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ABSTRACT

Using the sample of A-share listed companies from 2011 to 2022, we show a robust negative relationship between customer concentration and stock price crash risk in China. This finding contrasts with previous research based on U.S. firms, which shows that customer concentration is positively correlated with stock price crash risk. We believe that the Chinese imperfect capital market is the key factor contributing to this divergence. We reveal that a concentrated customer base can reduce stock price crash risk by improving corporate governance and supply chain transparency. Heterogeneity analysis shows that the effect is more pronounced for firms located in regions with low marketization level and those receiving less market attention.

I. Introduction

Factors affecting corporate stock price crash risk have received much attention from academics (Habib, Hasan, and Jiang 2018). Customer concentration is an important part of a company's business environment. While theoretically, the effect of customer concentration on stock price crash risk is mixed, existing research based on U.S. data finds that customer concentration is positively correlated with stock price crash risk, since firms may be encouraged to withhold bad news to retain major customers (Lee, Jiraporn, and Song 2020; Ma et al. 2020).

However, according to the new institutional economics, the institutional environment determines the optimal corporate governance structure (Khanna and Palepu 2000; Williamson 1985). Compared to the U.S., financial markets in emerging markets like China are significantly imperfect (Allen, Qian, and Qian 2005). In such an environment, based on the stakeholder theory (Freeman 1984; Hill and Jones 1992; Ormazabal 2018), major customers, as important stakeholders, are able to improve suppliers' information transparency and thus reduce stock price crash risk. First, major customers have incentives to monitor suppliers. The agency theory suggests that small and medium-sized shareholders lack incentives to monitor the firm due to the free-rider problem (Jensen and Meckling 1976). In emerging markets with imperfect institutions, major customers, similar to large investors and creditors, can reduce monitoring costs and mitigate market failures (Shleifer and Vishny 1997). Second, major customers have the ability to promote information transparency for suppliers, since losing a major customer can be quite expensive for the supplier company. In addition, information conveyed through public disclosure is more credible than information conveyed privately (Kothari, Shu, and Wysocki 2009; Skinner 1997), and information conveyed privately is not the perfect substitute for public disclosure from the customer's point of view. As a result, major customers can incentivize companies to improve corporate governance and disclosure levels, thus reducing stock price crash risk (Habib, Hasan, and Jiang 2018).

To investigate this issue, we use a sample of Chinese A-share listed companies from 2011 to 2022 and find that, Chinese firms' customer concentration significantly reduces stock price crash risk. We adopt three instrumental variables to mitigate endogenous concerns. A concentrated customer base can significantly reduce stock price crash risk by improving corporate governance and supply chain transparency. Finally, heterogeneity analyses show that the negative effect is more pronounced for

Table 1. Descriptive statistics.

	Obs.	Mean	Std.	min	max
NCSKEW	19175	−0.407	0.752	−3.02	2.31
DUVOL	19175	−0.282	0.482	−1.65	1.43
CusConct	19175	0.336	0.225	0.031	1
CusConctHHI	14594	0.0617	0.114	0.0002	0.775
Size	19175	22.196	1.296	16.412	28.543
ROA	19175	0.033	0.067	−0.5	0.41
Lev	19175	0.413	0.202	0.02	0.96
SOE	19175	0.327	0.469	0	1
RE	19175	0.164	0.520	−0.67	3.13
BM	19175	0.603	0.247	0.08	1.51
Sigma	19175	0.059	0.025	0.02	0.19
Ret	19175	0.003	0.008	−0.02	0.04
InsProp	19175	43.396	25.060	0.03	94.86
Tover	19175	622.312	508.817	12.03	3533.35

firms located in regions with low marketization level, and those receiving less market attention.

Our main contributions are twofold. First, our study contributes to a more comprehensive understanding of the relationship between customer concentration and stock price crash risk. We provide new evidence from China that customer concentration sometimes plays a positive role in mitigating stock price crash risk. Conversely, in a well-developed capital market like the U.S., where the market can take on the monitoring role, customer concentration is likely to raise stock price crash risk (Lee, Jiraporn, and Song 2020; Ma et al. 2020). Second, in a border sense, the findings of this paper provide new evidence that the institutional and legal environments across countries affect financial market outcomes (La Porta et al. 1998; Öztekin and Flannery 2012).

II. Research design

Sample construction

We use the sample of Chinese A-share listed companies from 2011 to 2022. We exclude the service sector from our sample. The data are obtained from the China Stock Market & Accounting Research Database (CSMAR) and the Chinese Research Data Services (CNRDS).

Variable definitions

Stock price crash risk

Following Ma et al. (2020), we use negative return skewness coefficients (NCSKEW) and upward and downward volatility ratios (DUVOL) to measure stock price crash risk.

Customer concentration

Following the existing literature (Campello and Gao 2017), we use the sum of the percentage of sales to the top five customers (CusConct) and the Herfindahl index of sales to the top five customers (CusConctHHI) to measure customer concentration level, with higher values indicating greater customer concentration level.

$$CusConct_{it} = \sum_{j=1}^{5} \frac{Sale_{ijt}}{Sale_{it}}$$

$$CusConctHHI_{it} = \sum_{j=1}^{5} \left(\frac{Sale_{ijt}}{Sale_{it}} \right)^2$$

Controls

Following Kim et al. (2011) and Ma et al. (2020), we control for the natural logarithm of the total assets (Size), ROA, debt ratio (Lev), property rights nature (SOE), book-to-market ratio (BM), annual stock yield (RE), standard deviation of weekly return of stocks (Sigma), average weekly return of stocks (Ret), institutional shareholdings (InsProp), and turnover rate (Tover). Table 1 reports descriptive statistics.

Model specification

We estimate the following regression model:

$$Crash_{i,t} = \alpha + \beta CusConct_{i,t-1} + \gamma X_{i,t} + \delta_i + \mu_t + \varepsilon_{i,t}$$

$$(1)$$

Where $Crash_{i,t}$ is the stock price crash risk, $CusConct_{i,t}$ denotes the customer concentration level. $X_{i,t}$ is the set of control variables. δ_i and μ_t represents firm fix effects and year fixed effects, respectively. Standard errors are clustered at the firm level.

III. Empirical results

Baseline regression results

Column (1) of Table 2 presents our baseline regression results. On average, a one standard increase in customer concentration leads to an 8.85% (0.160 × 0.225/0.407) reduction in the mean stock price crash risk level. In columns (2) and (3), we use *DUVOL* and *CusConctHHI* as alternative measures for the stock price crash risk and customer concentration level, respectively.

Endogeneity tests

To address potential endogeneity concerns, we employ three instrumental variables. First, the adverse shock to customer industries (*IV1*) following Ma et al. (2020). Negative shocks to customer industries are not directly affected by the

company's actions or performance. However, negative shocks can intensify competition within the customer industry, potentially leading to increased company exits, mergers, and acquisitions, which in turn can elevate the company's customer concentration ratio.

Second, the number of potential major customers (*IV2*) following Dong et al. (2021). Since listed firms are more likely to be sizable monopolists, and distance between firms is crucial to the match between supplier and customer, a listed firm in the same province and in the same customer industry can be seen as a potential major customer of the firm.

Third, the Bartik instrument variable (*IV3*) method (Bartik 1991). We utilize the provincial-level mean customer concentration in 2003 as the initial share, and the growth rate of the industry-level mean customer concentration per year (removing own firms) to represent the common shocks. The provincial-level mean customer concentration represents factors such as culture, geography, transportation, and other regional influences that affect the customer concentration of businesses within a given province. The growth rate of the industry-level mean customer concentration represents the changes in the downstream market structure over time. Table 3 presents the 2SLS regression results.

Table 2. Baseline regression results.

Variables	(1) NCSKEW	(2) DUVOL	(3) NCSKEW
CusConct$_{t-1}$	−0.160***	−0.0894**	
	(−2.715)	(−2.325)	
CusConctHHI$_{t-1}$			−0.312***
			(−2.724)
Size	0.0427**	0.00896	0.0504**
	(2.399)	(0.778)	(2.343)
ROA	0.133	0.129*	0.00618
	(1.077)	(1.685)	(0.0457)
Lev	0.00789	0.00531	0.0276
	(0.119)	(0.124)	(0.351)
SOE	−0.20***	−0.14***	−0.18***
	(−4.156)	(−4.729)	(−3.561)
RE	0.162***	0.0773***	0.197***
	(5.386)	(3.873)	(5.550)
BM	−0.54***	−0.26***	−0.50***
	(−10.06)	(−7.631)	(−7.810)
Sigma	−8.76***	−4.09***	−8.99***
	(−17.86)	(−13.46)	(−15.63)
Ret	−30.00***	−20.11***	−32.20***
	(−12.90)	(−13.11)	(−11.90)
InsProp	0.463***	0.296***	0.470***
	(6.709)	(6.719)	(6.063)
Tover	9.47***	2.46**	8.10***
	(5.331)	(2.201)	(3.969)
Year FE	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Obs.	19,175	19,175	14,594
R-squared	0.113	0.115	0.117

*** p < .01, ** p < .05, * p < .10.

Table 3. 2SLS regression.

First stage Variables	(1) CusConct$_{t-1}$		(2) CusConct$_{t-1}$		(3) CusConct$_{t-1}$	
IV1	0.120*** (8.49)					
IV2			0.714*** (3.57)			
IV3					0.126*** (3.35)	
F-value	72.05		12.71		11.21	
Second stage	IV1		IV2		IV3	
	(1)	(2)	(3)	(4)	(5)	(6)
Variables	NCSKEW	DUVOL	NCSKEW	DUVOL	NCSKEW	DUVOL
CusConct$_{t-1}$	−1.545* (−1.690)	−0.997* (−1.711)	−1.799* (−1.886)	−1.667** (−2.420)	−8.953** (−2.564)	−4.925** (−2.380)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,787	3,787	3,275	3,275	16,196	16,196

*** $p < .01$, ** $p < .05$, * $p < .10$.

Table 4. Channel tests.

Variables	(1) G_Score	(2) SPI
CusConct$_{t-1}$	0.204** (2.277)	0.0385** (1.962)
Controls	Yes	Yes
Year FE	Yes	Yes
Firm FE	Yes	Yes
Obs.	18,948	19,175
R-squared	0.142	0.040

*** $p < .01$, ** $p < .05$, * $p < .10$.

Channel analysis

Improving corporate governance

Higher concentrated customers may have stronger incentives and greater bargaining power to oversee the company's daily management. We use the governance score (*G_score*) in Huazheng's ESG rating to measure governance capabilities.

Improving supply chain transparency

For A-share listed companies, the disclosure of names of suppliers and customers is voluntary. Disclosing information about upstream suppliers can enhance supply chain transparency and optimize management practices for customers (Montecchi, Plangger, and West 2021). Therefore, we believe that companies with a higher customer concentration level are more likely to disclose information about upstream suppliers. We calculate the variable *SPI* as the number of suppliers whose names are disclosed.

Table 4 shows that customer concentration significantly improves corporate governance and supplier information transparency, which are in line with our expectations.

Heterogeneity analysis

3.4.1. Regional marketization level

We investigate the heterogeneity of regional marketization level. We classify the provinces into high- and low-marketization regions using the provincial marketization index.

Role of market attention

The influence of customer concentration may be less pronounced for companies with greater market attention. We classify companies into high and low market attention groups according to the number of analyst reports. Table 5 shows that the effect is significant only for companies located in low-marketization regions and companies with low market attention.

IV. Conclusion

In this paper, we find a robust negative relationship between customer concentration and stock price crash risk in China, which is contrary to the existing findings based on the U.S. sample. Improving corporate governance and supply chain transparency are two potential channels. Heterogeneity analysis indicates that the effect is more pronounced for firms located in regions with low level of marketization, and those receiving less market attention.

Our paper suggests that major customers can play a substitute role in improving corporate governance in emerging markets without mature financial systems. Moreover, our findings imply that institutional and legal environments can affect financial market outcomes.

Table 5. Heterogeneity analysis.

Sample	High Marketization Region (1)	Low Marketization Region (2)	High Market Attention (3)	Low Market Attention (4)
Variables	NCSKEW	NCSKEW	NCSKEW	NCSKEW
$CusConct_{t-1}$	−0.0968	−0.344***	−0.137	−0.204**
	(−1.415)	(−2.971)	(−1.374)	(−2.442)
Controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Obs.	15,304	3,871	9,476	9,699
R-squared	0.112	0.120	0.113	0.129

*** $p < .01$, ** $p < .05$, * $p < .10$.

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