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Independent Directors' Opposition, Earnings Management and the Risk of Stock Price Crash

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Abstract: In recent years, stock price crash events have occurred from time to time, resulting in the unstable operation of the capital market. The risk of stock price crash has drawn wide attention from all walks of life. This paper examines the data of A-share listed companies from 2007 to 2021 to study the impact of independent directors' dissenting opinions on the risk of stock price crash. The study found that the independent directors' dissenting opinions were negatively correlated with the risk of a stock price crash, and this conclusion was still valid after a series of robustness tests. The mechanism analysis shows that the independent directors' objection can exert the governance effect, restrain the abnormal related party transactions and earnings management behavior of the majority shareholders, and thus reduce the risk of corporate stock price crash. The above results are consistent with the logic that independent directors exert signaling and governance effects by expressing dissenting opinions to control the risk of stock price collapse. This conclusion has certain significance for preventing the risk of stock price collapse and promoting the stable development of capital market.

Keywords: Governance effect of independent directors, Risk of stock price crash.

1. Introduction

In recent decades, the economic level of China has developed rapidly and the vitality of China's financial market has become increasingly strong. In the face of the current demand for high-quality economic development, it is particularly important to safeguard the health and stability of financial markets. Xi Jinping once pointed out that "finance is an important core competitiveness of the country, financial security is an important component of national security, and financial system is an important basic system in economic and social development", stressing the importance of stable and safe financial markets and controllable risks. However, compared with developed market countries such as the United States and the United Kingdom, China's capital market needs to be improved. Problems such as a weak sense of risk, a large number of small and medium-sized investors, and loopholes in the information disclosure and governance systems of listed companies often lead to the risk of stock price collapse, which threatens the stability of financial markets. Therefore, in order to ensure the stability of the financial market and better serve the real economy and realize the high-quality development of the national economy, we need to explore the influencing factors of the risk of stock price crash.

In theory, an independent director's dissenting opinion could reduce the risk of a crash in a company's share price. The dissenting opinions expressed by independent directors can play a signaling role and a governance effect. Signaling can release the negative news of the company in advance and reduce the internal extrusion of negative information. However, the "signaling effect" will attract the attention of various participants related to the company, and then generate the "governance effect", which will supervise the abnormal related party transactions of the company, restrain the capital occupation behavior of major shareholders and restrain the earnings management behavior (Ye Kangtao et al., 2007). As an important institutional arrangement in the corporate governance structure, the independent director system can play a role in alleviating the first and second class agency conflicts (Fama and Jensen, 1983). The role of governance can improve the transparency of corporate information, optimize the actual financial position and earnings quality of the company, and thus reduce the risk of a collapse of the company's share price.

The dissenting opinion of the independent directors may not be effective in reducing the risk of a stock price crash. At present, China's listed companies generally have the characteristics of concentration of equity, and the majority shareholders have strong control and decision-making power over the company. China's relatively weak legal risk makes the cost of punishment for non-compliance by major shareholders low. At the same time, the imperfect safeguard system cannot effectively safeguard the risk of independent directors expressing their opinions (Wang Bing, 2007), which leads to the high risk of expressing dissenting opinions and the lack of motivation of independent directors to point out internal irregularities. Many independent directors are considered to be just "vase roles" (Tang Qingquan, 2006; Xiao Weijia et al., 2009; Tang Xuesong et al., 2010; Ye Kangtao et al., 2011). Therefore, the low proportion of dissenting votes cannot effectively prevent the violation and effectively reduce the risk of the company's stock price collapsing.

From the theoretical analysis, the impact direction of independent directors' negative vote on the risk of stock price crash is still unclear, so we test the problem through empirical research. We used a sample of A-share listed companies from 2007 to 2021 to prove that there is a negative correlation between the dissenting opinions of independent directors and the risk of stock price crash. Further analysis shows that the dissenting opinions of independent directors can indeed restrain the abnormal related party transactions and earnings management behavior of the majority shareholders. The above results are consistent with the logic that independent

directors exert governance effect by expressing dissenting opinions, thus reducing the risk of stock price collapse.

The contributions of this paper may be as follows: First, it expands the research on the economic consequences of independent director system. The existing research on the independent director system mainly discusses its role in alleviating agency conflicts from the perspective of corporate governance, such as the impact on corporate mergers and acquisitions and investment projects (Adams et al., 2010), the impact on the quality of corporate earnings (Wang Bing, 2007), and the impact on the capital occupation behavior of major shareholders (Ye Kangtao et al., 2007). This paper discusses whether the governance effect of the independent directors' dissenting opinions will further affect the risk of the company's stock price crash. The second is different from the previous research. From the perspective of governance effect, this paper tests the impact of independent directors' objection on the risk of stock price crash, and expands the understanding of the relationship between independent director system and stock price crash. Thirdly, it has certain practical significance. This paper analyzes the positive impact of the independent director system on controlling the risk of stock price crash, and shows the role that independent directors can play in the financial market of China.

The structure of this paper is as follows: the second part is a literature review of the existing research, the third part is research hypothesis and empirical design, the fourth part is empirical results and analysis, the fifth part is further test analysis, and the sixth part is conclusion.

2. Literature Review

2.1. Research on Independent Directors

An independent director is a director who is independent of the shareholders of the company, does not hold office within the company, has no significant business or professional ties with the company or the company's management, and makes independent judgment on the affairs of the company. On the one hand, independent directors with professional background can rely on their knowledge and experience to provide constructive suggestions for the company's decision-making and development and play an advisory role. On the other hand, the existence of independent directors as independent of other stakeholders in the company can supervise and restrain the behavior of management and major shareholders, and protect the interests of the company as a whole and the interests of minority shareholders.

At present, some researchers focus on the analysis and research from the perspective of independent directors' advisory role in corporate management. Independent directors are able to use their expertise and insights to provide reference for the Board's decisions and improve the Company's decision-making level and operating performance. Ye Kangtao et al. (2007) considered consulting to be one of the main functions of independent directors. Huang Haijie et al. (2016) said that independent directors with professional background have a more professional understanding of the generation and disclosure of the company's financial reports, thus affecting the company's earnings quality. Xie et al. (2003), Hu yiming and Tang songlian (2008) found that independent directors specializing in accounting can improve the company's earnings quality. Francis et al. (2015) found that independent directors from scholars have a positive impact on the company's earnings quality.

Another part of researchers focuses on the governance role played by independent directors. Fama and Jensen pointed out that the board of directors is an important institutional arrangement in the corporate governance structure, and independent directors should play an important role in alleviating agency conflicts and protecting the interests of small and medium-sized investors (Fama and Jensen, 1983; Adams et al., 2010). For the second type of agency problem between majority shareholders and minority shareholders (Morck et al., 1988; Claessens et al., 2000), Ye Kangtao et al. (2007) found that independent directors can supervise related party transactions and restrain the appropriation of funds by large shareholders. Liu Suzhi (2007) et al. found that independent directors can play a mitigating role by soliciting the voting rights entrusted by small shareholders, attending shareholders' meetings and voting against the motion that large shareholders harm small shareholders. Zhi Xiaoqiang and Tong Pan (2005) found that independent directors can identify the company's earnings management behavior. Tang Qingquan (2005), Gao Lei and others (2006) did not find a significant negative correlation between the capital occupation of independent directors and major shareholders. Wang Bing (2007) found that independent directors of listed companies in China did not play an effective role in supervision and governance from the perspective of earnings quality. More research also shows that independent directors in China mostly play the role of "vase" (Tang Qingquan, 2006; Xiao Weijia et al., 2009; Tang Xuesong et al., 2010; Ye Kangtao et al., 2011).

2.2. Research on the Risk of Stock Price Crash

The stock price crash refers to the phenomenon that the stock price of a company falls sharply in a short period of time due to the sudden release of the company's backlog of negative news and the impact on investors' emotions. The stock price crash has a serious negative impact on the stability and health of the capital market and the interests of investors. Therefore, the factors that lead to the formation of the risk of stock price crash have also become one of the important research topics. The existing research mainly analyzes the internal and external factors of the company.

Jin and Myers (2006) and Hutton et al. (2009) have all found that the principal-agent problem is the main internal influencing factor of the risk of stock price collapse. Due to the information asymmetry between the management and the shareholders, the management deliberately hides the negative news in the operation and investment activities of the enterprise for the sake of personal interests. The opportunistic behavior of the management leads to the backlog of negative news. When the accumulated negative news can no longer be concealed and released at one time, it will cause the investors to be emotionally impacted and sell off the shares, thus causing the stock price to crash. In addition, Wang Huacheng et al. (2015) found that the increase in the shareholding ratio of major shareholders can reduce the risk of stock price crash, and Song Xian Zhong (2017) showed that there was a negative correlation between the corporate social responsibility information disclosure and the risk of stock price crash. There are also other scholars who have different opinions from corporate tax avoidance (Kim et al., 2011a), accounting conservatism (Kim and Zhang, 2012), executive compensation incentives (Xu et al., 2014), financial reporting quality (Hutton et al., 2009; Kim and Zhang, 2014), over-

investment (Jiang Xuanyu and Xu Nianhang, 2015), majority shareholder supervision (Wang Huacheng et al., 2015) and internal control information disclosure (Ye Kangtao et al., 2015).

To sum up, the independent director's advisory function in the enterprise has been generally recognized, but the evidence of its governance role is still controversial, and the current research mostly proves that the independent director plays a governance role from an indirect perspective, and less directly observes the governance behavior of the independent director. In addition, in the existing research, the number of factors that will affect the risk of a stock price crash that focus on the specific act of independent directors against is relatively small. Therefore, this paper measures the independent director's governance activities from the independent director's negative vote, which is an active intervention to the enterprise, and explores whether this method has actual governance effect.

3. Research Assumptions and Empirical Design

3.1. Research Hypothesis

The independent directors' negative vote may play a "signaling role" to release the negative news of the company in advance and trigger a "governance effect" to inhibit the "hollowing out" of major shareholders, related party transactions and earnings management, which in turn may affect the risk of stock price collapse. First, a negative vote by an independent director may have the following effects:

First, the role of signals. The independent directors' negative opinion on the Board's motion is the most true and direct manifestation of the independent directors' performance of duties (Zheng Zhigang et al., 2016). The independent directors' negative vote on the Board's motion can indirectly convey the omissions and hidden problems in the company's operation and management. As a matter of fact, the percentage of board members who clearly express their negative votes is relatively low and it is difficult to actually obstruct the implementation of the motion. However, from the perspective of information transmission, in view of the common phenomenon that the two positions of chairman and CEO of an enterprise in China are combined, if the management puts forward a proposal and hopes to obtain the approval of the board of directors for implementation, it may be approved because it is in the personal interests of the chairman, even if there are hidden risks or problems in the project, such as merger and acquisition involving a large amount of money. In order to avoid the supervision from the shareholders' meeting and ensure the smooth progress of the project, the management may deliberately hide some negative information, and once the independent directors express clear opposition to the proposal, it indicates that they have mastered the internal information and indirectly transmit the information about the hidden dangers of the project to the outside. The dissenting vote by the independent directors may attract close attention from the market and various participants, as well as more stringent scrutiny by the regulatory authorities. Studies have shown that for false statements of listed companies, the regulatory penalties imposed by the CSRC and the exchanges will have significant economic consequences for listed companies (Chen et al., 2005; Liebman and Milhaupt, 2008).

Second, the governance effect. In the existing research, Fama and Jensen (1983) believe that independent directors have the characteristics of "independence" and "external" and are an important corporate governance mechanism to play a supervisory role and solve the agency problem of modern companies. Ye Kangtao and others (2011) believe that the independent directors' participation in the formation of corporate decisions can be observed by studying how the independent directors put forward negative opinions on the Board's proposals. Jiang et al. (2015) found that independent directors' questioning could improve corporate transparency and governance. The highly concentrated ownership structure is one of the significant characteristics of listed companies in China, which leads to the second type agency problem is often more serious. Large shareholders often use their absolute control to damage the interests of small and medium shareholders through earnings management, related party transactions, market manipulation and other means. (Jian and Wong, 2003; Jiang Guohua and Yue Heng, 2005; Li Zengquan et al., 2004).

To sum up, on the one hand, the independent directors' negative vote can directly mitigate the risk of a stock price crash to a certain extent by playing a "signaling role" to release negative news. On the other hand, the "signaling effect" of the independent director's negative vote will attract attention from many parties, resulting in "governance effect" to ease the second type of agency conflict and reduce the risk of stock price crash. Based on the above analysis, we propose the hypothesis to be tested:

Hypothesis: Given the same other conditions, the risk of a crash in the company's share price decreases when the independent directors voice their opposition.

3.2. Empirical Design

In order to verify whether the independent directors' dissenting opinions can reduce the risk of stock price crash, the following regression model is set with reference to Song Xian Zhong (2017), Zhang Xiaoyu and Xu Longbing (2017):

$$Crashrisk_{i,t} = \beta_0 + \beta_1 Dispprove_{i,t} + \beta\ CONTROLS_{i,t} + \sum Year + \sum Industry + \varepsilon_{i,t} \quad (1)$$

3.2.1. Risk of Stock Price Crash

$Crashrisk_{i,t}$ is a measure of the company's risk of a stock price crash in period: and. Referring to the research of Hutton et al. (2009) and Kim et al. (2011a), this paper adopts the following method to measure the risk of stock price collapse: firstly, calculate the weekly return of individual stocks after adjusting the market return rate according to model (2).

$$r_{i,t} = \alpha + \chi_1 r_{m,t-2} + \chi_2 r_{m,t-1} + \chi_3 r_{m,t} + \chi_4 r_{m,t+1} + \chi_5 r_{m,t+2} + \varepsilon_{i,t} \quad (2)$$

Among them, $r_{i,t}$ is the return rate of the i company considering the reinvestment of cash dividends in Week t, and $r_{m,t}$ is the market return rate of all A-share companies in Week t after the weighted average of the current market value. We add forward term and backward term of $r_{m,t}$ to model (2) to reduce the possible bias caused by asynchronous stock transactions. $\varepsilon_{i,t}$ is the portion of the Company's week t yield

that cannot be explained by market yield. Then, based on $W_{i,t} = \ln(1+\varepsilon_{i,t})$ to construct two measures to measure the risk of a stock price crash, using $W_{i,t}$ as a specific yield representing the individual stock at week t:

Skewness coefficient of negative returns (*Ncskew*):

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

n is the number of trading weeks of the i company in the t period, the larger, indicating that the more serious the negative skewness of the company's stock returns in the period, the higher the risk of a stock price crash.

Negative volatility rate of corporate yields (*Duvol*):

$$Duvol_{i,t} = \log\{[(n_u-1)\sum_{Down} W_{i,t}^2]/[(n_d-1)\sum_{Up} W_{i,t}^2]\} \quad (4)$$

When the i Company's weekly yield is higher (lower) than the t period average yield (recorded as $Up(Down)$), the corresponding period weeks are $n_u(n_d)$. The bigger the $Duvol_{i,t}$ is, the greater the left deviation of the company's stock yield and the higher the risk of a stock price crash.

3.2.2. Independent Director Voted Against

The dummy variable $Dispprove_{i,t}$ is used to express the dissenting opinions expressed by the independent directors of the Company in the current period. Referring to the practice in the existing literature (Liang Quan Xi and Zeng Hai Shu, 2016), if there is any objection from the independent director, 1 is taken; otherwise, 0 is taken. Where the dissenting opinion is expressed as all opinions except the opinion type of "Agree". This paper mainly focuses on the estimation of regression coefficient of β_1. If the estimation is significantly negative, it indicates that the independent directors' dissenting opinion can reduce the risk of stock price crash. The assumption in this paper it is proved.

3.2.3. Control Variable

CONTROL is a series of control variables, including: logarithm of total assets of an enterprise (*Size*); Corporate asset-liability ratio (*Lev*); The return on assets of the enterprise, i.e. the ratio of net profit after tax to total assets (*ROA*); The shareholding ratio of the largest shareholder (*Top*1); Revenue growth rate, i.e. the ratio of period and period revenue difference to period revenue (*Growth*); Proportion of current assets, i.e. the ratio of current assets at the end of the period to total assets at the end of the period (*Liqasset*); Ratio of cash flows from operating activities to total assets (*Cash*); If the enterprise is a state-owned enterprise, take 1; otherwise, take 0 (*SOE*); The number of years of incorporation of the Company is taken as the logarithm (*Age*); If the two positions are combined, 1 will be taken if the chairman and general manager are the same person, otherwise 0 will be taken as (*Dual*); If the auditor is from the four largest accounting firms in the world, the value will be 1; otherwise, the value will be 0 (*Big*4); The number of listed companies tracked by analysts in the current year is 1 plus the logarithm (*Analysts*).

Table 1. Variable Definition and Construction

variable symbol	Variable name	Variable construction description
Ncskew	Risk of stock price crash	See the text for the skewness coefficient of negative returns on corporate shares.
Duvol	Risk of stock price crash	The rate at which a company's stock returns fluctuate, see the text.
Dispprove	The independent directors voted against it.	If there is an objection from an independent director, 1 is used; otherwise, 0 is used.
Size	Total assets	The total assets of an enterprise are logarithmic.
Lev	Asset-liability ratio	Ratio of total liabilities to total assets
ROA	return on asset	Ratio of net profit after tax to total assets
*Top*1	The largest shareholder's shareholding ratio	The shareholding ratio of the largest shareholder in the enterprise
Growth	Revenue growth rate	Period t and t-1 Revenue Variance vs. Period Revenue t-1
Liqasset	Proportion of current assets	Ratio of current assets at the end of the period to total assets at the end of the period
Cash	Cash flow position	Ratio of cash flows from operating activities to total assets
SOE	Enterprise nature	If the enterprise is a state-owned enterprise, take 1; otherwise, take 0
Age	Business life	The number of years of establishment of the enterprise is taken as the logarithm
Dual	Integration of two functions	If the chairman and general manager are the same person, 1 will be taken; otherwise, 0 will be taken.
*Big*4	Audit quality	If the auditor is from the four largest accounting firms in the world, 1 will be used; otherwise, 0 will be used.
Analysts	Analyst tracking	The number of listed companies tracked by analysts in the current year is 1 plus the logarithm

3.3. Data Source

This study takes A-share listed companies from January 1, 2007 to December 31, 2021 as the research object, and selects the list of listed companies, relevant market data and financial data from China Taian Database CSMAR. Referring to the existing literature, we processed the initial sample as follows: (1) The financial industry companies were excluded due to the particularity of the financial industry report structure; (2) because the financial data of ST enterprises may be specially processed, the ST * and ST class stocks are excluded; (3) removing samples with missing data; (4) Shrink the tail of continuous variables at 1% and 99% points respectively to

control the effect of outliers.

3.4. Descriptive Statistic

Table 2. descriptive statistic

	(1)	(2)	(3)	(4)	(5)
variable	Sample size	average/mean value	standard deviation	minimum value	maximum
$Ncskew_t$	33,393	-0.418	0.734	-2.626	1.636
$Duvol_t$	33,393	-0.295	0.481	-1.470	0.945
$Dispprove_t$	33,393	0.0172	0.130	0	one
$Size_t$	33,393	22.14	1.294	19.69	26.14
Lev_t	33,393	0.434	0.209	0.0535	0.929
ROA_t	33,393	0.0378	0.0631	-0.272	0.200
$Top1_t$	33,393	34.80	14.94	8.700	74.45
$Growth_t$	33,393	0.382	1.015	-0.670	7.141
$Liqasset_t$	33,393	0.567	0.206	0.0931	0.958
$Cash_t$	33,393	0.0477	0.0709	-0.172	0.248
SOE_t	33,393	0.384	0.486	0	one
Age_t	33,393	2.852	0.351	1.792	3.497
$Dual_t$	33,393	0.260	0.439	0	one
$Big4_t$	33,393	0.0585	0.235	0	one
$Analysts_t$	33,393	1.416	1.189	0	3.784

Table 2 is a descriptive statistic: the average value of *Dispprove* is 0.0172, indicating that the percentage of dissenting opinions expressed by independent directors on the board is 1.72%. Generally speaking, the percentage of dissenting opinions expressed by independent directors is not very high; The average value of *Dual* is 0.26, which indicates that in the selected sample of listed companies, the ratio of general manager to chairman is 26%. The average value of *Big*4 is 0.0585, indicating that 5.85% of the companies in the selected sample employ auditors from the four largest international accounting firms. The large standard deviation of dependent variable and independent variable indicates that there are obvious differences between enterprises. In addition, the correlation analysis is also carried out in this paper. It is found that the correlation coefficient between the control variables is not large and the variance expansion factor is less than 5, which indicates that there is no serious multicollinearity problem. Results are not reported due to space limitations.

4. Empirical Results and Analysis

4.1. Benchmark Regression Analysis

Table 3. OLS regression results

	(1)	(2)	(3)	(4)
variable	$Ncskew_t$	$Duvol_t$	$Ncskew_t$	$Duvol_t$
$Dispprove_t$	-0.269***	-0.281***	-0.264***	-0.280***
	(-8.268)	(-12.225)	(-8.167)	(-12.208)
$Size_t$			0.010	0.003
			(0.988)	(0.439)
Lev_t			-0.061	-0.041
			(-1.378)	(-1.421)
ROA_t			-0.209**	-0.179***
			(-2.090)	(-2.784)
$Top1_t$			-0.002**	-0.001**
			(-2.100)	(-2.262)
$Growth_t$			-0.002	0.001
			(-0.398)	(0.392)
$Liqasset_t$			-0.005	0.026
			(-0.106)	(0.895)
$Cash_t$			0.018	0.002
			(0.246)	(0.042)
SOE_t			-0.072***	-0.052***
			(-2.783)	(-3.236)
Age_t			-0.022	-0.043
			(-0.324)	(-0.952)
$Dual_t$			0.003	0.001
			(0.195)	(0.066)
$Big4_t$			-0.077*	-0.058**
			(-1.910)	(-2.267)
$Analysts_t$			0.065***	0.034***
			(10.377)	(8.387)
constant term	-0.374***	-0.285***	-0.479*	-0.208
	(-18.759)	(-19.335)	(-1.850)	(-1.202)
observed value	33,393	33,393	33,393	33,393
R^2	0.034	0.041	0.039	0.045
Firm fixed effect	YES	YES	YES	YES
Annual fixed effect	YES	YES	YES	YES

Note: * * *, * *, * are significant at 1%, 5% and 10% respectively; The value of t is in parentheses. Table 3 to Table 11 are the same.

Table 3 shows the OLS regression results of the independent directors' dissenting votes and the risk of the Company's share price collapsing. Columns (1) and (2) represent the regression results after excluding the control variables and including the control variables to measure the risk of stock price collapse; Columns (3) and (4) represent regression results that measure the risk of a stock price crash by *Duvol* , excluding the control variables and including the control variables. In columns (1) and (3), we do not include the control variable, and the coefficient of *Dispprove* at this time is -0.269 and -0.281 measured by *Ncskew* and *Duvol* when the risk of stock price collapse is measured and significant, indicating that the independent directors' dissenting opinion can reduce the risk of stock price collapse without controlling other factors. In columns (2) and (4), we included other company characteristic variables such as the company's asset size (*Size*), asset-liability ratio (*Lev*), shareholding ratio of major shareholders (*Top*1), and whether the auditor is from the four largest international accounting firms (*Big*4). The coefficients of *Dispprove* changed to -0.265 and -0.280 and are still significant at 1%. The above regression results show that there is a significant negative correlation between independent directors' negative vote and the risk of stock price crash, regardless of whether the influence of control variables is considered, which supports the expectation of the research hypothesis in this paper.

4.2. Robustness Test

Because the regression results may be accidental, in order to verify the robustness, this paper uses the replacement of the explanatory variable measure, the replacement of the explanatory variable measure and the propensity score matching method (PSM) to test the robustness.

4.2.1. Replace the Explanatory Variable Measure

The explanatory variables in model (1) were replaced by *Dispprove*2 and *Dispprove_rate* were regressed. For the virtual variable *Dispprove*2 , 1 is taken when the independent director of the enterprise raises an objection in the current year; otherwise, 0 is taken, in which the objection is expressed as all opinions except "Agree" and "Others". *Dispprove_rate* is the percentage of dissenting opinions, where dissenting

opinions are all opinions except for the opinion type of "Agree".

Table 4. Replace the explanatory variable measure

	(1)	(2)	(3)	(4)
variable	$Ncskew_t$	$Ncskew_t$	$Duvol_t$	$Duvol_t$
$Dispprove2$	-0.241***		-0.282***	
	(-5.610)		(-9.800)	
$Dispprove\_rate$		-0.568***		-0.538***
		(-7.152)		(-8.437)
$Size_t$	0.011	0.011	0.004	0.004
	(1.041)	(1.032)	(0.510)	(0.523)
Lev_t	-0.062	-0.060	-0.042	-0.040
	(-1.383)	(-1.346)	(-1.417)	(-1.379)
ROA_t	-0.206**	-0.200**	-0.176***	-0.170***
	(-2.059)	(-2.003)	(-2.736)	(-2.639)
$Top1_t$	-0.002**	-0.002**	-0.001**	-0.001**
	(-2.090)	(-2.136)	(-2.251)	(-2.304)
$Growth_t$	-0.002	-0.002	0.001	0.001
	(-0.416)	(-0.370)	(0.349)	(0.435)
$Liqasset_t$	-0.007	-0.005	0.023	0.025
	(-0.159)	(-0.109)	(0.812)	(0.872)
$Cash_t$	0.019	0.017	0.003	0.001
	(0.252)	(0.230)	(0.063)	(0.011)
SOE_t	-0.071***	-0.072***	-0.052***	-0.052***
	(-2.752)	(-2.793)	(-3.191)	(-3.243)
Age_t	-0.009	-0.011	-0.029	-0.030
	(-0.134)	(-0.152)	(-0.651)	(-0.661)
$Dual_t$	0.003	0.003	0.000	0.001
	(0.183)	(0.191)	(0.041)	(0.062)
$Big4_t$	-0.079**	-0.077*	-0.060**	-0.059**
	(-1.978)	(-1.948)	(-2.395)	(-2.329)
$Analysts_t$	0.065***	0.065***	0.034***	0.034***
	(10.388)	(10.386)	(8.396)	(8.388)
constant term	-0.567**	-0.513**	-0.299*	-0.254
	(-2.190)	(-1.987)	(-1.722)	(-1.467)
observed value	33,393	33,393	33,393	33,393
R^2	0.038	0.038	0.043	0.042
Firm fixed effect	YES	YES	YES	YES
Annual fixed effect	YES	YES	YES	YES

Table 4 shows the OLS regression results after changing the explanatory variable measure. (1) and (3) show the regression results of $Dispprove2$ as explanatory variables, and the coefficients are significantly negative at the level of 1% in both columns of regression; (2) and (4) show the regression results after taking $Dispprove\_rate$ as explanatory variables, and the coefficient is also significantly negative at the level of 1% in both columns of regression. The results show that the negative correlation between independent directors' dissenting opinions and the risk of stock price crash is still valid even if the measurement method of independent directors' dissenting opinions is changed, which indicates that the conclusion of this paper is robust.

4.2.2. Replace the Interpreted Variable Measure

Since the risk of a stock price crash reflects the concealment of the company's negative news, it is essentially a measure of the information content of the stock price. Another common measure of the information content of stock price is stock price synchronicity, so we use stock price synchronicity as an alternative measure of the explained variable. Therefore, we replace the explained variable of model (1) with $Synch1$ and $Synch2$ for regression.

$Synch1$ referring to the measurement method of Zhou Linjie (2014) stock price synchronicity, the model is as follows:

First, a measurement model of R^2 is established according to the methods of Morck er al. (2000) and Durnev et al. (2003). The regression equation of each company is as follows:

$$r_{j,w,t} = \alpha_{j,t} + \beta_{j,t} r_{m,w,t} + \gamma_{j,t} r_{i,w,t} + \varepsilon_{j,w,t} \quad (5)$$

$r_{j,w,t}$ is the j company's total revenue for the w week of the t fiscal year, $r_{m,w,t}$ is the market revenue for the w week of the t fiscal year, and $r_{i,w,t}$ is the industry's revenue for the w week of the t fiscal year based on the Shenwan Level 1 industry index. Among them, market revenue and industry revenue are the weighted average after excluding companies (market revenue is calculated by a similar method), and industry revenue is calculated as follows:

$$r_{i,w,t} = \frac{(\sum_{k \in i} W_{k,w,t} r_{k,w,t} - W_{J,w,t} r_{j,w,t})}{J_{i,w} - 1} \quad (6)$$

$W_{k,w,t}$ is the market value weight of the j companies in the industry in the w week of the t fiscal year, and $J_{i,w}$ is the number of companies in the i industry in the w week. Finally, the stock price synchronicity ($Synch1$) is defined as follows:

$$Synch1 = \log(\frac{R^2_{adj,j,t}}{1 - R^2_{adj,j,t}}) \quad (7)$$

Among them, $R^2_{adj,j,t}$ is the adjusted R^2 value obtained by the company after regression with the model in the fiscal year.

$Synch2$ referring to the measurement method of stock price synchronicity of Yizhihong et al. (2018), the model is as follows:

First, calculate the weekly earnings data for the stock i:

$$R_{i,w,t} = \beta_0 + \beta_1 R_{M,w,t} + \beta_2 R_{M,w-1,t} + \beta_3 R_{I,w,t} + \beta_4 R_{I,w-1,t} + \varepsilon_{i,w,t} \quad (8)$$

Among them, $R_{i,w,t}$ is the return rate of the i company after considering the reinvestment of the cash dividend in the w week; $R_{M,w,t}$ is the market's weighted average of all companies' market capitalisation yields in the w week of the t year; all $R_{I,w,t}$ is the rate of return after excluding shares for the industry in which the i company is located, weighted by the market value in circulation of the other companies. Finally, define the stock price synchronicity ($Synch2$):

$$Synch2_{i,t} = \ln(\frac{R^2_{i,t}}{1 - R^2_{i,t}}) \quad (9)$$

Among them, $R^2_{i,t}$ is the value obtained by regression of the model in the t fiscal year of the i company.

Table 5. Replace the interpreted variable measure

	(1)	(2)
variable	*Synch*1	*Synch*2
$Dispprove_t$	-0.141***	-0.130***
	(-3.928)	(-4.162)
$Size_t$	0.251***	0.222***
	(17.824)	(17.828)
Lev_t	-0.499***	-0.445***
	(-8.924)	(-9.175)
ROA_t	-0.447***	-0.379***
	(-4.039)	(-3.928)
$Top1_t$	0.000	0.000
	(0.333)	(0.148)
$Growth_t$	-0.028***	-0.024***
	(-4.361)	(-4.196)
$Liqasset_t$	-0.028	-0.019
	(-0.514)	(-0.393)
$Cash_t$	-0.073	-0.072
	(-0.869)	(-0.969)
SOE_t	-0.046	-0.041
	(-1.392)	(-1.393)
Age_t	-0.020	0.003
	(-0.213)	(0.036)
$Dual_t$	-0.003	-0.004
	(-0.157)	(-0.254)
$Big4_t$	0.046	0.038
	(0.843)	(0.751)
$Analysts_t$	-0.015**	-0.017**
	(-1.969)	(-2.431)
constant term	-5.435***	-4.755***
	(-15.015)	(-14.683)
observed value	32,540	32,540
R^2	0.307	0.313
Firm fixed effect	YES	YES
Annual fixed effect	YES	YES

Table 5 shows the OLS regression results after changing the measures of the explained variables. Columns (1) and (2) respectively represent the regression results with $Synch1$ and $Synch2$ as the explained variables, and the coefficients remain significantly negative at the level of 1% in the two-column regression. The above regression results show that the negative correlation between the independent directors' negative vote and the risk of the company's stock price crash still holds even if the measurement of the explained variable is changed and the risk of stock price crash is measured by the stock price synchronicity index.

4.2.3. Propensity Score Matching

This paper uses the propensity score matching method (PSM) to process the sample. This paper selects enterprise size, asset-liability ratio, return on assets, shareholding ratio of the largest shareholder, revenue growth rate, proportion of current assets, ratio of cash flows from operating activities to total assets, nature of the enterprise, logarithm of the company's establishment period, whether two positions are combined, whether the auditor is from the four largest accounting firms in the world, and analyst tracking as the characteristic variables.

Table 6 reports the regression results of paired samples using PSM, the coefficient of $Dispprove$ which is still significantly negative at 1% level in the two-column regression, and the results have not changed, which proves the robustness of the conclusions in this paper.

Table 6. Propensity score matching (PSM)

	(1)	(2)
variable	$Ncskew_t$	$Duvol_t$
$Dispprove_t$	-0.297***	-0.201***
	(-2.601)	(-2.673)
$Size_t$	0.016	-0.003
	(0.166)	(-0.045)
Lev_t	0.720	0.255
	(1.487)	(0.913)
ROA_t	0.096	-0.096
	(0.130)	(-0.238)
$Top1_t$	-0.010	0.002
	(-1.316)	(0.500)
$Growth_t$	-0.023	-0.044
	(-0.422)	(-1.345)
$Liqasset_t$	0.132	0.129
	(0.292)	(0.516)
$Cash_t$	0.147	0.216
	(0.199)	(0.474)
SOE_t	0.064	-0.061
	(0.334)	(-0.538)
Age_t	0.084	0.636*
	(0.148)	(1.733)
$Dual_t$	-0.200	-0.006
	(-1.217)	(-0.057)
$Big4_t$	0.789**	0.466***
	(2.086)	(2.836)
$Analysts_t$	0.091	0.084*
	(1.319)	(1.935)
constant term	-1.113	-2.015
	(-0.478)	(-1.386)
observed value	1,144	1,144
R^2	0.119	0.173
Firm fixed effect	YES	YES
Annual fixed effect	YES	YES

4.3. Endogeneity test

Due to the possible endogeneity of sample selection, this paper uses the method of Liang Quan-xi and Zeng Hai-shu (2016) to deal with the potential self-selection problem by using the Heckman two-stage method. Firstly, the Probit regression method is used to calculate the IMR value (inverse mills ratio) of whether the company has any dissenting directors by using the model (10), and then the IMR value is added to the model (1) as a control variable to re-estimate the coefficient of $Disapprove$.

$$\begin{aligned}\Pr(Dispprove_{i,t}=1) &= \delta_0+\delta_1 Size_{t-1}+\delta_2 Lev_{t-1}+\delta_3 ROA_{t-1}+\delta_4 Top1_{t-1}\\ &+\delta_5 Growth_{t-1}+\delta_6 Liqasset_{t-1}+\delta_7 Cash_{t-1}+\delta_8 SOE_{t-1}+\delta_9 Age_{t-1}\\ &+\delta_{10} Dual_{t-1}+\delta_{11} Big4_{t-1}+\delta_{12} Analysts_{t-1}+\varepsilon_{i,t}\end{aligned} \tag{10}$$

Table 7. Heckman two-stage method

	(1)	(2)
variable	$Ncskew_t$	$Duvol_t$
$Dispprove_t$	-0.266***	-0.281***
	(-8.204)	(-12.218)
IMR	8.434***	4.124**
	(2.825)	(2.102)
$Size_t$	-0.433***	-0.214**
	(-2.743)	(-2.067)
Lev_t	4.028***	1.958**
	(2.778)	(2.057)
ROA_t	-1.697***	-0.906**
	(-3.164)	(-2.555)
$Top1_t$	-0.034***	-0.017**
	(-2.956)	(-2.245)
$Growth_t$	0.060***	0.032**
	(2.655)	(2.123)
$Liqasset_t$	-0.357***	-0.147*
	(-2.675)	(-1.676)
$Cash_t$	4.752***	2.317**
	(2.831)	(2.097)
SOE_t	0.510**	0.232*
	(2.448)	(1.707)
Age_t	-2.090***	-1.054**
	(-2.842)	(-2.181)
$Dual_t$	-0.475***	-0.233**
	(-2.808)	(-2.097)
$Big4_t$	-0.064	-0.052**
	(-1.580)	(-2.003)
$Analysts_t$	-0.838***	-0.407*
	(-2.623)	(-1.938)
constant term	-5.557***	-2.692**
	(-3.083)	(-2.257)
observed value	33,393	33,393
R^2	0.039	0.045
Firm fixed effect	YES	YES
Annual fixed effect	YES	YES

Column (1) of Table 7 reports the second stage regression results of the Heckman treatment effect of $Ncskew$ as a dependent variable; Column (2) reports the second stage regression results when used $Duvol$ as a dependent variable. The results show that the coefficient of is significantly negative in the two-column regression, which indicates that the sample does have a serious problem of self-selection bias. After adjusting the sample self-selection bias, the coefficient of $Dispprove$ is significantly negative at 1% in both series of regression. The above regression results indicate that there is still a significant negative correlation between the independent directors' dissenting opinions and the risk of stock price crash even under the control of sample self-selection bias.

5. Further Analysis

This paper argues that "governance effect" is the main transmission mechanism of independent directors' dissenting opinions affecting the risk of stock price crash. Independent directors' dissenting opinions can play a signal role, trigger attention and supervision, alleviate the second kind of agency conflict, and inhibit large shareholders from hollowing out the company through abnormal connected transactions and information manipulation, thus reducing the risk of stock price crash of enterprises. To sum up, this paper examines whether the "governance effect" plays a role by examining whether independent directors' dissenting opinions alleviate the second kind of agency problem and information manipulation problem.

5.1.1. Earnings Management

We tested whether the Independent Directors' negative vote alleviated the problem of information manipulation as follows: Firstly, the accrual earnings management index is calculated to measure the information manipulation behavior and the earnings management behavior of the majority shareholders of the enterprise by $DisAcc$ with reference to the method of Huang Hua et al. (2020). The cross-section modified Jones model is adopted to estimate the accrued earnings management level of the enterprise. The specific calculation method is as follows:

First, the model (11) is regressed, and the estimated parameter values β1, β2, β3 are substituted into the model (12) to obtain the non-discretionary accruals (NDA), and the discretionary accruals (DA) are obtained from the model (13), and the absolute value of the discretionary accruals is taken to obtain the enterprise accruals management index ($DisAcc$).

$$TR_T / A_{t-1} = \beta_1(1/A_{t-1}) + \beta_2(\Delta Ri_t / A_{t-1}) + \beta_3(FA_t / A_{t-1}) \quad (11)$$

$$NDA_t = \beta_1(1/A_{t-1}) + \beta_2(\Delta Ri_t / A_{t-1} - \Delta Ra_t / A_{t-1}) + \beta_3(FA_t / A_{t-1}) \quad (12)$$

$$DA_t = TR_t / A_{t-1} - NDA_t \quad (13)$$

Among them, TR is the total accrued profit (net profit less cash flow from operating activities) of the company, A is the total assets at the end of the year, ΔRi_t is the change value of the company's annual operating income, FA is the original value of the company's fixed assets at the end of the year, and ΔRa_t is the change value of the Company's annual accounts receivable.

This paper constructs the following model to test this path of action: firstly, model (1) is used to test the impact of independent directors' objections on the risk of stock price crash; if the coefficient of β_1 is significant, model (14) is used to test the impact of independent directors' objections on the intermediate variable ($DisAcc$); if the coefficient of λ_1 is significant, model (15) is used to test: if the coefficient of β_2 is significant and β_1 is insignificant, it is a complete intermediate effect; There is no mediating effect if none is significant; All of them are significant, which is part of the mediating effect.

$$DisAcc_{i,t} = \lambda_0 + \lambda_1 Dispprove_{i,t} + \lambda CONTROLS_{i,t} + \varepsilon_{i,t} \quad (14)$$

$$Crashrisk_{i,t+1} = \beta_0 + \beta_1 Dispprove_{i,t} + \beta_2 DisAcc_{i,t} + CONTROLS_{i,t} + \varepsilon_{i,t} \quad (15)$$

Column (1) of Table 8 reports the test results of earnings management behavior for *DisAcc* as an intermediate variable. It can be seen that the coefficient of *Dispprove* is significantly negative at 1%, indicating that the independent directors' dissenting opinions can inhibit the majority shareholders' earnings management behavior, and the earnings management behavior under control can help to improve the transparency of corporate information, reduce the backlog of negative information within the company, and thus reduce the risk of the company's stock price crash. Therefore, we believe that earnings management acts as an intermediary between the dissenting votes of independent directors and the risk of the company's share price collapsing, which verifies the transmission path predicted above.

5.1.2. Unusual Related Party Transactions

Regarding the second type of agency conflicts, we measure the abnormal related party transactions (*RPTr*) with reference to Chen Donghua et al. (2017) and measure the second type of agency problems with this:

First, the ratio of annual purchases and sales of goods and services purchased (received) and sold (provided) by a listed company to its parent company and other enterprises controlled by the same parent company to its total assets is calculated. Then, in order to exclude the normal operation of the enterprise in the connected purchase and sale, the ratio of annual purchase and sale amount to total assets is regressed with the method of Jian and Wong(2010), and the absolute value of the residual is taken to represent the abnormal connected transaction level, using the total assets of the company, the leverage ratio of the enterprise (the ratio of owner's equity to total assets) and the market-to-book ratio (the market value of the company/shareholders' equity).

In this paper, the following model is constructed to test this action path. The test procedure is referred to above and will not be described here.

$$RPTr_{i,t} = \lambda_0 + \lambda_1 Dispprove_{i,t} + \lambda CONTROLS_{i,t} + \varepsilon_{i,t} \quad (16)$$

$$Crashrisk_{i,t+1} = \beta_0 + \beta_1 Dispprove_{i,t} + \beta_2 RPTr_{i,t} + CONTROLS_{i,t} + \varepsilon_{i,t} \quad (17)$$

Column (2) of Table 8 reports the test result of abnormal related party transactions for *RPTr* as an intermediate variable. It can be seen that the coefficient of *Disapprove* is significantly negative at the level of 1%, indicating that the independent directors' dissenting opinions can inhibit the abnormal related party transactions of the company, and the reduction of abnormal related party transactions and "hollowing out" of large shareholders will help to improve the actual financial situation of the company and reduce the risk of the company's stock price collapsing. In conclusion, we believe that abnormal connected transactions can also play an intermediary role between the dissenting votes of independent directors and the risk of the company's share price collapsing, which verifies the above-mentioned forecast of this transmission path.

Table 8. Mechanism Test

	(1)	(2)
variable	*DisAcc*	*RPTr*
$Dispprove_t$	-0.008**	-0.012***
	(-2.521)	(-2.712)
$Size_t$	-0.006***	-0.011***
	(-3.873)	(-4.969)
Lev_t	0.028***	-0.006
	(5.022)	(-0.872)
ROA_t	-0.146***	0.019*
	(-8.071)	(1.653)
$Top1_t$	0.000	0.000***
	(0.968)	(2.868)
$Growth_t$	0.003***	0.001
	(3.856)	(1.637)
$Liqasset_t$	0.052***	0.021***
	(9.770)	(2.825)
$Cash_t$	-0.152***	0.011
	(-11.889)	(1.264)
SOE_t	-0.001	0.020***
	(-0.620)	(4.209)
Age_t	0.020**	0.023*
	(2.516)	(1.772)
$Dual_t$	-0.002	0.001
	(-0.963)	(0.936)
$Big4_t$	0.001	0.010
	(0.250)	(1.463)
$Analysts_t$	0.007***	-0.000
	(10.024)	(-0.015)
constant term	0.138***	0.131**
	(4.139)	(2.334)
observed value	30,978	32,662
R^2	0.074	0.019
Firm fixed effect	YES	YES
Annual fixed effect	YES	YES

6. Conclusion

In the face of the need to achieve high-quality economic development in China, it is particularly important to safeguard the stability of the financial market. As a major hidden danger affecting the stable development of the financial market, the risk of stock price crash needs to be effectively controlled by certain measures. In this regard, this paper studies the impact mechanism of how independent directors' dissenting opinions play a governance role to reduce the risk of corporate stock price crash.

This study found that there was a negative correlation between independent directors' dissenting opinions and the risk of stock price crash. The independent directors' dissenting opinions can play a governance role in restraining the abnormal related party transactions and earnings management behavior of the majority shareholders, thus reducing the risk of stock price collapse; Further research shows that the independent directors' dissenting opinions can significantly reduce the risk of stock price crash in the case of the largest shareholder with a higher shareholding ratio, higher audit quality and a larger number of analysts.

Through the research conclusion of this paper, we think that if we want the independent directors to have the power to raise objections to the motion, truly play the governance role of independent directors and get rid of the title of "vase director", we need to further improve the relevant system. On the one hand, the internal governance structure of the Company should be improved to strengthen the supervision and restraint on the irregularities committed by the internal management and major shareholders of the Company, so as to prevent the election and re-election of independent directors from being manipulated and interfered by major shareholders, and to enable independent directors to express their opinions independently of the interests of shareholders in a fair manner. On the other hand, the external environment and regulations also need to be further improved to strengthen the supervision of abnormal related party transactions, earnings management and other acts of the company, as well as the punishment of financial fraud and other irregularities; At the same time, it is also necessary to strengthen the relevant protection and litigation systems of independent directors, reduce the risks faced by independent directors in expressing dissent in the company, and ensure the effective operation of the independent director system. The research conclusion of this paper has certain practical significance to understand the transmission path between independent director system and the risk of stock price crash, and to understand the role of independent director system in stabilizing the financial markets of emerging market countries.

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