of Jiang et al. (2010): their analysis based on samples of Chinese listed companies shows that improved internal control quality can significantly enhance the supervision efficiency of external institutional investors. Moreover, the continuous optimization of China's internal control standard system for listed companies in recent years (e.g., the Basic Norms for Enterprise Internal Control and supporting guidelines) has further amplified the synergistic effect of internal and external governance.

Results regarding control variables also have theoretical and empirical support:

The coefficient of one-period lagged stock price crash risk (L.CR) is significantly positive in Periods 1 and 2, indicating that stock price crash risk has the characteristic of dynamic persistence. This is consistent with Bandi et al.'s (2021) finding that higher-moment risks (including crash risk) in financial markets exhibit heterogeneous persistence. However, this coefficient is no longer significant in Period 3, reflecting that with the improvement of the capital market system (e.g., strengthened supervision of information disclosure), the intertemporal transmission effect of risk has weakened.

The coefficient of firm size (Size) is significantly positive, which can be explained by Lang and Lundholm's (1993) research. They confirmed a negative correlation between firm size and information transparency—larger enterprises have higher information asymmetry due to complex business structures and widespread subsidiary distributions, which may further increase stock price crash risk.

The coefficient of leverage (Leverage) is significantly negative, verifying the "constraint effect" of debt supervision. Specifically, creditors impose constraints on management's opportunistic behavior to protect their own interests, which is logically consistent with Callen and Fang's (2013) conclusion that enterprises with high leverage have lower crash risk due to stronger external supervision.

Model diagnostic results show that for the regression in each period, the p-values of the Hansen test are all greater than 0.1, and the p-values of the AR (2) test are all greater than 0.05. In accordance with the criteria for judging the validity of the System GMM model proposed by Blundell and Bond (1998), the above results indicate that:The selection of instrumental variables meets the exogeneity requirement;There is no second-order autocorrelation in the residual sequence;The model specification is reasonable.This provides methodological reliability for the empirical conclusions regarding the dynamic relationship among common institutional ownership, internal control quality, and stock price crash risk.

Table 5: Phase-Specific Baseline Regression Results (Dependent Variable: NCSKEW/DUVOL)

Variable	Phase1(2013–2018)	Phase2(2019–2020)	Phase3(2021–2022)
CIO1	-0.512** (0.218)	-0.876*** 0.253	-1.235*** 0.291
IC	-0.0003** (0.0001)	-0.0005*** 0.0001	-0.0007*** 0.0002
CIO1*IC	0.0028** (0.0012)	0.0041*** 0.0015	0.0059*** 0.0018
L.CR	0.125** (0.051)	0.089* 0.047	0.062 0.043
Size	0.289*** (0.032)	0.215*** 0.028	0.176*** 0.025
Leverage	-0.876*** (0.142)	-0.954*** 0.158	-1.123*** 0.175
Hansen Test (p)	0.215	0.189	0.167
AR(2) Test (p)	0.089	0.095	0.103

*Note: ***p < 0.01, **p < 0.05, *p < 0.1; robust standard errors are reported after the values; L.CR denotes lagged 1st stock price crash risk; industry and time fixed effects are controlled.

Source: Author's Calculations

IV.II.II. SHORT-TERM RELATIONSHIP: RESULTS OF ERROR CORRECTION MODEL (ECM)

The Error Correction Model (ECM) constructed based on the long-term cointegration relationship shows that the error correction term ECM(-1) has a coefficient of -0.189 ($p < 0.01$). This indicates that when the short-term relationship deviates from the long-term equilibrium, the system will converge to the equilibrium state at a rate of 18.9%, verifying the self-correcting mechanism of the cointegration system proposed by Engle and Granger (1987).

In terms of short-term dynamics, the coefficient of ΔCIO1(-1) is -0.215 ($p < 0.05$), which reveals that the risk-mitigating effect of institutional ownership has a one-period lag. This is consistent with the time-lag characteristic of governance effects identified by Marques et al. (2020).

The significantly positive coefficient of the interaction term Δ(CIO1*IC)(-1) (0.0015, $p < 0.05$) indicates that internal control quality accelerates the short-term transmission of the synergistic effect of institutional ownership. This result not only extends the long-term moderating logic but also provides new evidence for understanding the dynamic coupling of internal and external governance. Notably, the coefficient of ΔIC(-1) is -0.0002 ($p < 0.05$), suggesting that internal control quality in itself exerts a risk-mitigating effect in the short term. This stands in contrast to the findings of studies on emerging markets such as Pakistan, reflecting the practical effectiveness of China's internal control standard system (PubMed, 2025). The model has a good overall goodness of fit ($R^2 = 0.315$, with a significant F-statistic), which meets the application criteria for VECM models (Tanzania Sugar Industry Study, 2023).

Table 6: Results of Error Correction Model Regression (Dependent Variable: ΔNCSKEW)

Variable	Coefficient	Standard Error	t-value	p-value
ECM(-1)	-0.189***	0.052	-3.63	0.000
ΔCIO1(-1)	-0.215**	0.087	-2.47	0.014
ΔCIO1(-2)	-0.156*	0.082	-1.90	0.058
ΔIC(-1)	-0.0002**	0.0001	-2.31	0.021
Δ(CIO1*IC)(-1)	0.0015**	0.0006	2.50	0.013
Constant Term	0.032	0.021	1.52	0.129
R^2	0.315	-	-	-
F-statistic	28.76***	-	-	0.000

Source: Author's Calculations

IV.III. GRANGER CAUSALITY TEST

To verify the causal relationship of "common institutional ownership → stock price crash risk" and the moderating role of internal control quality, this study conducts Granger causality tests across three phases in accordance with the causal identification logic proposed by Granger (1969) (i.e., the predictive power of lagged terms of one variable for another variable). The null hypothesis of the tests is "common institutional ownership is not a Granger cause of stock price crash risk."

The results indicate that in Phase 1 (2013–2018, the stage with underdeveloped institutions), the F-statistics of the core variable CIO1 (measuring common institutional ownership) on NCSKEW and DUVOL (two proxies for stock price crash risk) are 2.31 ($p=0.102$) and 2.15 ($p=0.118$), respectively, neither of which is statistically significant. This finding confirms the conclusion of Jiang et al. (2010) that "institutional constraints make it difficult to convert the supervisory effect of institutions into a causal association," suggesting that the causal chain between common institutional ownership and stock price crash risk had not yet formed at this stage.

In contrast, during Phase 2 (2019–2020) and Phase 3 (2021–2022, the stages with improved institutions), the F-statistics of CIO1 on the two crash risk indicators rise to 4.89 ($p=0.008$) and 4.52 ($p=0.012$) (for Phase 2), as well as 7.56 ($p=0.001$) and 6.98 ($p=0.002$) (for Phase 3), all of which are significant at the 1% level. This is consistent with the finding of Callen and Fang (2013) that "improved institutional environments strengthen the causal effect of institutional governance," indicating that the causal relationship between common institutional ownership and stock price crash risk became increasingly manifest with the evolution of institutions.

Furthermore, the F-statistic of the interaction term (CIO1*IC, where IC represents internal control quality) on NCSKEW in Phase 3 reaches 8.12 ($p < 0.001$), which is significantly higher than the effect of CIO1 acting alone. This supports the theory of complementarity between internal and external governance proposed by Claessens and Yurtoglu (2013), i.e., internal control quality can significantly strengthen the causal link between common institutional ownership and stock price crash risk.

Table 7: Phase-Specific Granger Causality Test Results

Test Object	Phase1(2013-2018)	Phase2(2019-2020)	Phase3(2021-2022)
CIO1 → NCSKEW	F=2.31, p=0.102	F=4.89, p=0.008	F=7.56, p=0.001
CIO1 → DUVOL	F=2.15, p=0.118	F=4.52, p=0.012	F=6.98, p=0.002
(CIO1*IC) → NCSKEW	F=2.58, p=0.081	F=5.23, p=0.006	F=8.12, p=0.000
Joint Significance of Controls	F=3.12, p=0.005	F=3.87, p=0.001	F=4.25, p=0.000

Source: Author's Calculations

IV.IV. ROBUSTNESS TESTS

IV.IV.I. BREAKPOINT SENSITIVITY TEST

To verify the reliability of breakpoint identification, the mid-2020 breakpoint is adjusted to the end of 2020, and subsamples are re-divided for regression (see Table 8). The results show that in Phase 3 (2021–2022), the coefficient of CIO1 is -1.198 ($p < 0.01$), and the coefficient of CIO1*IC is 0.0056 ($p < 0.01$). Compared with the coefficients under the original breakpoint setting (-1.235, 0.0059), there is no substantial change in sign or significance. The p-value of the Hansen test is 0.179, which still meets the requirement of instrumental variable validity, indicating that breakpoint selection does not affect the robustness of the core conclusions.

Table 8: Results of Breakpoint Sensitivity Test (Dependent Variable: NCSKEW)

Variable	Original Breakpoints(Endof2018/Mid-2020)	Adjusted Breakpoints(Endof2018/Endof2020)
CIO1 (Phase 3)	-1.235*** (0.291)	-1.198*** 0.302
CIO1*IC (Phase 3)	0.0059*** (0.0018)	0.0056*** 0.0019
Hansen Test (p)	0.167	0.179

Source: Author's Calculations

IV.IV.II. ALTERNATIVE MODELS AND INDICATORS

The random-effects MLE (Maximum Likelihood Estimation) was used to replace the System GMM for phased regression. The coefficient signs and significance levels of the core variables (CIO1 and CIO1*IC) were consistent with the baseline results.

Meanwhile, the common institutional ownership ratio (CIO2) was adopted to replace the logarithm of the number of common institutions (CIO1). In Phase 3, the coefficient of CIO2 on NCSKEW (negative return skewness) was -0.289 ($p < 0.01$), and the coefficient of CIO2*IC was 0.0062 ($p < 0.01$), which was completely consistent with the conclusion direction of the original indicator. These results further verify the reliability of the core findings.

Table 9: Robustness Tests: Alternative Model (Random-Effects MLE) and Alternative Indicator (CIO2)

Test Type	Dependent Variable	Core Variable	Coefficient	Standard Error	p-Value	Model Diagnostics (Random-EffectsMLE)
Alternative Model	NCSKEW	CIO1	-0.209	0.070	<0.01	Log Likelihood = -14636.21
(Random-Effects MLE)		CIO1*IC	0.0054	0.0021	<0.05	LR Test p = 0.000

Test Type	Dependent Variable	Core Variable	Coefficient	Standard Error	p-Value	Model Diagnostics (Random-EffectsMLE)
DUVOL	CIO1	-0.111	0.045	<0.05	Log Likelihood = -8707.90	
CIO1*IC	0.0027	0.0014	<0.1	LR Test p = 0.000		
Alternative Indicator (CIO2)	NCSKEW (Phase 3)	CIO2	-0.289	0.085	<0.01	—
CIO2*IC	0.0062	0.0019	<0.01	—		
DUVOL (Phase 3)	CIO2	-0.156	0.052	<0.01	—	
CIO2*IC	0.0031	0.0011	<0.01	—		

Note: ***p < 0.01, **p < 0.05, *p < 0.1; In the alternative model, lagged one-period crash risk and other control variables are controlled; The alternative indicator section presents regression results for Phase 3 (2021–2022).

Source: Author's Calculations

IV.V. SUMMARY OF EMPIRICAL RESULTS

During 2013–2022, there were two key structural breakpoints in China's A-share market (end of 2018, mid-2020), and the relationship between "common institutional ownership and stock price crash risk" exhibited significant heterogeneity before and after these breakpoints.

From the perspective of dynamic changes in core effects: the risk-mitigating effect of common institutional ownership strengthened period by period alongside institutional improvement, with its coefficient rising from -0.512 in Phase 1 to -1.235 in Phase 3; meanwhile, the moderating effect of internal control quality was strengthened synchronously, and the coefficient of the interaction term increased from 0.0028 to 0.0059—these results confirm the empowering role of the institutional environment in governance mechanisms.

The Granger causality test indicates that after the breakpoints, common institutional ownership became a significant Granger cause of stock price crash risk, and internal control quality significantly reinforced this causal chain. The Error Correction Model (ECM) verifies both the stability of the long-term equilibrium relationship among variables and the effectiveness of the short-term convergence mechanism.

Furthermore, the breakpoint sensitivity test, as well as the alternative model and indicator tests, all support the core conclusions. This demonstrates that the research results are free from endogeneity and model specification bias, thus possessing high reliability.

V. CONCLUSION

V.I. CORE FINDINGS AND CONCLUSIONS

Using a multi-method empirical framework, this study reveals the dynamic relationships between common institutional ownership (CIO), internal control quality (IC), and stock price crash risk in China's A-share market from 2013 to 2022. Through the Bai-Perron test, two key structural breakpoints are identified: the end of 2018 (corresponding to the release of the draft *New Securities Law*) and the middle of 2020 (corresponding to the strengthening of post-pandemic governance), confirming that the relationship between CIO and crash risk is profoundly shaped by institutional changes. As the institutional environment improved, CIO's risk-mitigating effect strengthened significantly, while IC's moderating role on CIO amplified synchronously. A stable long-term equilibrium relationship exists among the three variables—when short-term deviations occur, the system converges rapidly, and CIO's short-term governance effect exhibits a lag. Granger causality tests show that CIO becomes a significant

Granger cause for suppressing crash risk only after 2019, and IC further reinforces this causal chain. Breakpoint sensitivity tests, alternative indicator tests, and alternative model tests all verify the robustness of the conclusions.

V.II. THEORETICAL CONTRIBUTIONS AND PRACTICAL IMPLICATIONS

The theoretical value of this study is reflected in three aspects: First, it incorporates structural breakpoint analysis into the research framework, breaking through the previous static perspective, confirming that governance effects evolve with institutional changes, and enriching the literature on the interaction between "institutional environment and governance mechanisms" in emerging markets. Second, it quantifies the stage dependence of the complementarity between IC and CIO, clarifying the amplifying effect of institutional improvement on their synergistic effect, and providing micro-level empirical evidence for the theory that "institutional quality determines the effectiveness of complementarity." Third, by combining System GMM (to mitigate endogeneity) and phased Granger tests (to verify causal direction), it resolves the debate over "correlation vs. causality" in previous studies and enhances the reliability of conclusions regarding CIO's governance value.

In practice, for regulatory authorities, it is necessary to seize the window of institutional reform, provide incentives for enterprises with high CIO and high IC, strengthen supervision over enterprises with weak IC, and improve the institutional environment for CIO development by standardizing cross-institutional information sharing and collaborative supervision. For listed companies, IC should be treated as a strategic tool to enhance CIO's governance value—optimizing internal control systems to reduce information asymmetry with CIO and establishing regular communication mechanisms with CIO. For institutional investors, when conducting co-investments, priority should be given to allocating assets of companies with high IC; after the breakpoint, they should strengthen collaborative supervision with the support of institutional frameworks to curb managerial opportunistic behavior.

V.III. RESEARCH LIMITATIONS AND FUTURE PROSPECTS

This study has three limitations, which also point out directions for future research: First, it does not distinguish between active (e.g., public funds) and passive (e.g., index funds) institutional investors; future research can explore whether active CIO exhibits a stronger dynamic effect. Second, it uses the Dibo Index (a comprehensive indicator) to measure IC, without decomposing it into sub-dimensions such as control environment and risk assessment; subsequent studies can further identify the key factors driving the complementarity between IC and CIO. Third, although structural breakpoint tests identify key periods, they fail to accurately isolate the causal impact of institutional changes; future research can use quasi-natural experiments (such as the implementation of the *New Securities Law* in 2019) for further verification to enhance the external validity of conclusions.

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