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Industry Competition Structure, Market Power, and Stock Price Crash Risk *

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Abstract

This paper analyses the relationship between competition (industry competition structure, market power, excessive size) and stock price crash risk in Chinese A-share listed companies. We find that (1) industry concentration or monopoly is positively related with stock price crash risk; (2) a balanced industry competition structure helps to mitigate stock price crash risk; and (3) excessive firm size (firm size adjusted by industry average) has moderating effects on the relation between market power and stock price crash risk. The empirical results of this study suggest that large companies should be prevented from using their market power to increase their monopoly so as to avoid competition imbalance.

***Keywords*:** Stock Price Crash Risk, Herfindahl-Hirschman Index, Lerner Index, Competition Structure, Market Power, Excessive Size
***CLC codes*:** F832.5, F830.91

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I. Introduction

Since the outbreak of the financial crisis in the United States in 2008, the bursting of financial bubbles has had a great impact on the global capital market. In particular, the collapse of stock markets has caused huge damage to social and economic operations, affected financial stability, and hurt the real economy. Stock price crash risk is of concern to both the financial market and the real economy. On 19 June 2013, a State Council executive meeting chaired by the Chinese prime minister Li Keqiang (1) discussed policy measures with regard to finance to support economic restructuring, transformation, and upgrading; (2) emphasised the key role of finance in the real economy; and (3) proposed the target of continuing to promote financial market reform and prevent financial risks. Therefore, it is of practical importance to analyse the stock price crash risk by examining real economy factors.

One stream of research on stock price crash risk investigates the issue from the perspective of behavioural finance, the potential impact of investors' trading behaviour on stock prices. Hong and Stein (2003), for example, find that differences in opinions among investors represented by a firm's detrended turnover will cause the accumulated hidden information to come out during market declines and induce a market crash. Another research stream, from the perspective of information asymmetry, finds that opaque firms are more likely to experience stock price crashes (Jin and Myers, 2006; Hutton *et al.*, 2009). The rationale is that if insiders conceal and accumulate bad news for an extended period, the stock price will surely be overvalued; once the amount of accumulated bad news reaches a tipping point, all bad news will be released immediately and in huge quantities, leading to stock price crashes. By the same token, Kim *et al.* (2011a, 2011b) and Kim and Zhang (2010) relate corporate tax avoidance, equity incentives, and accounting conservatism to stock price crash risk.

However, the above studies focus on the impact of financial market trading or corporate micro factors on stock price crash risk. From a more macro point of view, the external competitive environment also has an important impact on a company's operations and stock performance. Therefore, the relationship between industry competition in the real economy and stock performance in the capital market and the point at which regulators need to intervene in the competitive environment of the industry are issues that require attention. Existing studies tell us that firms in more concentrated industries earn lower stock returns (Hou and Robinson, 2006; Sharma, 2011); however, firms enjoying high market power or firms that are established in concentrated industries have lower idiosyncratic volatility (Gaspar and Massa, 2006). These findings imply that competition does affect stock price crash risk. Studies also find that one of the channels through which competition affects stock price crash risk is information (Peress, 2010; Li, 2010).

This study investigates the relationship between industry competition and stock price crash risk from the dimensions of industry competition structure (number of firms in the industry, industry concentration, and Entropy Index) and corporate market power. The study aims to explore how to make full use of the financial market to allocate resources while preventing a stock price crash. We construct our sample from all Chinese A-share listed companies between 2006 and 2013, excluding financial firms and deleting observations with incomplete data. The study finds that industrial monopoly and competition imbalance are positively related to stock price crash risk. However, moderate competition helps to ease stock price crash risk. At the firm level, the effect of a company's market power on its stock price crash risk is closely linked to excessive size (company size adjusted by industry average), which means that with a different excessive size, the relationship between market power and stock price crash risk will be different. The results of our study remind regulators to (1) watch out for large firms that increase their monopoly through their market power and (2) prevent competition imbalance in order to reduce stock price crash risk.

Our study contributes to the literature in several ways. First, this paper associates competition indicators with stock price crash risk to reveal the impact of macro governance factors on the capital market. Second, we provide further empirical evidence that in addition to returns, turnover, and volatility, industry competition has an effect on stock performance. Third, the empirical results of this paper have strong practical relevance and policy implications for the current economic restructuring initiated by the Chinese Central Government.

The rest of the paper is organised as follows: Section II reviews the related literature and proposes the research hypotheses; Section III introduces our sample, proxy variables, and the empirical model; Section IV reports the empirical results; Section V presents further tests; Section VI discusses the robustness tests; and Section VII concludes the paper.

II. Literature Review and Hypothesis Development

2.1 Literature on Stock Price Crash Risk

Early research on stock price crash risk is mostly conducted from the perspective of behavioural finance and rational expectations equilibrium. Romer (1993) argues that investors can find hidden news by observing other investors' trading behaviour. As a result, stock prices can be revealed through the trading process. Hong and Stein (2003) predict that high trading volume should be associated with more negative return skewness. Chen *et al.* (2001) support the prediction of Hong and Stein (2003) and find that detrended stock turnover, past stock return, and firm size are positively related to stock price crash risk.

In recent years, most researchers have explored the reasons for stock price crash risk

from the viewpoint of information asymmetry. Some scholars believe that when managers of listed companies take their compensation contracts and career development into consideration, they tend to stockpile negative information and accelerate the release of good news, which leads to information asymmetry between management and outside investors and forms "information barriers" (Ball, 2009; Graham *et al.*, 2005; Khan and Watts, 2009; Kothari *et al.*, 2009; LaFond and Watts, 2008). However, when bad news is accumulated to a tipping point that makes it hard to withhold anymore, it will be released to the market all at once, and investors are very likely to overreact to this accumulated bad news, resulting in stock prices falling sharply. Accordingly, if we can reduce or eliminate the information barriers, the risk of a stock price crash can be remarkably mitigated. The empirical findings from Jin and Myers (2006) and Hutton *et al.* (2009) show that for firms with lower transparency, their stocks have higher R^2s and are more prone to crash.

Regarding transparency, Kim *et al.* (2011a, 2011b) find that tax avoidance and the equity compensations of chief financial officers (CFOs) are positively related to stock price crash risk. Kim and Zhang (2010) show that accounting conservatism reduces the likelihood of a firm experiencing stock price crashes. These results imply that firms with higher CFO equity compensations or tax avoidance are more opaque, which leads to a higher stock price crash risk. However, for firms with accounting conservatism, the situation is the opposite.

Using a sample of Chinese A-share listed firms, Pan *et al.* (2011) investigate the relationship between corporate information transparency and stock price crash risk and how analyst following affects this relationship. They also find that opaque firms are more prone to stock price crashes and that analyst following reduces the influence of information opacity on crash risk. Xu *et al.* (2012) show that analyst optimism is significantly positively associated with stock price crash risk. From the perspective of "herd behaviour", Xu *et al.* (2013) examine the role of institutional investors in firm-level stock price crash risk, and the results show that institutional investors in China exacerbate the crash risk rather than stabilise the market.

2.2 Industry Competition Structure and Stock Price Crash Risk

Since 2006, studies on product market competition have gradually incorporated those on the capital market. On the one hand, scholars investigate the relationship between competition indices and stock returns. Hou and Robinson (2006), for example, find that firms in more concentrated industries earn lower returns. Sharma (2011) uses multidimensional indices of product market competition (Herfindahl-Hirschman Index, Lerner Index, and the industry market size) as proxies for the level of competition, and his conclusions are basically the same as those of Hou and Robinson (2006). On the other hand, scholars study the link between competition environment and the idiosyncratic volatility of stock returns. Gaspar and Massa (2006) provide evidence suggesting that firms established

in concentrated industries or firms enjoying high market power have more stable cash flow. They also find that the smaller the deviation in investors' expectations for stock prices, the lower the stock idiosyncratic volatility. Irvine and Pontiff (2009) attribute increases in idiosyncratic return volatility, which is mirrored by an increase in the idiosyncratic volatility of fundamental cash flows, to more intense economy-wide competition.

Scholars also investigate the relationship between competition indices and information disclosure at the industry and firm levels. The industry-level proxies for competition are usually the total number of firms in an industry and industry concentration as measured by the Herfindahl-Hirschman Index. Li (2010) reports that competition from potential entrants increases information disclosure quality while competition from existing rivals decreases information disclosure quantity. Yi *et al.* (2010) show that where the product market competition and corporate governance mechanisms are complementary to or substitutable for each other, good corporate governance can promote information disclosure.

The firm-level proxies for competition are the Lerner Index and the price-cost margin (Gaspar and Massa, 2006; Sharma, 2011; Peress, 2010). A higher Lerner Index means stronger market power and a lower competitive threat from rivals. Peress (2010) empirically supports his proposition that firms use their monopoly power to pass on shocks to customers, which encourages stock trading, expedites the capitalisation of private information into stock prices, and improves the allocation of capital. Following Peress's (2010) research, Zhang (2011) argues that product market power and good corporate governance can significantly improve the information content of stock prices.

The above empirical results indicate that market competition does have an effect on corporate information disclosure, which in turn affects stock prices. On the basis of these results, we put forward the following two alternative testable hypotheses:

H1a: Market competition decreases the stock price crash risk.
H1b: Market competition increases the stock price crash risk.

In Chinese capital markets, whether market competition decreases or increases, stock price crash risk is an empirical issue.

2.3 Interaction of Excessive Size and Market Power

According to Gaspar and Massa (2006), firm size, which is closely related to market power, provides a firm with bargaining leverage vis-à-vis its suppliers or business customers and the interaction between market power and excessive size has a negative impact on idiosyncratic volatility. Jin and Myers (2006) develop a theoretical model and then empirically prove that the lack of transparency is the reason for the increase in R^2 and that a higher R^2 means that the stock is more prone to price crashes. According to Jin and Myers

(2006) and Gaspar and Massa (2006), we consider that a larger company with stronger market power has higher stock price synchronicity, which increases stock price crash risk: That is to say, the interaction between excessive size (the difference between the firm's size and the average size of firms in the industry) and market power increases stock price crash risk. Hence, we propose a second testable hypothesis:

H2: The interaction between excessive size and market power increases stock price crash risk significantly.

III. Research Design

3.1 Sample Selection

We choose Chinese A-share listed companies from 2006 to 2013 as the sample, and the related data are obtained from the China Stock Market and Accounting Research (CSMAR) database and the WIND database. We choose 2006 as our starting point so as to eliminate the effect of the split share structure reform on corporate information disclosure and the information content of stock prices (Zhang and Liao, 2010; Yu and Yang, 2010).

We then clean the sample by (1) excluding stocks that trade for less than 30 weeks during a particular year, following Jin and Myers (2006); (2) excluding companies in the financial industry; (3) eliminating outliers;[2] and (4) deleting observations with incomplete data. The final sample is an unbalanced panel of 1,680 firms and 10,005 firm-year observations.

In addition, to check the robustness of the empirical results, we extend the investigation period to 2003 to 2013.[3] We also test the results for the pre-split share structure reform period, 2003 to 2005, and explore the effect of the reform.

3.2 The Definition and Measurement of Variables

3.2.1 Stock price crash risk

Following Chen *et al.* (2001), as well as Kim and Zhang (2010), we employ two measures of firm-specific crash risk: $NCSKEW_{i,t}$ and $DUVOL_{i,t}$. Both measures are based on firm-specific weekly returns estimated as the residuals from the expanded index model regression to ensure that our crash risk measures reflect firm-specific factors.

Firstly, we estimate the following expanded index model regression:

$$R_{i,\tau}=\alpha_i+\beta_1\times R_{m,\tau-2}+\beta_2\times R_{m,\tau-1}+\beta_3\times R_{m,\tau}+\beta_4\times R_{m,\tau+1}+\beta_5\times R_{m,\tau+2}+\varepsilon_{i,\tau}, \quad (1)$$

[2] The deleted outliers include $BM = 0$; $Lev > 1$; $Roa < -1$ or $Roa > 1$. The variable for opaqueness has been processed for outliers when it is calculated.

[3] Due to the availability of data, the earliest data we use starts from 2002.

where $R_{i,\tau}$ is the return on stock i in week τ and $R_{m,\tau}$ is the return on market index in week τ. The lead terms ($R_{m,\tau+1}$, $R_{m,\tau+2}$) and lag terms ($R_{m,\tau-2}$, $R_{m,\tau-1}$) for the market index return are included to allow for nonsynchronous trading.

Then we calculate the firm-specific weekly return, denoted $W_{i,\tau}$, for firm i in week τ:

$$W_{i,\tau} = ln(1+\varepsilon_{i,\tau}), \tag{2}$$

where $\varepsilon_{i,\tau}$ is the residual of equation (1) for firm i in week τ.

Our two measures of stock price crash risk are calculated as the negative skewness of firm-specific weekly returns (*NCSKEW*) and the down-to-up volatility (*DUVOL*). Specifically, for each firm i in year t, we compute *NCSKEW* as

$$NCSKEW_{i,t} = -[n(n-1)^{3/2}\Sigma W_{i,\tau}^{3}]/[(n-1)(n-2)(\Sigma W_{i,\tau}^{2})^{3/2}], \tag{3}$$

where $W_{i,\tau}$ is the firm-specific weekly return for firm i in week τ, which is calculated by equation (2), and n is the number of trading weeks in year t. A negative sign is put in front of the third moment so that a higher value of *NCSKEW* corresponds to a more left skewed distribution, which means a higher crash risk.

We calculate the second measure of crash risk as

$$DUVOL_{i,t} = \log\{[(n_u-1)\,\Sigma_{DOWN}\,W_{i,\tau}^{2}]/[(n_d-1)\,\Sigma_{UP}\,W_{i,\tau}^{2}]\}, \tag{4}$$

where n_u and n_d are the number of up and down weeks, respectively. Again, a higher value of the proxy indicates a higher crash risk.

3.2.2 Proxies for competition

We construct proxies to measure competition at industry and firm levels.

(1) Proxies for competition at the industry level (*Ind_hhi*)

Following the Guidelines for Industry Classification of Listed Companies issued by the China Securities Regulatory Commission (CSRC) in 2001, we classify all firms into 13 industries, and the manufacturing industry is further classified into 10 sub-industries. Therefore, there are 22 industries altogether. After excluding firms in the financial industry, we investigate listed firms in 21 industries.

Following Hou and Robinson (2006), Sharma (2011), Gaspar and Massa (2006), and Li (2010), we use industry concentration measured as the Herfindahl-Hirschman Index (*Ind_hhi*) of the sales of listed companies in an industry to proxy for industry competition structure. In addition, we also control for the effect of the number of firms in an industry (*Ind_num*) on stock price crash risk.

The formula used to calculate the Herfindahl-Hirschman Index (*Ind_hhi*) is as follows:

$$Ind\_hhi = \sum_{i=1}^{N}(x_{i,t}/X_{j,t})^2 = \sum_{i=1}^{N} S_{i,j}^2, \tag{5}$$

where $x_{i,t}$ is the sales of firm i in year t, $X_{j,t}$ is the aggregate revenues of industry j in year t, and $S_{i,j}$ is the proportion of sales for firm i in industry j.

The Herfindahl-Hirschman Index (*Ind_hhi*) reflects the industry concentration; when the number of companies (*Ind_num*) in an industry is controlled for, the Herfindahl-Hirschman Index (*Ind_hhi*) can also indicate the competition imbalance in that industry: that is, a higher value of *Ind_hhi* implies more imbalanced competition in the industry.

(2) Proxy for competition at the firm level (*Lerner*)

We use the Lerner Index (Lerner, 1934) adjusted by industry, denoted by *Lerner*, as the proxy for competition at the firm level. According to the theory of industrial organisation, the Lerner Index represents the market power of a company, which can be calculated as follows:

$$Lerner\ Index = (Price - Cost\ Margin)/Price. \tag{6}$$

As the cost margin cannot be observed directly, we use the price-cost margin, which is equal to operating profits divided by sales, to represent the Lerner Index: that is, we replace *Price* by sales and *Cost Margin* by operating costs. Following Gaspar and Massa (2006), Sharma (2011), Peress (2010), and Zhang (2011), we subtract the industry's arithmetic average of price-cost margin from the firm's price-cost margin to get the index *Lerner*. This approach could eliminate the influence of different industries possibly having structurally different profit rates for reasons unrelated to market power and make *Lerner* better reflect the company's competitive position in the industry. The formula is as follows:

$$Lerner_{i,j,t} = Lerner\ Index_{i,j,t} - IND\_L_{j,t}, \tag{7}$$

where $Lerner_{i,j,t}$ is the market power for firm i within industry j in year t, $Lerner\ Index_{i,j,t}$ is the Lerner Index (price-cost margin) for firm i within industry j in year t, and $IND\_L_{j,t}$ is the arithmetic average of the price-cost margin for industry j in year t. A higher value of *Lerner* means stronger market power and stronger competitiveness in the product market.

3.2.3 Control variables

Following Chen *et al.* (2001), Hutton *et al.* (2009), Kim *et al.* (2011a, 2011b), and Xu *et al.* (2012), we control for other variables that might affect stock price crash risk.

(1) $NCSKEW_{t-1}$ ($DUVOL_{t-1}$): stock price crash risk in year t-1.

(2) Dtn_{t-1}: the average monthly share turnover over the current fiscal year t minus the average monthly share turnover over the previous fiscal year t-1.

(3) Ret_{t-1}: the arithmetic average of firm-specific weekly returns in year t-1.

(4) $Sigw_{t-1}$: the standard deviation of firm-specific weekly returns over the fiscal year t-1.

(5) $Lnta_{t-1}$: the logarithm of a firm's total assets in year t-1.

(6) Bm_{t-1}: the firm's book value divided by the firm's market value in year t-1.

(7) Lev_{t-1}: the debt to asset ratio in year t-1.

(8) Roa_{t-1}: operating profit in year t divided by total assets in year t-1.

(9) $Opaque_{t-1}$: the measure of accrual manipulation, which is measured by a 3-year moving sum of absolute discretionary accruals according to the Modified Jones Model. A higher value of *Opaque* means lower transparency.

(10) *State_Ownership*:[4] state control dummy which equals 1 if the firm is state owned and 0 otherwise.

3.2.4 Other variables

(1) Ex_size_{t-1}: the difference between the firm's size and the average size of firms in the industry. We standardise Ex_size_{t-1} and investigate the impact of the interaction between *Lerner* and *Ex_size* on stock price crash risk.

(2) Ind_hhi3_{t-1}: Following Hou and Robinson (2006), we average the values of *Ind_hhi* over the past 3 years and use it as the proxy for industry competition structure in the robustness test. This proxy ensures that potential data errors do not have undue influence on our Herfindahl measure.

(3) Ei_{t-1}: Following Zhao and Wei (2008), we also use the Entropy Index (*Ei*) to measure the industry concentration; the formula is as follows:

$$\mathrm{Ei}=\sum_{i=1}^{N} S_i \log(1/S_i), \tag{8}$$

where *Ei* represents the Etropy Index, *N* is the number of listed firms in the industry, and S_i is the proportion of sales of firm *i* to total sales of all listed firms in the industry. A higher value of *Ei* means a more balanced competition structure in the industry. We use this variable in the robustness test on the relationship between the extent of competition balance and stock price crash risk.

(4) *Lerner_a*: Following Sharma (2011), we compute another proxy for market power, *Lerner_a*, by subtracting the sales-weighted price-cost margin of all firms in the industry from a firm's price-cost margin and use it in the robustness test.

(5) *Lerner_b*: a firm's price-cost margin without any adjustment, which is used in the robustness test.

Table 1 reports the descriptive statistics for the main variables.

3.3 Research Model

To control for firm and year effects, we use the two-way fixed effects model as follows:

$$CrashRisk_{i,t} = \alpha_i + \beta \times Competition_{i,t-1} + \gamma \times ControlVariables_{i,t-1} + Year_{i,t} + \varepsilon_{i,t}, \tag{9}$$

where $Competition_{i,t-1}$ is the proxy for industry competition structure or a firm's market

[4] We thank the anonymous referee for this suggestion.。

power, which includes *Ind_hhi*, *Ind_num,* or *Lerner*; $ControlVariables_{i,t-1}$ is the series of control variables referred to above; $Year_{i,t}$ is a series of year dummy to control for time effects; and α_i is the individual effects.

The model with an interaction between *Lerner* and *Ex_size* is as follows:

$$CrashRisk_{i,t} = \alpha_i + \beta_1 \times Lerner_{i,t-1} + \beta_2 \times Ex\_size + \beta_3 \times Lerner \times Ex\_size + \gamma \times ControlVariables_{i,t-1} + Year_{i,t} + \varepsilon_{i,t} \quad (10)$$

Table 1 Descriptive Statistics

Variables	Observations	Mean	SD	Minimum	Median	Maximum
NCSKEW	10005	-0.209	0.691	-3.803	-0.179	4.330
DUVOL	10005	-0.154	0.338	-1.342	-0.155	1.580
Ind_hhi(L)	10005	0.073	0.083	0.018	0.047	0.831
Ind_hhi3(L)	10005	0.075	0.091	0.019	0.047	0.829
Ind_num(L)	10005	139.327	101.547	4.000	117.000	479.000
Ei(L)	10005	3.622	0.731	0.573	3.765	4.735
Lerner(L)	10005	-0.012	0.147	-1.665	-0.025	0.731
Lerner_a(L)	10005	0.036	0.152	-1.674	0.015	0.713
Lerner_b(L)	10005	0.242	0.169	-1.506	0.204	0.966
Ex_size(L)	10005	-0.033	0.120	-0.253	-0.039	5.294
Dtn(L)	10005	-1.678	37.425	-227.819	-2.173	177.320
Lev(L)	10005	0.508	0.190	0.007	0.521	0.996
Lnta(L)	10005	21.773	1.232	15.729	21.645	28.405
Bm(L)	10005	0.717	0.290	0.006	0.720	2.383
Ret(L)	10005	-0.002	0.005	-0.531	-0.001	-0.000
Sigw(L)	10005	0.051	0.021	0.009	0.049	1.002
Roa(L)	10005	0.043	0.076	-0.610	0.033	0.989
Opaque(L)	10005	0.208	0.159	0.005	0.167	1.614
State_ownership	10005	0.633	0.482	0.000	1.000	1.000

IV. Empirical Results and Analysis

4.1 Industry Competition Structure and Stock Price Crash Risk

Table 2 presents the empirical results of the impact of industry competition structure on stock price crash risk. The results in columns (1) and (2) show that after we control for other factors influencing stock price crash risk, industry concentration (*Ind_hhi*) is positively related with stock price crash risk measured by *NCSKEW* and *DUVOL* at the 1% and 5% significance levels, respectively. As a higher *Ind_hhi* means higher concentration in an industry, the results reveal that stock price crash risk increases with the degree of market

monopoly, and that competition helps to reduce stock price crash risk. The results are consistent with our hypothesis H1a.

Columns (3) and (4) in Table 2 report the relationship between the number of firms in an industry (*Ind_num*) and stock price crash risk. The results show that *Ind_num* is positively related to stock price crash risk measured by *NCSKEW* and *DUVOL* at the 5% and 10% significance levels, respectively, which indicates that the more firms there are in an industry, the higher the stock price crash risk is.

Table 2 Industry Competition Structure and Stock Price Crash Risk

Variables	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Ind_hhi(L)	0.5931***	0.2868**			0.5243**	0.2571**
	(0.2271)	(0.1165)			(0.2278)	(0.1170)
Ind_num(L)			0.0006**	0.0003**	0.0005**	0.0002*
			(0.0002)	(0.0001)	(0.0002)	(0.0001)
NCSKEW(L)	-0.1135***		-0.1134***		-0.1144***	
	(0.0110)		(0.0110)		(0.0110)	
DUVOL(L)		-0.1082***		-0.1079***		-0.1090***
		(0.0104)		(0.0104)		(0.0104)
Dtn(L)	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Lev(L)	-0.2566***	-0.1196***	-0.2534***	-0.1179***	-0.2584***	-0.1204***
	(0.0826)	(0.0408)	(0.0823)	(0.0405)	(0.0825)	(0.0407)
Lnta(L)	0.2273***	0.1136***	0.2243***	0.1122***	0.2273***	0.1136***
	(0.0254)	(0.0125)	(0.0252)	(0.0123)	(0.0254)	(0.0125)
Bm(L)	-0.6205***	-0.3066***	-0.6133***	-0.3033***	-0.6157***	-0.3045***
	(0.0649)	(0.0309)	(0.0648)	(0.0309)	(0.0649)	(0.0309)
Ret(L)	-2.6990**	-1.8368***	-2.6358**	-1.8078***	-2.6587**	-1.8192***
	(1.3033)	(0.6478)	(1.3027)	(0.6485)	(1.3059)	(0.6498)
Sigw(L)	-1.1519	-0.7919**	-1.1221	-0.7782**	-1.1294	-0.7826**
	(0.7452)	(0.3773)	(0.7432)	(0.3766)	(0.7454)	(0.3776)
Roa(L)	-0.4411***	-0.2586***	-0.4307***	-0.2541***	-0.4302***	-0.2539***
	(0.1430)	(0.0662)	(0.1439)	(0.0664)	(0.1431)	(0.0660)
Opaque(L)	0.0040	-0.0051	0.0054	-0.0046	0.0071	-0.0038
	(0.0707)	(0.0348)	(0.0704)	(0.0347)	(0.0704)	(0.0346)
State_Ownership	-0.0512	-0.0327	-0.0483	-0.0313	-0.0504	-0.0324
	(0.0534)	(0.0269)	(0.0532)	(0.0269)	(0.0533)	(0.0269)
Constant	-4.1115***	-2.1070***	-4.0687***	-2.0830***	-4.1630***	-2.1292***
	(0.5073)	(0.2511)	(0.5012)	(0.2472)	(0.5068)	(0.2502)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10005	10005	10005	10005	10005	10005
R-squared	0.139	0.142	0.139	0.142	0.140	0.143
Number of stk	1680	1680	1680	1680	1680	1680

Note: (L) represents one year lagged; robust standard errors are reported in parentheses; ***, **, and * denote t-statistics significance at the 1, 5, and 10 percent levels, respectively.

To further clarify the relationship between industry competition and stock price crash risk, we continue to discuss how the number of firms in an industry affects the Herfindahl-Hirschman Index (*Ind_hhi*). According to equation (5), the Herfindahl-Hirschman Index (*Ind_hhi*) is determined by two factors: one is the number of firms (*N*) in an industry, and the other is the proportion of sales for firm *i* in industry *j* ($x_{i,t}/X_{j,t}$) to the total sales in industry *j*. If the number of firms (*N*) is equal in different industries, the sales proportion of different firms in the industry will have a major impact on the Herfindahl-Hirschman Index (*Ind_hhi*). In this case, greater differences in the distribution of the proportion of sales in the industry mean larger Herfindahl-Hirschman Index (*Ind_hhi*) values. Therefore, if we control for the number of firms (*Ind_num*), the Herfindahl-Hirschman Index (*Ind_hhi*) also reflects the degree of competition equilibrium in an industry, and a higher Herfindahl-Hirschman Index (*Ind_hhi*) value indicates a more imbalanced competition structure. We then regress the Herfindahl-Hirschman Index (*Ind_hhi*) on stock price crash risk measured by *NCSKEW* and *DUVOL*, controlling for the number of firms in an industry (*Ind_num*). The empirical results are presented in columns (5) and (6) of Table 2, which show that the Herfindahl-Hirschman Index (*Ind_hhi*) is positively related with stock price crash risk at the 5% significance level, while the number of firms in an industry (*Ind_num*) is positively related with stock price crash risk at the 5% and 10% significance levels. Thus, we conclude that imbalanced competition structure in an industry will increase the stock price crash risk, which means that excessive concentration (*Ind_hhi*) or excessive competition (*Ind_num*) aggravates stock price crash risk.

In summary, our explanation of Table 2 is as follows:

(1) During the period 2006 to 2013, the industry concentration of Chinese A-share listed companies is positively related with stock price crash risk. Therefore, a higher degree of monopoly within an industry leads to firms in that industry bearing a higher stock price crash risk.

(2) During the period 2006 to 2013, the imbalanced competition structure in an industry is positively related with stock price crash risk: That is to say, a more unbalanced competition structure within an industry leads to firms in that industry bearing a higher stock price crash risk.

The empirical results indicate that continuing marketisation and breaking industry monopoly help to reduce stock price crash risk in the capital market. In addition, optimising competition structure in an industry and keeping moderate competition help to mitigate stock price crash risk.

4.2 Market Power and Stock Price Crash Risk

We use *Lerner* as the proxy for a firm's market power by subtracting the industry's arithmetic average price-cost margin from the firm's price-cost margin. Columns (1) and (2)

in Table 3 present the empirical results of regressing stock price crash risk on a firm's market power. We find that a firm's market power is negatively related with stock price crash risk, but the coefficient is not significant. However, a firm's market power is often associated with its size (Gaspar and Massa, 2006), and firm size can affect bargaining power. Therefore, we further perform a regression controlling for excessive size (standardised *Ex_size*). As shown by the results presented in columns (3) and (4) of Table 3, excessive size (*Ex_size*) is positively related with stock price crash risk at the 1% and 5% significance levels while market power (*Lerner*) is still insignificant.

Following Gaspar and Massa (2006), we add the interaction term between excessive size (*Ex_size*) and market power (*Lerner*) as in equation (10). The results are presented in columns (5) and (6) of Table 3. We find that the interaction term between excessive size (*Ex_size*) and market power (Lerner) is positively related with stock price crash risk at the 1% significance level and excessive size (*Ex_size*) is positively related with stock price crash risk at the 1% significance level, which is consistent with hypothesis H2. During the period 2006 to 2013, excessive size (*Ex_size*) and market power (*Lerner*) have a significant interaction effect on stock price crash risk but market power (*Lerner*) itself does not have a significant effect on the crash risk. The interaction effect[5] indicates that market power (*Lerner*) has a significant positive effect on crash risk through excessive firm size (*Ex_size*), although it does not affect the crash risk by itself.

To summarise, the impact of market power on stock price crash risk varies with the size of the company: Market power increases stock price crash risk for big companies, but for small companies, stronger market power helps to mitigate stock price crash risk.

The results in Table 3 reveal that for the super big companies in an industry, higher pricing power means stronger market power and intensifies their monopoly effects. The stronger market power also increases their ability to bargain with regulators. As a result, these companies can stockpile bad news more easily. When the bad news is released all at once, the stock price will collapse accordingly.

For competitive small firms with high pricing power, their market power represents an innovative, high-end, and emerging force. These companies naturally attract the attention of investors, which reinforces information mining by outsiders and improves transparency. In addition, small firms are not strong enough to bargain with investors, banks, and regulators. They need to disclose information more timely. Moreover, investors focus more on the future value of these growing enterprises with a high price-cost margin and often ignore the current problems existing in the companies. The stock prices of these growing firms reflect the optimistic expectations of investors, thus mitigating their current stock price crash risk.

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[5] Referring to Jaccard, J. and Turrisi, R. (2012), *Interaction Effects in Multiple Regression* (2nd Edition), SAGE Publications, Inc.

Table 3 Interaction Effect of Excessive Size and Market Power on Stock Price Crash Risk

Variables	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Lerner (L)	-0.0003	-0.0020	0.0007	-0.0016	0.0347**	0.0129
	(0.0140)	(0.0069)	(0.0139)	(0.0068)	(0.0162)	(0.0081)
Ex_size(L)			0.6249***	0.2827**	1.2081***	0.5319***
			(0.2377)	(0.1357)	(0.2958)	(0.1481)
Lerner×*Ex_size*(L)					0.7247***	0.3097***
					(0.1901)	(0.0919)
NCSKEW(L)	-0.1122***		-0.1129***		-0.1131***	
	(0.0110)		(0.0110)		(0.0110)	
DUVOL(L)		-0.1069***		-0.1075***		-0.1079***
		(0.0104)		(0.0104)		(0.0104)
Dtn(L)	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Lev(L)	-0.2509***	-0.1185***	-0.2581***	-0.1218***	-0.2681***	-0.1261***
	(0.0832)	(0.0410)	(0.0833)	(0.0411)	(0.0833)	(0.0411)
Lnta(L)	0.2239***	0.1123***	0.2164***	0.1089***	0.2106***	0.1065***
	(0.0253)	(0.0124)	(0.0254)	(0.0125)	(0.0254)	(0.0125)
Bm(L)	-0.6186***	-0.3061***	-0.6256***	-0.3093***	-0.6229***	-0.3081***
	(0.0650)	(0.0309)	(0.0650)	(0.0309)	(0.0649)	(0.0309)
Ret(L)	-2.6790**	-1.8278***	-2.6313**	-1.8063***	-2.6087**	-1.7975***
	(1.2996)	(0.6463)	(1.2990)	(0.6457)	(1.2963)	(0.6447)
Sigw(L)	-1.1470	-0.7899**	-1.1335	-0.7841**	-1.1218	-0.7798**
	(0.7430)	(0.3762)	(0.7434)	(0.3766)	(0.7423)	(0.3762)
Roa(L)	-0.4430***	-0.2579***	-0.4409***	-0.2569***	-0.4382***	-0.2558***
	(0.1444)	(0.0668)	(0.1442)	(0.0666)	(0.1441)	(0.0665)
Opaque(L)	0.0016	-0.0060	0.0079	-0.0032	0.0105	-0.0021
	(0.0708)	(0.0348)	(0.0707)	(0.0348)	(0.0708)	(0.0348)
State_Ownership	-0.0489	-0.0320	-0.0491	-0.0321	-0.0508	-0.0328
	(0.0533)	(0.0269)	(0.0532)	(0.0269)	(0.0531)	(0.0268)
Constant	-3.9961***	-2.0560***	-3.8065***	-1.9702***	-3.6630***	-1.9089***
	(0.5028)	(0.2484)	(0.5051)	(0.2503)	(0.5070)	(0.2501)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	10005	10005	10005	10005	10005	10005
R-squared	0.138	0.142	0.141	0.140	0.139	0.143
Number of stk	1680	1680	1680	1680	1680	1680

Note: (L) represents one year lagged; robust standard errors are reported in parentheses; ***, **, and * denote t-statistics significance at the 1, 5, and 10 percent levels, respectively.

Therefore, the focus of regulation should vary to accommodate different types of companies. With regard to those super big companies with monopoly power, regulators should prevent their monopoly power from being intensified by their pricing power, pay more attention to their transparency, and resolve the potential stock price crash risk in time. For small- and middle-sized firms with high pricing power, such as innovative, high-end, and emerging firms, regulators should give appropriate support and improve their governance structure in order to avoid the accumulation of risks.

V. Further Tests

The above conclusions are made for the period 2006 to 2013, which is after the split share structure reform. To test whether the relationship between competition and stock price crash risk changes before and after the reform, we extend our sample periods to as early as 2003. For the full sample (2003-2013), we have 12,715 firm-year observations; for the subsample before the reform (2003-2005), we have 2,710 firm-year observations; and for the subsample after the reform (2006-2013), which has been tested in our main test,[6] we have 10,005 firm-year observations.

5.1 Tests for Different Periods: Industry Competition Structure and Stock Price Crash Risk

Table 4 presents how industry concentration (*Ind_hhi*) and the number of firms in an industry (*Ind_hhi*) affect stock price crash risk in three different periods. The regression results are the same in the full sample (columns (1) and (2)) and the subsample after the reform (columns (5) and (6)); this shows that both *Ind_hhi* and *Ind_num* increase stock price crash risk significantly. However, the relationship is not significant in the subsample before the reform (columns (3) and (4)). The results are logically consistent with Zhang and Liao (2010) and Yu and Yang (2010). After the reform, with the improvement in transparency, the relationship between industry competition structure and stock price crash risk is more evident.

In Table 4, we find that the impact of industry competition structure on stock price crash risk is different before and after the split share structure reform. It is natural for us to test whether the reform has a structural effect on the relationship.

To investigate the influence of the reform, we introduce a new dummy variable *Split*, which equals 1 in the years after the split share structure reform (2006-2013) and 0 in the years before the reform (2003-2005). In the full sample (2003-2013) regression, we add the reform dummy variable *Split* and the interaction between *Split* and industry concentration

[6] Although we have reported the results of the main test, in order to allow readers compare regression results in different periods more easily, we still list the main test results with the other results.

(*Ind_hhi*). The results are presented in Table 5. Columns (1), (2), (3), and (4) all show that *Split* is negatively related with stock price crash risk at the 1% significance level, which indicates that the reform has improved the transparency of listed companies and decreased the crash risk. Columns (3) and (4) indicate that the product of *Split* and *Ind_hhi* is negatively related with stock price crash risk, but insignificantly. Therefore, although the reform improves transparency and weakens the relationship between industry competition structure and stock price crash risk, the moderating effect is not significant.

Table 4 Industry Competition Structure and Stock Price Crash Risk: Staging Tests

	Full sample		Subsample before the split share structure reform		Subsample after the split share structure reform	
	2003-2013		2003-2005		2006-2013	
Variables	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Ind_hhi(L)	0.3696**	0.1789**	-1.9883	-1.7196*	0.5243**	0.2571**
	(0.1723)	(0.0823)	(2.0531)	(0.9703)	(0.2278)	(0.1170)
Ind_num(L)	0.0005**	0.0002**	-0.0052	-0.0015	0.0005**	0.0002*
	(0.0002)	(0.0001)	(0.0040)	(0.0019)	(0.0002)	(0.0001)
NCSKEW(L)	-0.0914***		-0.2995***		-0.1144***	
	(0.0101)		(0.0240)		(0.0110)	
DUVOL(L)		-0.0849***		-0.2815***		-0.1090***
		(0.0092)		(0.0215)		(0.0104)
Dtn(L)	0.0002	0.0002	-0.0014	-0.0007	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0017)	(0.0008)	(0.0003)	(0.0001)
Lev(L)	-0.1062	-0.0597*	-0.0656	-0.0520	-0.2584***	-0.1204***
	(0.0678)	(0.0330)	(0.3286)	(0.1530)	(0.0825)	(0.0407)
Lnta(L)	0.1841***	0.0918***	0.3460**	0.2142***	0.2273***	0.1136***
	(0.0201)	(0.0097)	(0.1342)	(0.0645)	(0.0254)	(0.0125)
Bm(L)	-0.6856***	-0.3338***	-2.2103***	-1.1811***	-0.6157***	-0.3045***
	(0.0570)	(0.0262)	(0.2535)	(0.1184)	(0.0649)	(0.0309)
Ret(L)	-3.1641**	-2.1370***	-264.8412	-123.5205	-2.6587**	-1.8192***
	(1.2424)	(0.5991)	(206.4912)	(99.3106)	(1.3059)	(0.6498)
Sigw(L)	-1.3271*	-0.9205***	-9.5309	-4.2388	-1.1294	-0.7826**
	(0.6994)	(0.3447)	(9.0371)	(4.1606)	(0.7454)	(0.3776)
Roa(L)	-0.6582***	-0.3752***	-1.6635***	-0.8446***	-0.4302***	-0.2539***
	(0.1166)	(0.0551)	(0.3538)	(0.1704)	(0.1431)	(0.0660)
Opaque(L)	0.0252	-0.0021	-0.0393	-0.0708	0.0071	-0.0038
	(0.0569)	(0.0277)	(0.2243)	(0.1056)	(0.0704)	(0.0346)
State_Ownership	-0.0164	-0.0100	0.1875*	0.1117**	-0.0504	-0.0324
	(0.0365)	(0.0177)	(0.1132)	(0.0561)	(0.0533)	(0.0269)
Constant	-3.1382***	-1.5782***	-4.7171*	-3.2557**	-4.1630***	-2.1292***
	(0.4042)	(0.1957)	(2.7903)	(1.3417)	(0.5068)	(0.2502)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12715	12715	2710	2710	10005	10005
R-squared	0.132	0.147	0.193	0.206	0.140	0.143
Number of stk	1696	1696	1029	1029	1680	1680

Note: (L) represents one year lagged; robust standard errors are reported in parentheses; ***, **, and * denote t-statistics significance at the 1, 5, and 10 percent levels, respectively.

Table 5 Influence of Split Share Structure Reform on the Relationship between Industry Competition Structure and Stock Price Crash Risk

Variables	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)
Ind_hhi(L)	0.3696**	0.1789**	0.3620**	0.1734**
	(0.1723)	(0.0823)	(0.1711)	(0.0817)
Split(L)	-0.6176***	-0.3623***	-0.6103***	-0.3570***
	(0.0467)	(0.0227)	(0.0475)	(0.0233)
Ind_hhi×*Split*(L)			-0.1031	-0.0746
			(0.1352)	(0.0691)
Ind_num(L)	0.0005**	0.0002**	0.0005**	0.0002**
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
NCSKEW(L)	-0.0914***		-0.0914***	
	(0.0101)		(0.0101)	
DUVOL(L)		-0.0849***		-0.0849***
		(0.0092)		(0.0092)
Dtn(L)	0.0002	0.0002	0.0002	0.0002
	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Lev(L)	-0.1062	-0.0597*	-0.1061	-0.0596*
	(0.0678)	(0.0330)	(0.0678)	(0.0329)
Lnta(L)	0.1841***	0.0918***	0.1838***	0.0916***
	(0.0201)	(0.0097)	(0.0201)	(0.0097)
Bm(L)	-0.6856***	-0.3338***	-0.6851***	-0.3334***
	(0.0570)	(0.0262)	(0.0570)	(0.0262)
Ret(L)	-3.1641**	-2.1370***	-3.1595**	-2.1336***
	(1.2424)	(0.5991)	(1.2420)	(0.5989)
Sigw(L)	-1.3271*	-0.9205***	-1.3262*	-0.9198***
	(0.6994)	(0.3447)	(0.6991)	(0.3445)
Roa(L)	-0.6582***	-0.3752***	-0.6563***	-0.3738***
	(0.1166)	(0.0551)	(0.1166)	(0.0551)
Opaque(L)	0.0252	-0.0021	0.0247	-0.0025
	(0.0569)	(0.0277)	(0.0569)	(0.0277)
State_Ownership	-0.0164	-0.0100	-0.0162	-0.0099
	(0.0365)	(0.0177)	(0.0365)	(0.0177)
Constant	-3.1382***	-1.5782***	-3.1316***	-1.5734***
	(0.4042)	(0.1957)	(0.4046)	(0.1960)
Year	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes
Observations	12715	12715	12715	12715
R-squared	0.132	0.147	0.132	0.147
Number of stk	1696	1696	1696	1696

Note: (L) represents one year lagged; robust standard errors are reported in parentheses; ***, **, and * denote t-statistics significance at the 1, 5, and 10 percent levels, respectively.

On the basis of results in Tables 4 and 5, we conclude that the split share structure reform does not have a structural effect on the relationship between industry competition structure and stock price crash risk, although the regression results are different before and after the reform. But our results are more significant after the reform (2006-2013).

5.2 Further Test on Market Power and Stock Price Crash Risk

5.2.1 Tests for different periods: Market power and stock price crash risk

Columns (1) and (2) of Table 3 reveal that the association between market power and stock price crash risk is not significant. We further test whether the results are still the same in the full sample and the subsample before the reform. Table 6 lists the regression results for the different samples.

Table 6 Market Power and Stock Price Crash Risk: Staging Tests

	Full sample		Subsample before the split share structure reform		Subsample after the split share structure reform	
	2003-2013		2003-2005		2006-2013	
Variables	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Lerner(L)	0.0026	-0.0017	-0.4936**	-0.1740	-0.0021	-0.0128
	(0.0771)	(0.0371)	(0.2393)	(0.1191)	(0.0881)	(0.0433)
NCSKEW(L)	-0.0902***		-0.3024***		-0.1122***	
	(0.0101)		(0.0241)		(0.0110)	
DUVOL(L)		-0.0837***		-0.2841***		-0.1069***
		(0.0093)		(0.0215)		(0.0104)
Dtn(L)	0.0002	0.0002	-0.0014	-0.0007	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0017)	(0.0008)	(0.0003)	(0.0001)
Lev(L)	-0.0951	-0.0550	-0.1526	-0.0751	-0.2509***	-0.1185***
	(0.0691)	(0.0336)	(0.3381)	(0.1574)	(0.0832)	(0.0410)
Lnta(L)	0.1820***	0.0909***	0.3716***	0.2258***	0.2239***	0.1123***
	(0.0200)	(0.0097)	(0.1365)	(0.0656)	(0.0253)	(0.0124)
Bm(L)	-0.6902***	-0.3359***	-2.2329***	-1.1888***	-0.6186***	-0.3061***
	(0.0571)	(0.0262)	(0.2556)	(0.1198)	(0.0650)	(0.0309)
Ret(L)	-3.2262***	-2.1661***	-274.4453	-128.3750	-2.6790**	-1.8278***
	(1.2402)	(0.5977)	(208.4293)	(100.5229)	(1.2996)	(0.6463)
Sigw(L)	-1.3597*	-0.9351***	-10.2119	-4.6569	-1.1470	-0.7899**
	(0.6984)	(0.3441)	(9.0489)	(4.1868)	(0.7430)	(0.3762)
Roa(L)	-0.6757***	-0.3825***	-1.6547***	-0.8385***	-0.4430***	-0.2579***
	(0.1180)	(0.0558)	(0.3553)	(0.1706)	(0.1444)	(0.0668)
Opaque(L)	0.0188	-0.0050	-0.0469	-0.0720	0.0016	-0.0060
	(0.0572)	(0.0278)	(0.2239)	(0.1054)	(0.0708)	(0.0348)
State_Ownership	-0.0133	-0.0087	0.1852	0.1113*	-0.0489	-0.0320
	(0.0365)	(0.0177)	(0.1146)	(0.0571)	(0.0533)	(0.0269)
Constant	-3.0254***	-1.5272***	-5.7867**	-3.7292***	-3.9961***	-2.0560***
	(0.4020)	(0.1949)	(2.7919)	(1.3403)	(0.5028)	(0.2484)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12715	12715	2710	2710	10005	10005
R-squared	0.131	0.146	0.193	0.205	0.138	0.141
Number of stk	1696	1696	1029	1029	1680	1680

Note: (L) represents one year lagged; robust standard errors are reported in parentheses; ***, **, and * denote t-statistics significance at the 1, 5, and 10 percent levels, respectively.

Columns (1) and (2) of Table 6 show that market power does not have a significant and consistent effect on stock price crash risk in the full sample (2003-2013). In the subsample before the reform (2003-2005), although in column (3) *Lerner* is significantly negatively related with stock price crash risk at the 5% level, the result in column (4) is not significant. Columns (5) and (6) indicate that in the subsample after the reform, again market power does not have significant effect on stock price crash risk.

5.2.2 Influence of the interaction term between excessive size and market power on stock price crash risk

Table 3 presents the interaction effect of excessive size and market power. We further investigate whether the interaction effect still holds in the full sample (2003-2013) and the subsample before the reform (2003-2005). Table 7 presents our empirical results for the different periods.

Table 7 Interaction Effect of Excessive Size and Market Power: Staging Test

	Full sample		Subsample before the split share structure reform		Subsample after the split share structure reform	
	2003-2013		2003-2005		2006-2013	
Variables	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Lerner(L)	0.0346**	0.0156**	-0.1097	-0.0367	0.0347**	0.0129
	(0.0155)	(0.0075)	(0.1138)	(0.0557)	(0.0162)	(0.0081)
Ex_size(L)	0.9096***	0.4100**	5.4110	3.7936	1.2081***	0.5319***
	(0.3412)	(0.1667)	(8.7501)	(4.3152)	(0.2958)	(0.1481)
Lerner×*Ex_size*(L)	0.7281***	0.3384***	-0.8130	-0.2324	0.7247***	0.3097***
	(0.2027)	(0.0981)	(2.7985)	(1.3662)	(0.1901)	(0.0919)
NCSKEW(L)	-0.0910***		-0.3033***		-0.1131***	
	(0.0101)		(0.0240)		(0.0110)	
DUVOL(L)		-0.0846***		-0.2858***		-0.1079***
		(0.0093)		(0.0214)		(0.0104)
Dtn(L)	0.0002	0.0002	-0.0013	-0.0006	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0017)	(0.0008)	(0.0003)	(0.0001)
Lev(L)	-0.1099	-0.0617*	-0.1494	-0.0730	-0.2681***	-0.1261***
	(0.0691)	(0.0335)	(0.3386)	(0.1577)	(0.0833)	(0.0411)
Lnta(L)	0.1707***	0.0858***	0.3271**	0.1946***	0.2106***	0.1065***
	(0.0201)	(0.0097)	(0.1524)	(0.0741)	(0.0254)	(0.0125)
Bm(L)	-0.6845***	-0.3332***	-2.2014***	-1.1664***	-0.6229***	-0.3081***
	(0.0569)	(0.0261)	(0.2556)	(0.1197)	(0.0649)	(0.0309)
Ret(L)	-3.1148**	-2.1180***	-272.2651	-127.2489	-2.6087**	-1.7975***
	(1.2379)	(0.5966)	(208.5250)	(100.4142)	(1.2963)	(0.6447)
Sigw(L)	-1.3199*	-0.9188***	-10.1974	-4.6661	-1.1218	-0.7798**
	(0.6975)	(0.3438)	(9.0563)	(4.1861)	(0.7423)	(0.3762)
Roa(L)	-0.6629***	-0.3767***	-1.6545***	-0.8395***	-0.4382***	-0.2558***
	(0.1176)	(0.0556)	(0.3554)	(0.1707)	(0.1441)	(0.0665)
Opaque(L)	0.0285	-0.0006	-0.0493	-0.0738	0.0105	-0.0021
	(0.0573)	(0.0278)	(0.2244)	(0.1057)	(0.0708)	(0.0348)

State_Ownership	-0.0160	-0.0099	0.1873	0.1134**	-0.0508	-0.0328
	(0.0363)	(0.0176)	(0.1139)	(0.0566)	(0.0531)	(0.0268)
Constant	-2.7556***	-1.4061***	-4.6841	-2.9577*	-3.6630***	-1.9089***
	(0.4049)	(0.1954)	(3.2817)	(1.6018)	(0.5070)	(0.2501)
Year	Yes	Yes	Yes	Yes	Yes	Yes
Firm	Yes	Yes	Yes	Yes	Yes	Yes
Observations	12715	12715	2710	2710	10005	10005
R-squared	0.133	0.147	0.194	0.205	0.140	0.143
Number of stk	1696	1696	1029	1029	1680	1680

Note: (L) represents one year lagged; robust standard errors are reported in parentheses; ***, **, and * denote t-statistics significance at the 1, 5, and 10 percent levels, respectively.

We find that the interaction effect is insignificant in the subsample before the reform (2003-2005), as shown by columns (3) and (4) in Table 7. However, in the full sample (columns (1) and (2) in Table 7), the interaction term is positively related with stock price crash risk at the 1% significance level, which is consistent with the regression results in the subsample after the reform (columns (5) and (6) in Table 7). Therefore, with the implementation of the split share structure reform, the interaction effect between excessive size and market power is more evident.

From Tables 4 to 7, we find that with the implementation of the split share structure reform, transparency has been improved in Chinese stock markets, leading to more significant relationships between industry competition structure or market power and stock price crash risk. Our main test results are verified in the full sample (2003-2013) but not proved in the subsample before the reform (2003-2005). Due to the structural impact of the reform on stock price crash risk, we still choose the period after the reform (2006-2013) as our sample period for the main test and robustness tests.

VI. Robustness Tests[7]

6.1 Robustness Tests on the Relationship between Industry Competition Structure and Stock Price Crash Risk

6.1.1 Change in the sample period of the Herfindahl-Hirschman Index

In the empirical analysis on the relationship between industry competition structure and stock price crash risk above, we use the lagged one-period Herfindahl-Hirschman Index (*Ind_hhi*) as a proxy for the degree of competition in an industry. In order to minimise the undue influence of potential data errors on variables, and following Hou and Robinson (2006), we use the average of the Herfindahl-Hirschman Index over the past three years

[7] To save space, the results of the robustness tests are not reported in detail, but they are available upon request.

(*Ind_hhi3*) to measure the degree of competition in an industry. The result is consistent with Table 2.

6.1.2 Relationship between the Entropy Index (*Ei*) and stock price crash risk

In the analysis above, we find that industry concentration (*Ind_hhi*) and the number of companies in an industry (*Ind_num*) are significantly positively related with stock price crash risk. Therefore, we argue that both excessive industry concentration and excessive industry competition would lead to stock price crash risk. In order to prove the relationship between unbalanced competition and stock price crash risk directly, we use the Entropy Index (*Ei*) to perform robustness tests. The results show that the Entropy Index (*Ei*) is negatively correlated with stock price crash risk at the 10% significance level, which indicates that a balanced competition structure within an industry helps to reduce stock price crash risk.

6.1.3 Relationship between current period industry competition index and stock price crash risk

Moreover, unlike firm-specific characteristics, industry competition is less likely to be affected by individual companies and is more likely to be exogenous. Therefore, we also use the current period industry competition index (*Ind_hhi*, *Ind_num*, *Ei*) in our regressions. The empirical results further support and strengthen our findings.

6.2 Robustness Tests on the Relationship between Market Power and Stock Price Crash Risk

Sharma (2011) also computes the difference between a firm's price-cost margin and the sales-weighted price-cost margin of all firms in the industry as a proxy for market power. In our robustness tests, we use the same method to adjust the Lerner Index and get the variable *Lerner_a*. The empirical results are still consistent with our findings. In addition, we use a firm's price-cost margin without any adjustment as the proxy for market power (*Lerner_b*) to perform robustness tests, and our conclusions still hold. The interaction between excessive size and market power are still significantly positively related with stock price crash risk: That is to say, larger companies with higher market power have a higher stock price crash risk.

VII. Conclusions and Implications

Using all A-share listed companies from 2006 to 2013 as the sample, we investigate how competition affects stock price crash risk at the industry and firm levels so as to explore the interactive effects between the real economy and the financial economy. We conduct a

variety of tests and get almost the same results. Therefore, our findings are robust.

We find that at the industry level, the higher the industry concentration (which means stronger monopoly) is, the higher the stock price crash risk of the companies in the industry. In addition, after controlling for the number of companies, stock prices are prone to crash when the competition in an industry is unbalanced. This implies that a balanced competition structure in an industry helps to mitigate stock price crash risk. Finally, at the firm level, the market power and the excessive size of a company have an interactive effect on stock price crash risk: That is, excessive size aggravates the impact of market power on stock price crash risk.

The above conclusions on the relationship between market competition and stock price crash risk, in essence, prove the same proposition: moderate competition helps reduce stock price crash risk at both the industry and firm levels. Companies have higher stock price crash risk in an industry with a stronger monopoly. After controlling for the number of companies in an industry, we find that stock prices are more likely to crash if the "polarisation of market share" is more serious in an industry. At the firm level, the impact of market power on stock price crash risk differs across different levels of firm size.

Our empirical results have policy implications. In the process of economic restructuring, transformation, and upgrading, policymakers should try to break the monopoly, pay more attention to the competition structure, and avoid polarisation of market share in an industry. It is important for regulators to monitor super big enterprises in order to increase their transparency and prevent monopolies caused by market power and excessive size, which would then help to mitigate stock price crash risk.

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行业竞争结构、公司市场势力与股价崩溃风险*

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摘要

本文以中国 A 股上市公司为样本，考察了行业竞争结构、公司市场势力及其异常规模对股价崩溃风险的影响关系。研究发现：（1）行业集中度越高、垄断性越强，则上市公司所面临的股价崩溃风险也会更高；（2）行业内竞争的均衡性有助于降低股价崩溃风险；（3）公司市场势力通过公司异常规模（即行业均值调整后的公司规模）对股价崩溃风险产生显著影响。这些实证结果的政策含义是，要防范大型企业凭借市场势力加剧垄断，防止竞争失衡；形成较为均衡的竞争结构以便降低上市公司的股价崩溃风险。

关键词：股价崩溃风险、赫芬达尔指数、勒那指数、竞争结构、市场势力、异常规模
中图分类号：F832.5、F830.91

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一、 引言

2008 年美国爆发金融危机以来，脱离实体经济的金融泡沫破裂，给全球资本市场带来了巨大冲击，尤其是股市的崩溃给经济社会运行带来了巨大破坏，影响国家金融稳定，危害实体经济的正常发展。对研究股价崩溃现象的研究不能仅仅局限于金融市场，还要从实体经济的角度予以考虑。2013 年 6 月 19 日，由李克强总理主持召开的国务院常务会议重点讨论了金融支持经济结构调整和转型升级的政策措施，强调了金融在实体经济中的重要作用，提出了继续推进金融市场改革并严格防范金融风险的目标。因此，结合实体经济层面因素对“股价崩溃”现象进行分析更加具有现实意义，也越来越多地受到学术界与实务界的关注。

关于股价崩溃的研究一方面从行为金融的角度出发，研究投资者的交易行为对股价可能产生的影响，如 Hong and Stein（2003）认为股票交易量的变化，代表了投资者多空双方的观点差异，在市场下跌的情况下会导致隐藏信息的释放，引发股价崩溃。另一方面则以信息不对称为着眼点，认为不透明的公司更容易发生股价崩溃（Jin and Myers, 2006; Hutton *et al.*, 2009），其理论逻辑在于管理层如果长期隐瞒并累积“坏消息”，必然会导致股价高估，一旦达到临界点，这些坏消息的突然释放会导致股价崩溃。沿着这一思路，Kim *et al.*（2011a, 2011b）、Kim and Zhang（2010）进一步将避税行为、期权激励、会计稳健性等关键因素与股价崩溃风险联系起来。

然而上述研究侧重的是金融市场交易和公司微观层面的因素对股价崩溃的影响，但从更宏观的角度来看，公司所处行业的外部竞争环境同样会对公司日常经营以及在资本市场上的表现产生重要影响。因此实体经济层面的行业竞争环境与上市公司在金融市场上的表现之间的关系如何，监管部门需要从什么角度入手对行业竞争环境进行干预，这些问题同样值得我们关注。国外的研究发现行业的集中度越高，股票的收益率越低（Hou and Robinson, 2006; Sharma, 2011）；市场势力越强的公司，或者是处于集中度高的行业中的公司，其股票的异质性波动率越小（Gaspar and Massa, 2006）。这些发现表明市场竞争确实会影响到股票价格风险。同时有研究发现市场竞争对股票价格风险的影响渠道之一就是信息 (Peress, 2010; Li, 2010）。

在上述有关股价崩溃、股价波动、市场竞争、信息透明度等研究成果的基础上，本文将以 2006—2013 年（滞后一期为 2005—2012 年）我国 A 股上市公司为研究样本（排除金融类上市公司并删掉数据有缺失的观测值），从行业竞争结构（行业内参与竞争企业的数量、行业集中度、熵指数）和企业的市场势力（Market Power）两个维度考察中国上市公司所面临的市场竞争程度与股价崩溃风险间的关系，探究如何在充分发挥金融市场资源配置作用的同时抑制股价崩溃。研究结果表明：在 2006 到 2013 年间，上市公司所处行业的垄断程度越高、竞争越不平衡，该行业内的公司就越容易发生股价崩溃，适度竞争有助于缓解股价崩溃风险；在公司层面，公司市场势力对股价崩溃风险的影响与其异常规模（Excess Size，即行业均值调整后的公司规模）有着密切联系，随着异常规模的不同，市场势力和股价崩溃风险之间的关系也会不同。这些实证结果的政策含义是，要防范大型企业凭借市场势力加剧垄断，防止竞争失衡；形

成较为均衡的竞争结构有利于降低上市公司的股价崩溃风险。

本文的贡献主要体现在以下几个方面：首先，本文将竞争指标与股价崩溃风险联系在一起，进一步揭示了宏观治理因素对股价崩溃风险的影响；其次，本文为行业竞争对上市公司的股价表现提供了除收益率、换手率、波动率外进一步的经验证据；最后，本文的实证研究结果在当前经济结构调整的措施方面具有较强的现实针对性和政策含义。

本文其余部分安排如下：第二部分对相关文献进行梳理回顾，并提出研究假设；第三部分对研究样本及代理变量进行界定；第四部分是对实证结果的分析和解释；第五部分为进一步检验；第六部分是稳健性检验；第七部分为研究结论。

二、 文献回顾与假设提出

（一）股价崩溃风险的影响因素

早期关于股价暴跌现象的研究大多是从行为金融学和理性预期均衡的角度进行的。例如 Romer（1993）认为，市场的交易过程会让投资者通过观察别人的行为发现更多之前被隐藏的信息进而影响到当前的资产价格。Hong and Stein（2003）预测在股票交易量较高的情况下，其收益的负偏态会更加明显。Chen *et al.*（2001）的实证研究支持了这一预测，他们发现：趋势调整后的股票交易量（Detrended Turnover）、股票的历史回报（Past Return）以及公司规模（Size）都与股价崩溃风险正相关。

近年来，研究者大多从公司信息的不对称角度来研究股价崩溃现象的成因。有学者认为，上市公司的管理者出于对自己的薪酬期权激励或职业生涯发展的考虑，倾向于隐藏公司内部的不利消息，并加速释放利好消息，这就导致在公司管理层和外部投资者之间出现信息不对称现象，形成“信息壁垒”（Ball, 2009; Graham *et al.*, 2005; Khan and Watts, 2009; Kothari *et al.*, 2009; LaFond and Watts, 2008）。但是，不利的消息积累到一定程度以后就很难再继续隐瞒下去，投资者一旦得知这些大量被累积起来的不利消息，很有可能会作出过度反应，进而导致股价大幅下跌。相应地，如果我们有办法降低或者消除这个“信息壁垒”，就会大大降低股价崩溃发生的风险。Jin and Myers（2006）以及 Hutton *et al.*（2009）的实证研究表明，上市公司的透明度越低，其 R^2 越高（即与市场的同步性越高），也更容易发生股价崩溃风险。

沿着信息透明度的思路，Kim *et al.*（2011a, 2011b）、Kim and Zhang（2010）发现公司 CFO 的期权激励和公司的避税行为与股价崩溃风险之间存在着显著的正相关关系，而会计稳健性程度则与股价崩溃风险之间存在着显著的负相关关系。这些研究表明，有着高期权激励的 CFO，以及有着避税行为的公司倾向于构建高的“信息壁垒”，这会加大公司的不透明程度，进而导致公司的股价崩溃风险增加；而更加稳健的会计政策则会削弱上市公司的“信息壁垒”，使其发生股价崩溃的可能性更小。

在国内，潘越、戴亦一和林超群（2011）以我国 A 股上市公司为样本考察了公司信息透明度与个股暴跌风险之间的关系，以及证券分析师关注程度对这种关系的影响，

他们发现上市公司的信息透明度越低，其个股暴跌风险就越大，而证券分析师对股票的高度关注会大大降低信息透明度与个股暴跌风险之间的负相关关系。许年行、江轩宇、伊志宏和徐信忠（2012）发现分析师的乐观偏差与上市公司未来股价崩盘风险之间存在着显著的正相关关系。许年行、于上尧和伊志宏（2013）从机构投资者“羊群行为”的视角考察了机构投资者在公司层面股价崩盘风险中所扮演的角色，他们发现国内的机构投资者更多地是扮演了“崩盘加速器”、而非“市场稳定器”的角色。

（二）行业竞争结构与股价崩溃风险

2006 年以后，产品市场竞争逐步与资本市场的研究相结合。一方面，学者们考察了竞争指标与股票收益率之间的关系，比如，Hou and Robinson（2006）发现市场集中度与股票收益率成反比关系；Sharma（2011）同时使用产品市场竞争的多维指标（赫芬达尔指数、勒纳指数、企业所在行业的销售额）作为竞争程度的代理变量，所得出的结论与 Hou and Robinson（2006）基本相同。另一方面，学者们考察了竞争指标与公司股价波动率之间的关系，比如，Gaspar and Massa（2006）发现行业的市场集中度越高，企业的市场势力越强，上市公司的现金流就越稳定，投资者对公司股价的预期偏差就越小，则股票收益率的波动也就越小；Irvine and Pontiff（2009）将现金流所导致的异质性波动率变化归因于整个经济体系内更加激烈的竞争。

更进一步地，学者们也分别从行业层面和微观企业层面对竞争指标与公司信息披露之间的关系进行了考察。

从行业层面来看，现有的研究通常使用行业内公司数量、赫芬达尔指数等行业层面的指标作为竞争程度的代理变量。Li（2010）发现来自于潜在竞争者的竞争可以提高信息披露质量，而来自于现有对手的竞争则降低了信息披露质量。伊志宏、姜付秀和秦义虎（2010）发现公司治理结构的合理安排能够对信息披露产生促进作用，而产品市场竞争则对某些公司治理机制产生了互补或替代作用。

从微观企业层面来看，学者一般使用勒那指数（Lerner Index）作为企业所面临竞争程度的一个代理变量（Gaspar and Massa, 2006; Sharma, 2011; Peress, 2010），该指标越大，说明企业定价能力越强，其市场势力和竞争力也就越强，在市场上所面临的竞争威胁较低。Peress（2010）发现公司市场势力越大，股票的换手率越高，同时股票价格的信息含量也越高；而产品市场的竞争则有可能降低信息效率。张益明（2011）在 Peress（2010）研究的基础上，考察了国内产品市场势力、公司治理与股票价格信息含量之间的关系，发现产品市场势力与合理的公司治理结构安排能够明显提高股票价格的信息含量，并且在在提高股票价格的信息含量方面，公司市场势力与不同的公司治理机制之间表现出了一定的替代或互补关系。

上述研究结果表明市场竞争确实与公司信息有关，但是从不同视角考察，有可能会得出不同的研究结论。因此，在上述文献的研究基础上，我们提出如下备择假设：

H1a：**市场竞争降低股价崩溃风险**；

H1b：**市场竞争增加股价崩溃风险**。

在中国资本市场上，上述两个假设哪个更符合现实情况，需要我们通过实证检验来加以证实。

（三）异常规模（Excess Size）与市场势力（Market Power）的交互作用

Gaspar and Massa（2006）指出，公司规模与其市场势力密切相关，因为公司规模能够影响公司的议价能力（Bargaining Leverage），他们发现市场势力与异常规模的交乘项能够显著削弱公司股价的异质性波动率（Idiosyncratic Volatility）。而 Jin and Myers（2006）则通过模型和实证指出是由于透明度（Transparency）的缺乏导致股票价格波动同步性（R^2）增加，而且有着高 R^2 的不透明的股票更容易崩溃。沿着 Jin and Myers（2006）中价格波动同步性（R^2）和股价崩溃风险的逻辑，结合 Gaspar and Massa（2006）的实证结论，我们认为行业中公司规模越大，且有着较强定价权的公司，会增加股价同步性，从而增加股价崩溃风险，即异常规模（Excess Size，即行业均值调整后的公司规模）与市场势力的交互作用会增加股价崩溃风险。据此我们提出如下假设：

H2：异常规模与市场势力在对股价崩溃风险的影响方面存在着交互作用，且二者之间的交叉项会显著增加股价崩溃风险。

三、 研究设计

（一）样本选择

我们的样本为 2006—2013 年（滞后一期为 2005—2012 年）全部 A 股上市公司，数据来源为 WIND 数据库和 CSMAR 数据库。我们之所以选择 2006 年（滞后一期为 2005 年）作为研究起点，是为了避免股权分置改革事件对公司信息披露及股票价格信息含量的影响（张学勇和廖理，2010；余宇新和杨大楷，2010）。

对于初始数据的处理：（1）参照 Jin and Myers（2006）的做法，剔除每年交易周数小于 30 的样本；（2）剔除金融类上市公司；（3）剔除异常值；[2]（4）剔除数据缺失的样本；最终形成一个非平衡面板数据，共计 1,680 家公司、10,005 个公司-年度观测值。

此外，为了保持结果的稳健性，我们在进一步检验中也对全样本（2003—2013 年，滞后一期为 2002—2012 年）和股权分置改革前（2003—2005 年，滞后一期为 2002—2004 年）这两个样本期间进行了考察，[3] 并考察了股权分置改革对行业集中度、公司市场势力与股价崩溃风险关系的影响。

（二）变量的定义和度量

1、股价崩溃风险（Crash Risk）

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[2] 剔除的异常值包括 *Bm* 为 0 的值，*Lev* 大于 1 的值，*Roa* 小于 -1 或者大于 1 的值。透明度指标在计算时已经对异常值进行了处理。

[3] 由于样本数据的可得性，我们所用到滞后一期数据的最早年份是 2002 年

参照 Chen *et al.*（2001）及 Kim and Zhang（2010）的方法，我们使用负收益偏态系数（$NCSKEW_{i,t}$）和收益波动比率（$DUVOL_{i,t}$）两个变量作为股价崩溃风险的代理变量。其具体计算过程为：

首先，测算单只股票收益受市场收益影响的程度，无法解释的部分为个股的公司特有收益。

$$R_{i,\tau} = \alpha_i + \beta_1 \times R_{m,\tau-2} + \beta_2 \times R_{m,\tau-1} + \beta_3 \times R_{m,\tau} + \beta_4 \times R_{m,\tau+1} + \beta_5 \times R_{m,\tau+2} + \varepsilon_{i,\tau} \quad (1)$$

其中，$R_{i,\tau}$ 是股票 i 在某一年度第 τ 周的收益率，$R_{m,\tau}$ 是市场所有股票在某一年度第 τ 周的收益率；方程（1）中加入市场收益的滞后项 $R_{m,\tau-2}$ 和 $R_{m,\tau-1}$ 以及超前项 $R_{m,\tau+1}$ 和 $R_{m,\tau+2}$，以调整股票非同步性交易的影响。

其次，计算股票 i 在第 τ 周的公司特有收益 $W_{i,\tau}$

$$W_{i,\tau} = ln(1+\varepsilon_{i,\tau}) \quad (2)$$

其中，$\varepsilon_{i,\tau}$ 为方程（1）的残差。

最后，我们计算衡量上市公司的股价崩溃风险的两个代理变量：

（1）*NCSKEW*——负收益偏态系数

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

其中，n 为股票 i 的每年交易周数，*NCSKEW* 表示偏态系数的负向程度，负向程度越大则表示股票 i 的崩溃风险越大。

（2）*DUVOL*——收益波动比率

$$DUVOL_{i,t} = \log\{[(n_u-1)\,\Sigma_{DOWN}\,W_{i,\tau}^{2}]/[(n_d-1)\,\Sigma_{UP}\,W_{i,\tau}^{2}]\} \quad (4)$$

其中，n_u 代表股票 i 的周特有收益高于股票 i 年平均收益的周数，n_d 则是股票 i 的周特有收益低于年平均收益的周数。*DUVOL* 的数值越大，个股 i 的崩溃风险越大（收益率左偏）。

2、竞争程度的代理变量

我们主要是从行业竞争结构和公司市场势力两个维度来构建竞争程度的代理变量。

（1）行业竞争结构的代理变量（*Ind_hhi*）：根据证监会 2001 年制定的《上市公司行业分类指引》，本文将上市公司按照行业门类划分为 13 个门类行业，其中制造业又被进一步细分为 10 个次类行业，最终我们将全部样本分别归属于 22 个行业类别，剔除金融业后，共有 21 个行业类别纳入考察。

参照 Hou and Robinson（2006）、Sharma（2011）、Gaspar and Massa（2006）以及 Li（2010）的做法，我们主要使用行业内上市公司销售收入的赫芬达尔指数（*Ind_hhi*）作为衡量上市公司所面临的行业竞争结构的代理变量，此外我们也控制了行业内上市

公司数量（*Ind_num*）对股价崩溃风险的影响。

赫芬达尔指数的计算公式列示如下：

$$Ind\_hhi = \sum_{i=1}^{N}(x_{i,t}/X_{j,t})^2 = \sum_{i=1}^{N} S_{i,j}^2 \quad (5)$$

其中 $S_{i,j}$ 表示上市公司 i 占行业 j 内所有上市公司的销售份额，$x_{i,t}$ 表示公司 i 在年度 t 的营业收入，$X_{j,t}$ 表示行业 j 在年度 t 的行业总营业收入。

一般来说，赫芬达尔指数（*Ind_hhi*）可以反映出行业集中程度，该数值越大，则行业集中度越高；同时，在对行业内上市公司数量（*Ind_num*）加以控制的情况下，赫芬达尔指数还可以反映出行业竞争的均衡程度，该数值越大，行业内的竞争越不均衡。

（2）公司市场势力的代理变量（*Lerner*）：我们使用经过行业调整的勒纳指数（Lerner, 1934）作为我们公司层面企业竞争程度的代理变量。在产业组织理论中，勒纳指数（Lerner Index）通常代表企业的市场势力，它表示产品价格（Price）高于其边际成本（Cost Margin）的程度，计算方法为：

$$Lerner\ Index = (Price - Cost\ Margin)/Price \quad (6)$$

由于边际成本在现实中无法观测，我们使用公司的销售毛利率来替代勒那指数，即用营业收入代表 *Price*，用营业成本代表 *Cost Margin*。参考 Gaspar and Massa（2006）、Sharma（2011）、Peress（2010）以及张益明（2011）的做法，我们对公司的销售毛利率进行了行业层面的调整，用公司的销售毛利率减去行业销售毛利率的算数平均值，以扣除行业特征的影响，同时反映出公司在行业中的竞争地位。公式如下：

$$Lerner_{i,j,t} = Lerner\ Index_{i,j,t} - IND\_L_{j,t} \quad (7)$$

其中 $Lerner_{i,j,t}$ 指的是企业 i 在行业 j 中 t 年的市场势力，$Lerner\ Index_{i,j,t}$ 指的是企业 i 在行业 j 中 t 年的勒纳指数，$IND\_L_{j,t}$ 指的是行业 j 在 t 年的整个行业勒纳指数的算数平均值。*Lerner* 指标越大，企业的市场势力就越强，其在产品市场上的竞争力也就越强。

3、控制变量

借鉴 Chen *et al.*（2001）、Hutton *et al.*（2009）、Kim *et al.*（2011a, 2011b）以及许年行、江轩宇、伊志宏和徐信忠（2012）的做法，结合本论文研究问题的实际情况，我们需要控制其他变量对股价崩溃风险的影响，具体说明如下：

（1）$NCSKEW_{t-1}$（$DUVOL_{t-1}$）：t-1 年的股价崩溃风险；

（2）Dtn_{t-1}：t-1 年的年度月均换手率的差分；

（3）Ret_{t-1}：t-1 年的公司年度周特有收益率的算数平均值；

（4）$Sigw_{t-1}$：t-1 年的公司年度周特有收益率的标准差；

（5）$Lnta_{t-1}$：t-1 年的公司规模，为上市公司总资产的自然对数；

（6）Bm_{t-1}：t-1 年的“期末总资产 / 市场价值”，其中市场价值为股权市值与净债务市值之和，非流通股权市值用净资产代替计算；

（7）Lev_{t-1}：t-1 年的资产负债率；

（8）Roa_{t-1}：t-1 年的总资产收益率，为 t 年的营业利润与 t-1 年公司总资产的比值；

（9）$Opaque_{t-1}$：t-1 年的公司透明度，根据修正的琼斯模型（Modified Jones Model），参考 Kim *et al.*（2011a）的做法，使用过去三年可操纵应计利润的绝对值之和进行衡量，该数值越大表明公司的透明度越低；

（10）*State_Ownership*：[4] 考虑到中国大陆国有企业和民营企业所面临的竞争环境、公司政策等方面有诸多不同，我们根据上市公司实际控制人性质将样本公司分为国有和民营两类，并作为我们的一个控制变量，当上市公司为国有企业时 *State_Ownership* = 1，否则 *State_Ownership* = 0。

4、其他变量

（1）Ex_size_{t-1}：异常规模（Excess Size），用于反映企业总资产超出行业平均总资产的规模。为了降低其数量级，我们对原始指标进行了标准化处理。在本文的研究中，我们会考察公司市场势力与异常规模之间的交互作用（即 $Lerner_{t-1}$ 与 Ex_size_{t-1} 的交叉项）对股价崩溃风险的影响。

（2）Ind_hhi3_{t-1}：过去三年的赫芬达尔指数均值（*Ind_hhi3*），参照 Hou and Robinson（2006）的做法，我们用这一指标对行业内上市公司销售收入的赫芬达尔指数（*Ind_hhi*）进行稳健性检验。

（3）Ei_{t-1}：参考赵玉林和魏芳（2008）的做法，我们用熵指数（*Ei*）来度量公司所在行业的集聚度，其计算公式为：

$$Ei=\sum_{i=1}^{N} S_i \log(1/S_i) \qquad (8)$$

其中 *Ei* 为熵指数，*N* 是行业内上市公司的数量，S_i 是上市公司占行业内上市公司的销售收入份额。熵指数 *Ei* 越大，则行业内的竞争越均衡。我们使用这一指标对竞争均衡性与股价崩溃风险关系作稳健性检验。

（4）*Lerner_a*：参考 Sharma（2011）的做法，我们使用单个上市公司的勒纳指数减去行业内销售份额加权平均勒那指数作为调整后的勒那指数，用作勒纳指数的稳健性检验。

（5）*Lerner_b*：单个上市公司未作任何调整的勒纳指数，即企业自身的销售毛利率对勒纳指数作进一步的稳健性检验。

主要变量的描述性统计参见表 1。

[4] 感谢审稿人提出的宝贵建议，我们将这一指标作为控制变量予以考虑。

表 1　变量的描述性统计

变量名称	观测值数量	均值	标准差	最小值	中位数	最大值
NCSKEW	10005	-0.209	0.691	-3.803	-0.179	4.330
DUVOL	10005	-0.154	0.338	-1.342	-0.155	1.580
Ind_hhi(L)	10005	0.073	0.083	0.018	0.047	0.831
Ind_hhi3(L)	10005	0.075	0.091	0.019	0.047	0.829
Ind_num(L)	10005	139.327	101.547	4.000	117.000	479.000
Ei(L)	10005	3.622	0.731	0.573	3.765	4.735
Lerner(L)	10005	-0.012	0.147	-1.665	-0.025	0.731
Lerner_a(L)	10005	0.036	0.152	-1.674	0.015	0.713
Lerner_b(L)	10005	0.242	0.169	-1.506	0.204	0.966
Ex_size(L)	10005	-0.033	0.120	-0.253	-0.039	5.294
Dtn(L)	10005	-1.678	37.425	-227.819	-2.173	177.320
Lev(L)	10005	0.508	0.190	0.007	0.521	0.996
Lnta(L)	10005	21.773	1.232	15.729	21.645	28.405
Bm(L)	10005	0.717	0.290	0.006	0.720	2.383
Ret(L)	10005	-0.002	0.005	-0.531	-0.001	-0.000
Sigw(L)	10005	0.051	0.021	0.009	0.049	1.002
Roa(L)	10005	0.043	0.076	-0.610	0.033	0.989
Opaque(L)	10005	0.208	0.159	0.005	0.167	1.614
State_ownership	10005	0.633	0.482	0.000	1.000	1.000

（三）研究模型

为了控制住自变量和因变量受公司异质性及时间趋势的影响，我们运用静态面板方法进行回归。研究竞争程度与股价崩溃风险的模型说明如下：

$$CrashRisk_{i,t} = \alpha_i + \beta \times Competition_{i,t-1} + \gamma \times ControlVariables_{i,t-1} + Year_{i,t} + \varepsilon_{i,t} \quad (9)$$

其中 $Competition_{i,t-1}$ 为行业竞争结构或公司市场势力代理变量，本文中主要指赫芬达尔指数（*Ind_hhi*）、行业内上市公司数量（*Ind_num*）以及反映公司市场势力的勒那指数（*Lerner*）；控制变量除上文所述之外，还通过加入年度虚拟变量控制住时间趋势。研究公司市场势力（Market Power）与异常规模（Excess Size）之间交互作用的模型：

$$CrashRisk_{i,t} = \alpha_i + \beta_1 \times Lerner_{i,t-1} + \beta_2 \times Ex\_size + \beta_3 \times Lerner \times Ex\_size + \gamma \times ControlVariables_{i,t-1} + Year_{i,t} + \varepsilon_{i,t} \quad (10)$$

四、 实证结果与分析

（一）行业竞争结构与股价崩溃风险

表 2 列示了行业竞争结构对股价崩溃风险影响的实证检验结果。其中（1）、（2）列报告了赫芬达尔指数对股价崩溃风险的影响，运用 *NCSKEW* 和 *DUVOL* 两个指标衡量股价崩溃风险，*Ind_hhi* 在 1%和 5%的显著性水平上与股价崩溃风险正向相关。由于赫芬达尔指数数值越大，表明市场集中度越高，因此（1）、（2）列的结果显示行业集中度的提高（即垄断程度的提高），会增加股价崩溃风险，而产品市场竞争程度的提高会降低股价崩溃风险，这似乎与我们的假说 H1a 相一致。

表 2 行业竞争结构与股价崩溃风险

变量名称	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Ind_hhi(L)	0.5931***	0.2868**			0.5243**	0.2571**
	(0.2271)	(0.1165)			(0.2278)	(0.1170)
Ind_num(L)			0.0006**	0.0003**	0.0005**	0.0002*
			(0.0002)	(0.0001)	(0.0002)	(0.0001)
NCSKEW(L)	-0.1135***		-0.1134***		-0.1144***	
	(0.0110)		(0.0110)		(0.0110)	
DUVOL(L)		-0.1082***		-0.1079***		-0.1090***
		(0.0104)		(0.0104)		(0.0104)
Dtn(L)	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Lev(L)	-0.2566***	-0.1196***	-0.2534***	-0.1179***	-0.2584***	-0.1204***
	(0.0826)	(0.0408)	(0.0823)	(0.0405)	(0.0825)	(0.0407)
Lnta(L)	0.2273***	0.1136***	0.2243***	0.1122***	0.2273***	0.1136***
	(0.0254)	(0.0125)	(0.0252)	(0.0123)	(0.0254)	(0.0125)
Bm(L)	-0.6205***	-0.3066***	-0.6133***	-0.3033***	-0.6157***	-0.3045***
	(0.0649)	(0.0309)	(0.0648)	(0.0309)	(0.0649)	(0.0309)
Ret(L)	-2.6990**	-1.8368***	-2.6358**	-1.8078***	-2.6587**	-1.8192***
	(1.3033)	(0.6478)	(1.3027)	(0.6485)	(1.3059)	(0.6498)
Sigw(L)	-1.1519	-0.7919**	-1.1221	-0.7782**	-1.1294	-0.7826**
	(0.7452)	(0.3773)	(0.7432)	(0.3766)	(0.7454)	(0.3776)
Roa(L)	-0.4411***	-0.2586***	-0.4307***	-0.2541***	-0.4302***	-0.2539***
	(0.1430)	(0.0662)	(0.1439)	(0.0664)	(0.1431)	(0.0660)
Opaque(L)	0.0040	-0.0051	0.0054	-0.0046	0.0071	-0.0038
	(0.0707)	(0.0348)	(0.0704)	(0.0347)	(0.0704)	(0.0346)
State_Ownership	-0.0512	-0.0327	-0.0483	-0.0313	-0.0504	-0.0324
	(0.0534)	(0.0269)	(0.0532)	(0.0269)	(0.0533)	(0.0269)
Constant	-4.1115***	-2.1070***	-4.0687***	-2.0830***	-4.1630***	-2.1292***
	(0.5073)	(0.2511)	(0.5012)	(0.2472)	(0.5068)	(0.2502)
年度	已控制	已控制	已控制	已控制	已控制	已控制
公司	已控制	已控制	已控制	已控制	已控制	已控制
Observations	10005	10005	10005	10005	10005	10005
R-squared	0.139	0.142	0.139	0.142	0.140	0.143
Number of stk	1680	1680	1680	1680	1680	1680

注：(L)代表滞后一期；括号中的数字为稳健标准误；***、**和*分别代表在 1%、5%和 10%统计水平上显著。

表 2 的（3）、（4）列报告了行业内上市公司的数量（*Ind_num*）与股价崩溃风险的关系。使用 *NCSKEW* 和 *DUVOL* 两个指标衡量风险，*Ind_num* 均在 5%或 10%的显著性水平上和股价崩溃风险正相关。

为了进一步厘清行业竞争程度与股价崩溃风险之间的关系，我们继续探讨赫芬达尔指数与行业内上市公司数量的关系。由赫芬达尔指数的计算公式（公式 5），我们可以看到该指数的决定因素包括两个方面，一个是行业内公司的数目（*N*），另一个是公司在行业内的销售份额（$x_{i,t}/X_{j,t}$）。此时，如果不同行业内的公司数量相同，则不同行业内公司之间的销售份额分布差异就会对赫芬达尔指数产生重要影响，销售份额的分布差异越大，赫芬达尔指数也就越大。因此，在控制住公司数量影响效果的情况下，赫芬达尔指数是行业内竞争结构不平衡性的体现，该数值越大，行业内的竞争结构越不平衡。基于上述分析，我们在控制住行业内上市公司数量（*Ind_num*）的情况下，对 *Ind_hhi* 进行回归，表 2 的（5）、（6）列报告了回归结果。此时，对 *NCSKEW* 和 *DUVOL* 两个股价崩溃风险指标来说，即使在控制住行业内公司数量的情况下，*Ind_hhi* 与 *Ind_num* 均在 5%或 10%的显著性水平上与股价崩溃风险正相关。据此，我们认为，行业内竞争结构的不平衡性会显著增加股价崩溃风险，过度集中（*Ind_hhi*）或过度竞争（*Ind_num*）均会增加股价崩溃风险。

综合上述结果，我们从两个维度来解释表 2：

结论（1）：2006—2013 年（滞后一期为 2005—2012 年）内，我国上市公司的行业集中度与股价崩溃风险正相关，即行业内的垄断程度越高，行业内公司所面临的股价崩溃风险就越大；

结论（2）：2006—2013 年（滞后一期为 2005—2012 年）内，我国上市公司行业内竞争的不平衡性与股价崩溃风险正相关，即行业内的竞争越不平衡，行业内的公司所面临的股价崩溃风险就越大。

上述实证结果告诉我们，（1）在实体经济层面，继续推进市场化改革，增加行业内的竞争程度，打破垄断，有助于缓解公司在股票市场上的股价崩溃风险；（2）优化行业内的竞争结构，保持合理的竞争水平，避免行业内形成一家或几家独大的局面，有助于缓解股价崩溃风险。

（二）公司市场势力与股价崩溃风险

我们使用经过行业算数平均调整的勒那指数（*Lerner*）作为市场势力的代理变量。表 3（1）、（2）列示了市场势力与股价崩溃风险之间的关系。根据回归结果我们可以看到在样本中，尽管市场势力能够降低与股价崩溃风险（系数为负），但是这一关系并不显著，H1b 无法得到显著支持。但是，由于公司的规模常常与公司的市场势力是相关的（Gaspar and Massa, 2006），公司规模可以影响其议价能力，故我们需要控制住异常规模再进行回归（为了降低异常规模的数量级，我们对其进行了标准化处理）。表 3（3）、（4）报告了回归结果：勒那指数与股价崩溃风险之间的关系仍然不显著，而异常规模与股价崩溃风险的关系在 1%及 5%水平上显著正相关。

表 3 异常规模和市场势力对股价崩溃风险的交互作用

变量名称	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Lerner (L)	-0.0003	-0.0020	0.0007	-0.0016	0.0347**	0.0129
	(0.0140)	(0.0069)	(0.0139)	(0.0068)	(0.0162)	(0.0081)
Ex_size(L)			0.6249***	0.2827**	1.2081***	0.5319***
			(0.2377)	(0.1357)	(0.2958)	(0.1481)
Lerner× *Ex_size*(L)					0.7247***	0.3097***
					(0.1901)	(0.0919)
NCSKEW(L)	-0.1122***		-0.1129***		-0.1131***	
	(0.0110)		(0.0110)		(0.0110)	
DUVOL(L)		-0.1069***		-0.1075***		-0.1079***
		(0.0104)		(0.0104)		(0.0104)
Dtn(L)	0.0002	0.0001	0.0002	0.0001	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Lev(L)	-0.2509***	-0.1185***	-0.2581***	-0.1218***	-0.2681***	-0.1261***
	(0.0832)	(0.0410)	(0.0833)	(0.0411)	(0.0833)	(0.0411)
Lnta(L)	0.2239***	0.1123***	0.2164***	0.1089***	0.2106***	0.1065***
	(0.0253)	(0.0124)	(0.0254)	(0.0125)	(0.0254)	(0.0125)
Bm(L)	-0.6186***	-0.3061***	-0.6256***	-0.3093***	-0.6229***	-0.3081***
	(0.0650)	(0.0309)	(0.0650)	(0.0309)	(0.0649)	(0.0309)
Ret(L)	-2.6790**	-1.8278***	-2.6313**	-1.8063***	-2.6087**	-1.7975***
	(1.2996)	(0.6463)	(1.2990)	(0.6457)	(1.2963)	(0.6447)
Sigw(L)	-1.1470	-0.7899**	-1.1335	-0.7841**	-1.1218	-0.7798**
	(0.7430)	(0.3762)	(0.7434)	(0.3766)	(0.7423)	(0.3762)
Roa(L)	-0.4430***	-0.2579***	-0.4409***	-0.2569***	-0.4382***	-0.2558***
	(0.1444)	(0.0668)	(0.1442)	(0.0666)	(0.1441)	(0.0665)
Opaque(L)	0.0016	-0.0060	0.0079	-0.0032	0.0105	-0.0021
	(0.0708)	(0.0348)	(0.0707)	(0.0348)	(0.0708)	(0.0348)
State_Ownership	-0.0489	-0.0320	-0.0491	-0.0321	-0.0508	-0.0328
	(0.0533)	(0.0269)	(0.0532)	(0.0269)	(0.0531)	(0.0268)
Constant	-3.9961***	-2.0560***	-3.8065***	-1.9702***	-3.6630***	-1.9089***
	(0.5028)	(0.2484)	(0.5051)	(0.2503)	(0.5070)	(0.2501)
年度	已控制	已控制	已控制	已控制	已控制	已控制
公司	已控制	已控制	已控制	已控制	已控制	已控制
Observations	10005	10005	10005	10005	10005	10005
R-squared	0.138	0.142	0.141	0.140	0.139	0.143
Number of stk	1680	1680	1680	1680	1680	1680

注：(L)代表滞后一期；括号中的数字为稳健标准误；***、**和*分别代表在 1%、5%和 10%统计水平上显著。

为了进一步阐明这一结果，参照 Gaspar and Massa（2006）的做法，根据模型（9），我们引入市场势力（*Lerner*）与异常规模（*Ex_size*）的交叉项，表 3（5）、（6）列报

告了回归结果。我们可以发现，异常规模在 1%的统计水平上保持正向显著，而市场势力与异常规模的交叉项均在 1%的统计水平上与股价崩溃风险显著正相关，实证结果验证了假说 H2。这些实证结果表明，在 2006—2013 年度内，市场势力并未对股价崩溃风险产生显著作用，但市场势力与企业异常规模的交乘项显著增加了股价崩溃风险，他们具有显著的交互效应。我们对这种交互作用的解读为：[5] 尽管市场势力自身没有显著降低股价崩溃风险，但是它通过异常规模（*Ex_size*）对股价崩溃风险产生显著影响。

这种交互作用告诉我们，公司市场势力对股价崩溃风险的影响并不是单一的，其在不同类型的企业中所发挥的作用并不相同：对规模过大的企业来说，市场势力越大，越有可能加剧其股价崩溃风险；对于规模较小的企业来说，较强的市场势力有助于缓解其股价崩溃风险。

综合上述实证结果，我们尝试对表 3（5）、（6）列中的交叉项给予进一步解读：对于行业内超大规模的企业，当其定价权越大（市场势力越大），越加剧了其垄断效应，对坏消息的隐藏更加容易。可以想象拥有定价权，而且规模超大的企业，其在社会、政治领域的话语权都会相对较强，这种强势地位促进了其与监管层讨价还价的能力，增加了其对内部坏消息的封锁、掩盖的能力，一旦坏消息的集中释放将会形成较大的股价崩溃。

对于有竞争力的小规模企业来说，那些拥有定价权的企业，往往处于行业内的领先地位，这种企业一般代表着先进的生产力，是创新、高端、新兴力量的代表。这些企业容易引起投资者的关注，加剧了外界对其信息的挖掘，推动其信息透明度的提高；同时这种小规模，具有定价权的企业由于尚未成长为规模庞大的业内巨擘，缺少与投资者、银行、监管层议价的实力，也在一定程度上促进了其各种消息的及时释放；再者，这些初期的、高利润的小企业，投资者更关注对其未来发展的预期，而往往忽视了其当前存在的一些问题，从而在股票价格上更多体现投资者的乐观情绪，企业发展过程中的问题往往被掩盖，或者在高速发展中被消化，从而缓解了当前的股价崩溃风险。

因此对于不同类型的企业，监管层的着力点也是不同的。对于监管层来说，要特别加强对大型垄断企业的监控，要防范其凭借市场势力进一步加剧垄断，通过提高其透明度，及时化解潜在的股价崩溃风险；对于具有较强定价权的中小型企业（比如处于产业链高端的新兴产业、创新型企业），要适当扶持，规范治理，避免企业发展初期的问题积累到后期，导致集中爆发。

五、 进一步检验

上述结论是基于股权分置改革之后，即 2006—2013 年（滞后一期为 2005—2012 年）全部 A 股上市公司的数据得出的。为了检验公司所处行业的竞争结构、公司市场

[5] 参照詹姆斯·杰卡德、罗伯特·图里西，《多元回归中的交互作用》。上海：格致出版社，2012。

势力与股价崩溃风险之间的关系在股权分置改革前、后以及全样本期间是否发生变化，我们分别在 2003—2013 年、2003—2005 年、2006—2013 年三个不同的样本期间内对上述结论进行检验。其中全样本期间（2003—2013 年，滞后一期为 2002—2012 年）有 12,715 个公司-年度观测值；股权分置改革前（2003—2005 年，滞后一期为 2002—2004 年）有 2,710 个公司-年度观测值；股权分置改革后（2006—2013 年，滞后一期为 2005—2012 年）有 10,005 个公司年度-观测值。[6]

表 4 行业竞争结构与股价崩溃风险—分期间检验

	全样本期间 2003—2013年		股权分置改革前 2003—2005年		股权分置改革后 2006—2013年	
变量名称	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Ind_hhi(L)	0.3696**	0.1789**	-1.9883	-1.7196*	0.5243**	0.2571**
	(0.1723)	(0.0823)	(2.0531)	(0.9703)	(0.2278)	(0.1170)
Ind_num(L)	0.0005**	0.0002**	-0.0052	-0.0015	0.0005**	0.0002*
	(0.0002)	(0.0001)	(0.0040)	(0.0019)	(0.0002)	(0.0001)
NCSKEW(L)	-0.0914***		-0.2995***		-0.1144***	
	(0.0101)		(0.0240)		(0.0110)	
DUVOL(L)		-0.0849***		-0.2815***		-0.1090***
		(0.0092)		(0.0215)		(0.0104)
Dtn(L)	0.0002	0.0002	-0.0014	-0.0007	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0017)	(0.0008)	(0.0003)	(0.0001)
Lev(L)	-0.1062	-0.0597*	-0.0656	-0.0520	-0.2584***	-0.1204***
	(0.0678)	(0.0330)	(0.3286)	(0.1530)	(0.0825)	(0.0407)
Lnta(L)	0.1841***	0.0918***	0.3460**	0.2142***	0.2273***	0.1136***
	(0.0201)	(0.0097)	(0.1342)	(0.0645)	(0.0254)	(0.0125)
Bm(L)	-0.6856***	-0.3338***	-2.2103***	-1.1811***	-0.6157***	-0.3045***
	(0.0570)	(0.0262)	(0.2535)	(0.1184)	(0.0649)	(0.0309)
Ret(L)	-3.1641**	-2.1370***	-264.8412	-123.5205	-2.6587**	-1.8192***
	(1.2424)	(0.5991)	(206.4912)	(99.3106)	(1.3059)	(0.6498)
Sigw(L)	-1.3271*	-0.9205***	-9.5309	-4.2388	-1.1294	-0.7826**
	(0.6994)	(0.3447)	(9.0371)	(4.1606)	(0.7454)	(0.3776)
Roa(L)	-0.6582***	-0.3752***	-1.6635***	-0.8446***	-0.4302***	-0.2539***
	(0.1166)	(0.0551)	(0.3538)	(0.1704)	(0.1431)	(0.0660)
Opaque(L)	0.0252	-0.0021	-0.0393	-0.0708	0.0071	-0.0038
	(0.0569)	(0.0277)	(0.2243)	(0.1056)	(0.0704)	(0.0346)
State_Ownership	-0.0164	-0.0100	0.1875*	0.1117**	-0.0504	-0.0324
	(0.0365)	(0.0177)	(0.1132)	(0.0561)	(0.0533)	(0.0269)
Constant	-3.1382***	-1.5782***	-4.7171*	-3.2557**	-4.1630***	-2.1292***
	(0.4042)	(0.1957)	(2.7903)	(1.3417)	(0.5068)	(0.2502)
年度	已控制	已控制	已控制	已控制	已控制	已控制
公司	已控制	已控制	已控制	已控制	已控制	已控制
Observations	12715	12715	2710	2710	10005	10005
R-squared	0.132	0.147	0.193	0.206	0.140	0.143
Number of stk	1696	1696	1029	1029	1680	1680

注：(L)代表滞后一期；括号中的数字为稳健标准误；***、**和*分别代表在 1%、5%和 10%统计水平上显著。

[6] 尽管在主检验中我们已经报告了 2006—2013 年的回归结果，为了使读者更容易地在不同样本期间对回归结果进行比较，我们仍然将其与其他样本期间的结果同时列示。

表 5　股权分置改革对行业集中度与股价崩溃风险关系的影响—交叉项检验

变量名称	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)
Ind_hhi(L)	0.3696**	0.1789**	0.3620**	0.1734**
	(0.1723)	(0.0823)	(0.1711)	(0.0817)
Split(L)	-0.6176***	-0.3623***	-0.6103***	-0.3570***
	(0.0467)	(0.0227)	(0.0475)	(0.0233)
Ind_hhi×*Split*(L)			-0.1031	-0.0746
			(0.1352)	(0.0691)
Ind_num(L)	0.0005**	0.0002**	0.0005**	0.0002**
	(0.0002)	(0.0001)	(0.0002)	(0.0001)
NCSKEW(L)	-0.0914***		-0.0914***	
	(0.0101)		(0.0101)	
DUVOL(L)		-0.0849***		-0.0849***
		(0.0092)		(0.0092)
Dtn(L)	0.0002	0.0002	0.0002	0.0002
	(0.0003)	(0.0001)	(0.0003)	(0.0001)
Lev(L)	-0.1062	-0.0597*	-0.1061	-0.0596*
	(0.0678)	(0.0330)	(0.0678)	(0.0329)
Lnta(L)	0.1841***	0.0918***	0.1838***	0.0916***
	(0.0201)	(0.0097)	(0.0201)	(0.0097)
Bm(L)	-0.6856***	-0.3338***	-0.6851***	-0.3334***
	(0.0570)	(0.0262)	(0.0570)	(0.0262)
Ret(L)	-3.1641**	-2.1370***	-3.1595**	-2.1336***
	(1.2424)	(0.5991)	(1.2420)	(0.5989)
Sigw(L)	-1.3271*	-0.9205***	-1.3262*	-0.9198***
	(0.6994)	(0.3447)	(0.6991)	(0.3445)
Roa(L)	-0.6582***	-0.3752***	-0.6563***	-0.3738***
	(0.1166)	(0.0551)	(0.1166)	(0.0551)
Opaque(L)	0.0252	-0.0021	0.0247	-0.0025
	(0.0569)	(0.0277)	(0.0569)	(0.0277)
State_Ownership	-0.0164	-0.0100	-0.0162	-0.0099
	(0.0365)	(0.0177)	(0.0365)	(0.0177)
Constant	-3.1382***	-1.5782***	-3.1316***	-1.5734***
	(0.4042)	(0.1957)	(0.4046)	(0.1960)
年度	已控制	已控制	已控制	已控制
公司	已控制	已控制	已控制	已控制
Observations	12715	12715	12715	12715
R-squared	0.132	0.147	0.132	0.147
Number of stk	1696	1696	1696	1696

注：(L)代表滞后一期；括号中的数字为稳健标准误；***、**和*分别代表在 1%、5%和 10%统计水平上显著。

（一）行业竞争结构与股价崩溃风险的分期间检验

表 4 列示了行业集中度（*Ind_hhi*）和行业内公司数量（*Ind_num*）对股价崩溃风险（*NCSKEW*、*DUVOL*）在三个期间的影响。可以看到，在全样本期间（2003—2013 年，（1）列和（2）列）和股权分置改革后（2006—2013 年，（5）列和（6）列）的

结果是相同的，即行业集中度（*Ind_hhi*）和行业内公司数量（*Ind_num*）均显著增加了股价崩溃风险。而在股权分置改革前（2003—2005 年，（3）列和（4）列）这一结果并不明显。这与张学勇和廖理（2010）、余宇新和杨大楷（2010）的结论在逻辑上是相符的。这同样也说明，股权分置改革后，随着信息透明度的提高，行业集中度（*Ind_hhi*）和股价崩溃风险之间的关系得以更加显著的体现。

在表 4 中我们可以看到股权分置改革前后，行业集中度与股价崩溃风险的关系是不同的，这是否意味着“股权分置改革”这一事件对该关系产生了结构性影响呢？

为了进一步厘清股权分置改革在这一关系中的作用，我们引入是否实施股权分置改革的虚拟变量 *Split*：*Split* = 1 代表已经实施股权分置改革的 2006—2013 年度，*Split* =0 代表尚未实施股权分置改革的 2003—2005 年度。在全样本期间（2003—2013 年）我们将股权分置改革（*Split*），以及它与行业集中度（*Ind_hhi*）交叉项 *Ind_hhi*×*Split* 逐步放入回归中，具体结果如表 5 所示。

我们可以看到，*Split* 在表 5（1）—（4）列均在 1%的显著性水平上与股价崩溃风险负相关，说明股权分置改革后，明显提升了上市公司的透明度，降低了股价崩溃风险，表 5（3）列和（4）列显示交叉项 *Ind_hhi*×*Split* 系数为负，说明股权分置改革后能够削弱行业集中度（*Ind_hhi*）与股价崩溃风险之间的正向关系，但是这一作用并不显著。

根据表 4 和表 5 的结果我们认为，尽管股权分置改革前（2003—2005 年）和股权分置改革后（2006—2013 年）行业集中度与股价崩溃风险的回归结果不同，但这两个时期并未发生根本性的结构变化，不过在股权分置改革后（2006—2013 年）我们得到了相同的且更加稳健和明显的结果。

（二）公司市场势力与股价崩溃风险的进一步检验

1、市场势力和股价崩溃风险的分期间检验

前文中，表 3 的（1）列和（2）列显示出公司市场势力并未显著降低股价崩溃风险，那么在全样本期间（2003—2013 年）和股权分置改革前（2003—2005 年）是否也是如此呢？表 6 列示了市场势力（*Lerner*）对股价崩溃风险（*NCSKEW*、*DUVOL*）在三个期间内的影响。

表 6 的（1）列和（2）列显示在全样本期间（2003—2013 年），公司市场势力对股价崩溃风险的影响并不显著。表 6 的第（3）列和第（4）显示在股权分置改革前（2003—2005 年），公司市场势力（*Lerner*）能够在 5%的显著性水平上降低股价崩溃风险（*NCSKEW*），但是对于另外一个股价崩溃风险指标（*DUVOL*）来说则并不显著。表 6 的（5）列和（6）列则表明，在股权分置改革后（2006—2013 年），尽管市场势力能够降低股价崩溃风险，但是这一关系并不显著。

2、异常规模和市场势力对股价崩溃风险的交互作用分期间检验

前文表 3 的（5）列和（6）列展示了公司异常规模和市场势力之间显著的交互效应，那么在全样本期间（2003—2013 年）和股权分置改革前（2003—2005 年）的情况又如何？表 7 列示了三个期间内这种交互效应的情况。

表 6　市场势力与股价崩溃风险之间的关系—分期间检验

	全样本期间 2003—2013年		股权分置改革前 2003—2005年		股权分置改革后 2006—2013年	
变量名称	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Lerner(L)	0.0026	-0.0017	-0.4936**	-0.1740	-0.0021	-0.0128
	(0.0771)	(0.0371)	(0.2393)	(0.1191)	(0.0881)	(0.0433)
NCSKEW(L)	-0.0902***		-0.3024***		-0.1122***	
	(0.0101)		(0.0241)		(0.0110)	
DUVOL(L)		-0.0837***		-0.2841***		-0.1069***
		(0.0093)		(0.0215)		(0.0104)
Dtn(L)	0.0002	0.0002	-0.0014	-0.0007	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0017)	(0.0008)	(0.0003)	(0.0001)
Lev(L)	-0.0951	-0.0550	-0.1526	-0.0751	-0.2509***	-0.1185***
	(0.0691)	(0.0336)	(0.3381)	(0.1574)	(0.0832)	(0.0410)
Lnta(L)	0.1820***	0.0909***	0.3716***	0.2258***	0.2239***	0.1123***
	(0.0200)	(0.0097)	(0.1365)	(0.0656)	(0.0253)	(0.0124)
Bm(L)	-0.6902***	-0.3359***	-2.2329***	-1.1888***	-0.6186***	-0.3061***
	(0.0571)	(0.0262)	(0.2556)	(0.1198)	(0.0650)	(0.0309)
Ret(L)	-3.2262***	-2.1661***	-274.4453	-128.3750	-2.6790**	-1.8278***
	(1.2402)	(0.5977)	(208.4293)	(100.5229)	(1.2996)	(0.6463)
Sigw(L)	-1.3597*	-0.9351***	-10.2119	-4.6569	-1.1470	-0.7899**
	(0.6984)	(0.3441)	(9.0489)	(4.1868)	(0.7430)	(0.3762)
Roa(L)	-0.6757***	-0.3825***	-1.6547***	-0.8385***	-0.4430***	-0.2579***
	(0.1180)	(0.0558)	(0.3553)	(0.1706)	(0.1444)	(0.0668)
Opaque(L)	0.0188	-0.0050	-0.0469	-0.0720	0.0016	-0.0060
	(0.0572)	(0.0278)	(0.2239)	(0.1054)	(0.0708)	(0.0348)
State_Ownership	-0.0133	-0.0087	0.1852	0.1113*	-0.0489	-0.0320
	(0.0365)	(0.0177)	(0.1146)	(0.0571)	(0.0533)	(0.0269)
Constant	-3.0254***	-1.5272***	-5.7867**	-3.7292***	-3.9961***	-2.0560***
	(0.4020)	(0.1949)	(2.7919)	(1.3403)	(0.5028)	(0.2484)
年度	已控制	已控制	已控制	已控制	已控制	已控制
公司	已控制	已控制	已控制	已控制	已控制	已控制
Observations	12715	12715	2710	2710	10005	10005
R-squared	0.131	0.146	0.193	0.205	0.138	0.141
Number of stk	1696	1696	1029	1029	1680	1680

注：(L)代表滞后一期；括号中的数字为稳健标准误；***、**和*分别代表在 1%、5%和 10%统计水平上显著。

表 7 的结果说明在股权分置改革前（2003—2005 年，（3）列和（4）列）异常规模和市场势力的交互作用并不明显。但是在全样本期间（2003—2013 年，（1）列和（2）列）、股权分置改革后（2006—2013 年，（5）列和（6）列）这种交互效应是显著的。据此，我们认为随着股权分置改革的实施，公司异常规模和市场势力之间的交互效应得以显著而稳健的体现。

表 7 异常规模和市场势力对股价崩溃风险的交互作用—分期间检验

变量名称	全样本期间 2003—2013年		股权分置改革前 2003—2005年		股权分置改革后 2006—2013年	
	NCSKEW	*DUVOL*	*NCSKEW*	*DUVOL*	*NCSKEW*	*DUVOL*
	(1)	(2)	(3)	(4)	(5)	(6)
Lerner(L)	0.0346**	0.0156**	-0.1097	-0.0367	0.0347**	0.0129
	(0.0155)	(0.0075)	(0.1138)	(0.0557)	(0.0162)	(0.0081)
Ex_size(L)	0.9096***	0.4100**	5.4110	3.7936	1.2081***	0.5319***
	(0.3412)	(0.1667)	(8.7501)	(4.3152)	(0.2958)	(0.1481)
Lerner×*Ex_size*(L)	0.7281***	0.3384***	-0.8130	-0.2324	0.7247***	0.3097***
	(0.2027)	(0.0981)	(2.7985)	(1.3662)	(0.1901)	(0.0919)
NCSKEW(L)	-0.0910***		-0.3033***		-0.1131***	
	(0.0101)		(0.0240)		(0.0110)	
DUVOL(L)		-0.0846***		-0.2858***		-0.1079***
		(0.0093)		(0.0214)		(0.0104)
Dtn(L)	0.0002	0.0002	-0.0013	-0.0006	0.0002	0.0001
	(0.0003)	(0.0001)	(0.0017)	(0.0008)	(0.0003)	(0.0001)
Lev(L)	-0.1099	-0.0617*	-0.1494	-0.0730	-0.2681***	-0.1261***
	(0.0691)	(0.0335)	(0.3386)	(0.1577)	(0.0833)	(0.0411)
Lnta(L)	0.1707***	0.0858***	0.3271**	0.1946***	0.2106***	0.1065***
	(0.0201)	(0.0097)	(0.1524)	(0.0741)	(0.0254)	(0.0125)
Bm(L)	-0.6845***	-0.3332***	-2.2014***	-1.1664***	-0.6229***	-0.3081***
	(0.0569)	(0.0261)	(0.2556)	(0.1197)	(0.0649)	(0.0309)
Ret(L)	-3.1148**	-2.1180***	-272.2651	-127.2489	-2.6087**	-1.7975***
	(1.2379)	(0.5966)	(208.5250)	(100.4142)	(1.2963)	(0.6447)
Sigw(L)	-1.3199*	-0.9188***	-10.1974	-4.6661	-1.1218	-0.7798**
	(0.6975)	(0.3438)	(9.0563)	(4.1861)	(0.7423)	(0.3762)
Roa(L)	-0.6629***	-0.3767***	-1.6545***	-0.8395***	-0.4382***	-0.2558***
	(0.1176)	(0.0556)	(0.3554)	(0.1707)	(0.1441)	(0.0665)
Opaque(L)	0.0285	-0.0006	-0.0493	-0.0738	0.0105	-0.0021
	(0.0573)	(0.0278)	(0.2244)	(0.1057)	(0.0708)	(0.0348)
State_Ownership	-0.0160	-0.0099	0.1873	0.1134**	-0.0508	-0.0328
	(0.0363)	(0.0176)	(0.1139)	(0.0566)	(0.0531)	(0.0268)
Constant	-2.7556***	-1.4061***	-4.6841	-2.9577*	-3.6630***	-1.9089***
	(0.4049)	(0.1954)	(3.2817)	(1.6018)	(0.5070)	(0.2501)
年度	已控制	已控制	已控制	已控制	已控制	已控制
公司	已控制	已控制	已控制	已控制	已控制	已控制
Observations	12715	12715	2710	2710	10005	10005
R-squared	0.133	0.147	0.194	0.205	0.140	0.143
Number of stk	1696	1696	1029	1029	1680	1680

注：(L)代表滞后一期；括号中的数字为稳健标准误；***、**和*分别代表在 1%、5%和 10%统计水平上显著。

根据表 4—表 7，我们可以看到，随着股权分置改革的实施，股票价格的信息含量得以提升，行业竞争结构、公司市场势力与股价崩溃风险的关系得以更加显著的体现。除了在股权分置改革后（2006—2013 年）的样本期外，本文的研究结论同样也在全样本期间（2003—2013 年）内得到了体现，但是却并未在股权分置改革之前（2003—2005

年）的样本期内得到验证。由于“股权分置改革”这一事件本身对股价崩溃风险的结构性影响，因此我们选择股权分置改革之后（2006—2013 年）作为主检验的样本区间，并在此基础上进行稳健性检验。

六、 稳健性检验[7]

（一）行业竞争结构与股价崩溃风险关系的稳健性检验

1、赫芬达尔指数窗口期的改变

在上文分析行业竞争程度与股价崩溃风险关系的实证研究中，我们使用了滞后一期赫芬达尔指数（*Ind_hhi*）作为行业竞争程度的代理变量。为了尽量减少潜在数据错误对指标的影响，我们参照 Hou and Robinson（2006）的做法，使用过去三年的赫芬达尔指数均值（*Ind_hhi3*）来衡量行业竞争程度。其结论与表 2 基本一致。

2、行业竞争均衡性指标“熵指数（*Ei*）”与股价崩溃风险的关系

在上述的分析中，我们发现行业集中程度（*Ind_hhi*）以及行业内公司数量（*Ind_num*）与股价崩溃风险呈现显著正相关，我们认为过度集中或者过度竞争都会导致股价崩溃风险。为了能够直接说明竞争的不平衡性（或者说适度竞争）与股价崩溃风险之间的关系，我们使用熵指数（*Ei*）直接进行稳健性检验。其结果显示熵指数（*Ei*）在 10% 的显著性水平上与股价崩溃风险负相关，即行业内竞争越均衡，则股价崩溃风险越低。

3、当期行业竞争指标与股价崩溃风险的关系

考虑到行业竞争程度受到个体公司的影响较小，相对于个体公司特征来说更具有外生性，所以我们还尝试使用当期的行业竞争指标（*Ind_hhi*、*Ind_num*、*Ei*）来进行回归检验，其实证结果进一步支持并加强了我们的研究结论。

（二）公司市场势力与股价崩溃风险关系的稳健性检验

Sharma（2011）使用单个上市公司的勒纳指数减去行业内销售份额加权平均勒那指数作为调整后公司市场势力的代理变量。我们使用同样方式对企业勒那指数进行行业层面的调整来计算公司市场势力（*Lerner_a*），并进行稳健性检验，其结果并未改变我们的研究结论。此外，我们还使用企业自身的勒那指数（*Lerner_b*）进行回归，我们的研究结论仍未发生显著改变，即异常规模与市场势力的交叉项对股价崩溃风险存在显著影响，说明异常规模越大的公司，随着市场势力的增强，进一步加剧了股价崩溃风险。

七、 结论与启示

本文以 2006—2013 年（滞后一期为 2005—2012 年）全部 A 股上市公司为样本，

[7] 由于篇幅所限，稳健性检验结果并未一一报告，如有需要，可根据要求提供。

分别从行业层面和企业层面研究竞争程度对上市公司股价崩溃风险的影响，以探讨实体经济层面与股票市场之间的相互作用，为产业经济结构的调整寻找切入点。我们分别采用多种方式进行实证检验，其结论基本一致，故我们认为本文的实证结果是比较稳健的。

研究发现：（1）从行业层面来看，行业内的集中度越高，垄断性越强，则该行业内的企业所面临的股价崩溃风险就越大；（2）在控制住企业数量影响的情况下，行业内的竞争越不平衡，两极分化越严重，则该行业内的企业就更容易面临股价崩溃风险；行业内竞争的均衡性能够缓解股价崩溃风险；（3）从企业层面来看，公司的市场势力和异常规模对股价崩溃风险存在着交互效应，异常规模会加剧市场势力所导致的股价崩溃风险。

上述三点结论从竞争的内在维度分析了竞争程度与股价崩溃风险之间的关系，从本质上来说，他们共同验证了一个命题：无论是行业层面还是企业层面，适度竞争有利于降低企业的股价崩溃风险。首先，从垄断的角度来看，垄断过高的行业股价崩溃风险会增加；其次，集中度指标除了反映垄断的情况之外，还反映了行业内竞争的不平衡性，在控制住企业数量因素的情况下，市场份额两极分化行业内的企业的股价崩溃风险更高；这一结论我们用熵指数也予以了验证；最后，从企业自身的市场势力来看，其本身对股价崩溃风险的影响并不明显，但是，随着企业规模的不同，市场势力对股价崩溃风险的影响也会发生变化。

上述结论有着较强的现实针对性及政策含义，我们认为，在当前经济结构调整和转型升级的大环境下，决策层对实体经济层面的调整并不能简单的着眼于企业数量多少，而应该在打破垄断的前提下，重点关注产业内的竞争结构，避免两极分化情形的出现。要培育适度竞争的产业规模，既要避免垄断，也要避免过度竞争，在行业内部形成相互制衡又相互合作的竞合格局，一方面形成行业内企业之间的相互竞争意识，同时又避免企业陷于岌岌可危的恶性竞争边缘，从而维持实体经济的稳定、持续、健康发展。从监管层的角度来看：要特别加强对大型垄断企业的监控，要防范其凭借市场势力进一步加剧垄断，关注其信息披露的透明度，及时化解潜在的股价崩溃风险。

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