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Supply chain list disclosure and stock price crash risk – the role of industry competition and abnormal related-party transactions

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ABSTRACT

This study looks at how competition in an industry and unusual deals between related parties affect the release of supply chain lists and the risk of a stock price crash. Adding to earlier research that showed a link between supply chain list disclosure and stock price crash risk (SPCR), this study looks at how competition in the industry affects this relationship and how strange transactions involving related parties affect it. A quantitative approach is adopted, with OLS regression performed on a sample of 20,301 firm-year observations of Chinese non-financial listed companies from 2012 to 2022. The findings indicate that industry competition weakens the negative relationship between list disclosure and SPCR. More robust evidence reveals that supply chain list disclosure effectively reduces SPCR only in firms operating in low-competition industries. The results suggest that disclosing supply chain lists may undermine the competitive advantage of enterprises and further intensify the industry competition due to the high proprietary costs, particularly in highly competitive sectors. The mechanism test also shows that making the supply chain lists public lowers the number of strange related-party transactions, which lowers SPCR. Finally, our findings remain robust after conducting a series of robustness checks. This research offers valuable insights for corporate managers in selecting disclosure strategies, informs policymakers on enhancing disclosure regulations, and serves as a reference for investors concerned about SPCR.

Contribution/ Originality: This study adds to what's already been written about supply chain transparency and SPCR by looking at how industry competition and unusual related-party transactions affect the relationship between supply chain list disclosure and SPCR.

1. INTRODUCTION

A stock price crash refers to an extremely negative market-adjusted return on a stock during a short period (Hutton, Marcus, & Tehranian, 2009; Kim, Li, & Zhang, 2011a, 2011b) that adversely affects firms, investors, and the capital market. Existing research identifies information asymmetry as a key driver of stock price crashes. Managers often conceal unfavourable information for personal gain; however, there is a limit to the extent they can accumulate and withhold bad news. Once the accumulated negative information exceeds this limit and is abruptly released to the market, listed companies' stocks become particularly prone to crashes (Hong & Stein, 2003; Jin & Myers, 2006).

Therefore, enhancing information transparency is the direct way to reduce information asymmetry and mitigate stock price crash risk (hereafter, SPCR).

Improving supply chain transparency is an important method for reducing information asymmetry (Luo & Nagarajan, 2015; Mollenkopf, Peinkofer, & Chu, 2022). In 2012, the China Securities Regulatory Commission issued the "Guidelines on the Content and Format of Information Disclosure by Companies Issuing Public Securities No. 2–Content and Format of Annual Report," which for the first time advocated for listed firms to disclose their supplier and customer lists voluntarily. However, there is debate in the literature regarding whether companies should disclose supply chain lists. On the one hand, existing studies suggest that greater disclosure of supply chain lists can alleviate companies' financing constraints (Shi, Yin, Yuan, Lai, & Luo, 2024; Wang, Shan, & Song, 2023) reduce credit risk (He & Xiao, 2022), and mitigate SPCR (Peng & Wang, 2016; Zhong, Song, & Lee, 2024). On the other hand, revealing the identities of supply chain partners may benefit the company's competitors, endangering the company's competitive advantage (Ellis, Fee, & Thomas, 2012; He, Chen, & Chan, 2022; Kalkanci & Plambeck, 2020; Xie, Xu, & Hsu, 2023).

Although previous studies have examined the relationship between supply chain list disclosure and SPCR (Peng & Wang, 2016; Zhong et al., 2024) they have overlooked an important factor: industry competition, which increases the proprietary costs of disclosure. According to the Prencipe (2004) a reporting company incurs proprietary costs when competitors exploit disclosed information. Specifically, recipients of supply chain lists include not only investors, analysts, and banks but also competitors (Ellis et al., 2012; Kalkanci & Plambeck, 2020). Disclosing such lists can result in the loss of customers and suppliers, diminish firms' product market returns in the following year (Xie et al., 2023) and enhance competitor production efficiency (He et al., 2022) especially in higher competitive industries. Thus, with the intensification of industry competition, disclosing supply chain lists may erode companies' competitive advantages and amplify competitive pressure. The heightened competitive pressure resulting from list disclosure incentivizes managers to conceal bad news (Li & Zhan, 2019; Ma, Yang, Zhang, & Zhu, 2024) which is the underlying cause of crashes. Therefore, industry competition may influence the mitigating effect of supply chain list disclosure on SPCR.

Additionally, previous research found that supply chain list disclosure reduces SPCR by decreasing tax avoidance and earnings management (Zhong et al., 2024) yet it ignored an important channel: abnormal related-party transactions. Habib, Jiang, and Zhou (2021) found that abnormal related-party transactions of Chinese listed companies impair the authenticity and verifiability of financial information, thereby exacerbating the SPCR. The operations of Chinese listed companies are mostly group-based; there are many suppliers or customers directly related to the company within the supply chain (Lee, Lim, Park, & Seshadri, 2024). Concealing the supply chain lists may provide favorable conditions for companies to engage in financial fraud through abnormal related-party transactions (Gong, Quan, & Liu, 2022). Therefore, abnormal related-party transactions may be a channel for list disclosure to reduce SPCR.

Overall, the study's first goal is to look into how industry competition affects the link between supply chain list disclosure and SPCR. Its second goal is to find out if unusual transactions involving related parties are a way that supply chain list disclosure lowers SPCR. To achieve these two objectives, we collect relevant data on Chinese A-share listed companies from 2012 to 2022. We first replicate the results of Zhong et al. (2024). Then, through the interaction between industry competition and supply chain list disclosure, we find the impact of supply chain list disclosure on SPCR is lessened by industry competition. Further analysis reveals that supply chain disclosure only effectively reduces SPCR in the context of lower industry competition. In addition, we conduct a cross-sectional analysis to reveal an underlying mechanism through which list disclosure influences SPCR. The results show that list disclosure has a bigger effect on SPCR in companies with more unusual related-party transactions. This means that list disclosure lowers SPCR by cutting down on unusual related-party transactions. Finally, our findings remain robust when considering an alternative indicator of supply chain list disclosure, adding additional control variables, and adopting a firm-fixed effect model.

The study adds to what's already been written about supply chain transparency and SPCR by looking at how industry competition affects the relationship between supply chain list disclosure and SPCR. This is something that hasn't been looked into before. By distinguishing between high and low levels of industry competition, we find that supply chain list disclosure does not always reduce SPCR as previous studies have suggested (Peng & Wang, 2016; Zhong et al., 2024). In addition, we extend the study on the mechanism through which supply chain list disclosure affects SPCR, demonstrating that list disclosure reduces management's opportunistic behaviour by reducing abnormal related-party transactions. Furthermore, this research has implications for firms and stakeholders. Specifically, corporate managers can adjust disclosure strategies based on the competitive environment of their industry to balance transparency and competitiveness. While recognizing the benefits of supply chain disclosure, investors should also consider the potential additional risks associated with increased competitive pressure following disclosure. This study also provides a reference for policymakers to improve relevant disclosure regulations.

2. LITERATURE REVIEW

2.1. Stock Price Crash Risk

SPCR is defined as the negative skewness of firm-specific returns after excluding market-wide factors, or more simply, the probability of experiencing a large negative return on stocks is higher than normal levels (e.g., (Hutton et al., 2009; Kim et al., 2011a)). Previous studies suggest that information asymmetry is key to causing crashes (Jin & Myers, 2006). Managers can use asymmetric information to conceal negative news for a long time to protect their interests (Khan & Watts, 2009; Kothari, Li, & Short, 2009). When accumulated negative information can no longer be withheld and is suddenly released to the market, it causes a steep drop in stock prices (Jin & Myers, 2006). Based on this theoretical framework, many empirical studies have demonstrated that increased information transparency can reduce SPCR. For example, prior studies have confirmed that the disclosure of environmental information (Zhang, Su, Wang, & Zhang, 2022) innovation information (Yu & Xiao, 2022) risk information (Au, Qiu, & Wu, 2023) and supply chain lists (Peng & Wang, 2016; Zhong et al., 2024) play significant roles in mitigating SPCR.

However, there is debate over whether non-financial information disclosure can reduce SPCR, and empirical studies have found that not all non-financial information disclosures can. For example, Meng, He, Zhang, and Gong (2023) found that disclosing operating information by listed companies exacerbates SPCR in highly competitive industries. This occurs because disclosing operating information entails high proprietary costs, and the increased competitive pressure following disclosure makes management more inclined to hide negative news, thereby intensifying SPCR. Although supply chain list disclosure has been shown to reduce SPCR (Peng & Wang, 2016; Zhong et al., 2024) it differs from other non-financial information that can reduce SPCR, such as environmental and risk information, that can reduce SPCR. Disclosing supply chain lists, similar to disclosing operating information incurs high proprietary costs (He et al., 2022; Xie et al., 2023). Therefore, industry competition is indispensable in analyzing the relationship between list disclosure and SPCR.

In addition, there is no consensus in the existing literature on the relationship between market competition and SPCR. Li and Zhan (2019) found that market competition exacerbates SPCR in the U.S., as management in competitive environments tends to withhold bad news. Conversely, competition is regarded as an effective external governance mechanism in France, prompting managers to disclose bad news regularly and thereby mitigating SPCR (Benkraiem, Galariotis, Guizani, & Lakhal, 2022). The contradiction between these findings may stem from differences in institutional systems. Supporting the findings of Li and Zhan (2019) data from China was used to demonstrate that competitive pressure compels managers to hide negative information, evidenced by fewer negative statements and risk disclosures in annual reports, thereby increasing SPCR (Ma et al., 2024). This research lays a foundation for our study.

Furthermore, although Peng and Wang (2016) and Zhong et al. (2024) have both examined the impact of supply chain list disclosure on SPCR, their analyses have limitations. Peng and Wang (2016) did not explore the channels

through which this effect occurs, while Zhong et al. (2024) focused on tax avoidance and earnings management as mechanisms but overlooked the role of abnormal related-party transactions. Abnormal related-party transactions, like tax avoidance and earnings management, are a form of managerial opportunism that makes financial data less reliable and authentic, which makes the SPCR worse (Habib et al., 2021). Keeping supply chain lists secret could make it easier for abnormal related-party transactions to happen (Gong et al., 2022). This channel is very important for studying the connection between list disclosure and SPCR. Therefore, the role of abnormal related-party transactions should not be overlooked.

2.2. Supply Chain List Disclosure

Current research has not reached a consensus on whether companies should disclose supply chain lists. On the one hand, enhanced list disclosure can reduce information asymmetry (He & Xiao, 2022; Luo & Nagarajan, 2015; Shi et al., 2024; Wang et al., 2023) and mitigate SPCR (Zhong et al., 2024). Stakeholders such as analysts, investors, and banks can derive valuable information from disclosed supply chain listings, thereby easing companies' financing constraints (Shi et al., 2024; Wang et al., 2023) reducing credit risk (He & Xiao, 2022) improving analyst forecasting accuracy (Luo & Nagarajan, 2015) and decreasing SPCR (Peng & Wang, 2016; Zhong et al., 2024).

On the other hand, while disclosing supply chain lists can reduce information asymmetry, managers are often hesitant to enhance supply chain transparency due to the proprietary, economic, and competitive value of supplier and customer information (Doorey, 2011). Specifically, recipients of supply chain lists include not only investors, analysts, and banks but also competitors. Disclosing customer information may enable existing and potential competitors to exploit this data, potentially leading to customer loss (Ellis et al., 2012). Similarly, disclosing supplier information might encourage competitors to source from the same suppliers, intensifying competition (Kalkanci & Plambeck, 2020). Some empirical studies highlight the negative consequences of disclosing customer lists, primarily due to proprietary costs. For example, disclosing customer identities significantly decreases firms' product market returns in subsequent years (Xie et al., 2023) and increases competitor production efficiency (He et al., 2022). Also, these effects are stronger in industries that are competitive, which suggests that competitors benefit more from knowing who customers are in those situations.

In summary, supply chain list disclosure poses both advantages and disadvantages for companies. The potential benefits of list disclosure primarily stem from reduced information asymmetry, whereas the risks are largely tied to high proprietary costs and intensified market competition.

2.3. Literature Gap

Existing literature has not analyzed how industry competition moderates the relationship between supply chain list disclosure and SPCR. Specifically, there is debate about whether supply chain list disclosure benefits firms. On the one hand, list disclosure can mitigate information asymmetry and SPCR. On the other hand, disclosing supply chain lists increases proprietary costs and weakens firms' competitive advantages, with these negative effects being more pronounced in highly competitive industries. Therefore, the question of whether industry competition weakens the suppressing effect of list disclosure on SPCR remains unanswered. Also, earlier studies found that list disclosure lowers SPCR by reducing tax avoidance and earnings management, but they missed an important channel: transactions involving related parties that don't make sense. Transactions like these, which are a big example of managers taking advantage of situations, have been shown to raise SPCR. But their role as a channel has not been fully proven. Whether supply chain list disclosure can reduce SPCR by decreasing abnormal related-party transactions is also a critical issue worth exploring.

Therefore, this study attempts to fill the above research gaps by addressing the following two questions: (1) Does industry competition influence the suppressing effect of supply chain list disclosure on SPCR? (2) Do abnormal related-party transactions play a mechanism role in the effect of list disclosure on SPCR?

2.4. Hypothesis Development

Revealing supply chain lists helps alleviate information asymmetry, thereby reducing the possibility of hiding negative news and lowering SPCR (Zhong et al., 2024). However, unlike general non-financial information, supply chain lists are closely related to a company's core operations, and such disclosure incurs higher proprietary costs, particularly in highly competitive industries. Specifically, disclosing customer information may be exploited by existing and potential competitors, leading to the loss of customer and supplier resources (Ellis et al., 2012; Kalkanci & Plambeck, 2020). Meanwhile, list disclosure may weaken the company's product market returns and enhance the production efficiency of competitors, with these adverse effects being more pronounced in highly competitive industries (He et al., 2022; Xie et al., 2023). Therefore, disclosing the supply chain list in highly competitive industries may weaken firms' competitive advantage and further intensify industry competition. In addition, increased competitive pressure after disclosing supply chain lists may lead management to be more inclined to withhold negative news (Li & Zhan, 2019; Ma et al., 2024) and the accumulation of negative information can trigger a crash (Jin & Myers, 2006).

Therefore, hypothesis H1 is proposed: Industry competition weakens the impact of supply chain list disclosure on SPCR.

Companies that are publicly traded in China mostly work as a group. Because of the way they are setup, related-party transactions between publicly traded companies and their parent (subsidiary) companies happen often and easily (Jian & Wong, 2010). Related-party transactions in normal business activities can not only reduce operating costs but also lower business risks, which play an important role in the firm's stable development (Wang, Cho, & Lin, 2019). However, earnings management often motivates some of these related-party transactions, leveraging related sales and unfair pricing to "beautify" financial statements. While temporarily boosting firm performance, it distorts the firm's financial condition, increasing internal and external information asymmetry, thereby increasing SPCR (Habib et al., 2021).

The business activities of listed firms often span multiple upstream and downstream segments, including raw material production, processing, transportation, and sales. Consequently, within the supply chain, many suppliers or customers are directly connected to the company (Lee et al., 2024). When supply chain lists are made public, investors and regulators can better see if there are related-party transactions between the company and its supply chain partners and judge more accurately whether these transactions are reasonable. This makes it less likely that there will be abnormal related-party transactions (Gong et al., 2022).

Therefore, hypothesis H2 is proposed: Supply chain list disclosure reduces the SPCR by decreasing abnormal related-party transactions.

3. METHODOLOGY

3.1. Sample Selection

We use Chinese A-share listed firms from 2012 to 2022 as research subjects. The data of supply chain lists are collected from the China Stock Market & Accounting Research Database (CSMAR) and manually exclude those that cannot accurately identify specific suppliers or customers. (e.g., Supplier A, Customer A). Data on financial and corporate characteristics is also sourced from the CSMAR database. The data undergoes processing using the following methods: (1) exclude financial industry firms; (2) firms with special treatment or particular treatment are excluded; (3) the individuals with missing data are excluded; (4) remove firms that recorded stock returns for less than 30 trading weeks yearly; (5) the 1% and 99% levels of winsorization are applied to all continuous variables. Finally, 21,303 firm-year observations were obtained.

3.2. Measurement of Supply Chain List Disclosure

Referring to prior research Shi et al. (2024) supply chain list disclosure (*SCLD*) is quantified by calculating the actual number of disclosed entities among the top five suppliers and customers divided by the total number of 10. A higher score indicates greater transparency within a company's supply chain. If the company provides only a pseudonym that fails to identify a specific supply chain partner precisely, we consider the identity as undisclosed. Additionally, two other metrics are employed for robustness:

(1) *SLD* = The number of disclosed suppliers / 5.

(2) *CLD* = The number of disclosed customers / 5.

3.3. Measurement of SPCR

Following prior research by Kim et al. (2011b) and Kim, Li, and Li (2014) we calculate firm-specific weekly returns first, which are the residuals in Equation 1.

$$r_{i.t} = \alpha_0 + \beta_1 r_{m.t-2} + \beta_2 r_{m.t-1} + \beta_3 r_{m.t} + \beta_4 r_{m.t+1} + \beta_5 r_{m.t+2} + \varepsilon_{i.t} \quad (1)$$

Where $r_{i,t}$ is the return on stock i in week t, and $r_{m,t}$ is the return on market returns in week t. The firm-specific return for firm i in week t is defined as $W_{i,t} = ln(1 + \varepsilon_{i,t})$, where $\varepsilon_{i,t}$ is the residual return in Equation 1.

Based on the $W_{i,t}$ calculated above, the first metric of SPCR is *NCSKEW* calculated in Equation 2 which measures the negative skewness of the return distribution (Chen, Hong, & Stein, 2001).

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

Where n is the number of weekly returns during year t. The higher *NCSKEW* indicates higher SPCR.

The second measure is *DUVOL*, calculated in Equation 3, which represents down-to-up volatility (Chen et al., 2001). The down (up) weeks refer to weeks during which $W_{i,t}$ is below (above) the annual mean.

$$DUVOL_{i,t} = ln\left\{\left[(n_u - 1)\sum_{Down} W_{i,t}^2\right] / \left[(n_d - 1)\sum_{Up} W_{i,t}^2\right]\right\} \quad (3)$$

Where n_u (n_d) is the number of up (down) weeks in year t. A higher *DUVOL* indicates higher SPCR.

3.4. Measurement of Industry Competition

Following prior research, we adopt two metrics to measure industry competition (Meng et al., 2023; Wang et al., 2023). The first one is *LNFN*, which is the natural logarithm of the industry firm count where the listed company operates.

A higher number of companies indicates greater industry competition. The second proxy, *LOWCONCT*, is a binary variable that equals 1 if the ratio of the top four companies' main business income to the total industry income is below the industry-year median and 0 otherwise. Low concentration accompanies high competition.

3.5. Measurement of Abnormal Related-Party Transactions

For abnormal related-party transactions, this paper adopts the method of Jian and Wong (2010) summarizing the firm's purchase and sale of related products or services and then dividing by operating revenue to remove the influence of the company's operating scale. Equation 4's regression model yields the residual part, which we define as abnormal related-party transactions, or *ABRPT*.

$$RPT_{i.t}/SALE_{i.t} = \alpha_0 + \alpha_1 SIZE_{i.t} + \alpha_2 LEV_{i.t} + \alpha_3 MB_{i.t} + IndFE + \varepsilon_{i.t} \quad (4)$$

3.6. Model Specification

To find out how competition between industries affects the link between supply chain list disclosure and SPCR, the following model was used:

$$CrashRisk_{i.t+1} = \alpha_0 + \beta_1 Disclosure_{i.t} + \beta_2 Disclosure \times INDCOMP_{i,t} + \beta_3 INDCOMP_{i.t} + \gamma ControlVariables_{i.t} + IndFE + YearFE + \varepsilon_{i.t} \quad (5)$$

We employ Ordinary Least Square regression models with year-fixed effects and industry-fixed effects to address the possible impact of economic fluctuation and industry differences on the results during the sample period. Further, we cluster the standard errors at the firm level to alleviate concerns about potential cross-sectional dependence in the data. *NCSKEW* or *DUVOL measure the dependent variable*, *CrashRisk*. For d*isclosure*, we use supply chain list disclosure (*SCLD*), supplier list disclosure (*SLD*), and customer list disclosure (*CLD*) in year t to measure. *INDCOMP* is one of the two industry competition measurements discussed before (i.e., *LNFN* and *LOWCONCT*). Following prior studies (e.g., (Kim et al., 2011a, 2011b; Meng et al., 2023)), control variables include prior-year negative skewness (*NCSKEW*), firm size (*SIZE*), market-to-book ratio (*MB*), returns on asset ratio (*ROA*), past returns (*RET*), firm leverage (*LEV*), opaqueness (*ABACC*), detrended annual share turnover (*DTURN*), and return volatility (*SIGMA*). Appendix A provides detailed definitions of all variables.

Then, to test whether the abnormal related-party transactions serve as a channel through which supply chain list disclosure reduces SPCR, we examine whether the effect of supply chain list disclosure on SPCR is stronger for firms with higher levels of abnormal related-party transactions. We divide the sample into two groups according to the median of *ABRPT* and test following model, respectively.

$$CrashRisk_{i.t+1} = \alpha + \beta Disclosure + \gamma ControlVariables_{i.t} + Industry + Year + \varepsilon_{i.t} \quad (6)$$

4. RESULTS

4.1. Descriptive Analysis

Table 1 displays the results of the descriptive analysis. The mean (median) values of the two SPCR measures (*NCSKEW* and *DUVOL*) are −0.333 (−0.291) and -0.216 (-0.215), with the standard deviation of 0.744 and 0.484, respectively, which are consistent with the results in the literature (Meng et al., 2023; Zhang et al., 2022; Zhong et al., 2024). From the perspective of list disclosure, the means (medians) of *SCLD*, *SLD*, and *CLD* are 0.184 (0), 0.173 (0), and 0.194 (0), respectively. This indicates that the average number of customers and suppliers disclosed per listed firm is less than two, with most firms not disclosing the supply chain list. *LNFN* reflects the natural logarithm of the number of listed companies in an industry, with a mean of 4.452 and a median of 4.543. In addition, the measure of abnormal related-party transactions, *ABRPT*, has a mean (median) of -0.010 (-0.042), with a standard deviation of 0.162.

Table 1. Descriptive statistics.

Variable	N	Mean	SD	Min.	Median	Max.
$NCSKEW_{t+1}$	21301	-0.333	0.744	-2.548	-0.291	1.755
$DUVOLN_{t+1}$	21301	-0.216	0.484	-1.400	-0.214	1.042
SCLD	21301	0.184	0.361	0	0	1
SLD	21301	0.173	0.375	0	0	1
CLD	21301	0.194	0.389	0	0	1
LNFN	21301	4.452	1.019	0.000	4.543	6.165
LOWCONCT	21301	0.496	0.500	0	0	1
ABRPT	21301	-0.010	0.162	-0.454	-0.042	0.748
NCSKEW	21301	-0.346	0.749	-2.546	-0.300	1.786
SIZE	21301	22.49	1.295	19.91	22.32	26.40
MB	21301	4.276	3.434	1.220	3.348	25.36
ROA	21301	0.027	0.072	-0.348	0.030	0.187
RET	21301	-0.135	0.118	-0.635	-0.098	-0.014
LEV	21301	0.457	0.204	0.0690	0.454	0.920
ABACC	21301	0.228	0.165	0.0290	0.183	0.940
DTURN	21301	-0.008	0.311	-0.972	-0.003	0.903
SIGMA	21301	0.048	0.020	0.017	0.044	0.111

Table 2. Pearson correlation analysis.

Variables	NCSKEW $_{t+1}$	DUVOL $_{t+1}$	SCLD	SLD	CLD	LNFN	LOW-CONCT	ABRPT	NCSKEW	SIZE	MB	ROA	RET	LEV	ABACC	DTURN	SIGMA
NCSKEW $_{t+1}$	1																
DUVOL $_{t+1}$	0.878*	1															
SCLD	-0.039*	-0.042*	1														
SLD	-0.044*	-0.047*	0.943*	1													
CLD	-0.030*	-0.034*	0.947*	0.786*	1												
LNFN	-0.002	-0.001	-0.148*	-0.123*	-0.157*	1											
LOWCONCT	0.007	0.007	-0.066*	-0.059*	-0.065*	0.573*	1										
ABRPT	0.008	0.015*	0.054*	0.036*	0.064*	0.022*	0.01	1									
NCSKEW	0.041*	0.047*	-0.043*	-0.043*	-0.039*	0.003	0.008	0.003	1								
SIZE	-0.015*	-0.034*	-0.059*	-0.062*	-0.050*	-0.126*	-0.139*	-0.037*	-0.005	1							
MB	0.068*	0.065*	0.021*	0.017*	0.021*	0.023*	-0.001	0.017*	0.008	-0.166*	1						
ROA	0.003	-0.011*	-0.037*	-0.035*	-0.036*	0.015*	0.039*	-0.024*	-0.005	0.098*	-0.172*	1					
RET	-0.009	0.004	0.014*	0.001	0.025*	-0.099*	-0.020*	0.019*	0.162*	0.199*	-0.290*	0.112*	1				
LEV	-0.008	-0.008	0.057*	0.041*	0.066*	-0.129*	-0.137*	0.025*	-0.012*	0.454*	0.361*	-0.318*	0.003	1			
ABACC	0	0	0.040*	0.034*	0.041*	-0.029*	-0.021*	-0.005	0.014*	-0.054*	0.125*	-0.072*	-0.019*	0.111*	1		
DTURN	-0.046*	-0.057*	0.017*	0.014*	0.018*	-0.020*	-0.004	0.008	-0.091*	0.015*	0.068*	-0.048*	-0.470*	0.039*	-0.025*	1	
SIGMA	0.020*	0.008	-0.021*	-0.007	-0.033*	0.124*	0.026*	-0.016*	-0.141*	-0.228*	0.298*	-0.116*	-0.718*	-0.009	0.025*	0.466*	1

Note: This table shows the Pearson correlation coefficients between all variables. * $p < 0.05$.

Table 2 shows the correlation analysis between the variables. As expected, the three measures of supply chain list disclosure, SCLD, SLD, and CLD, are positively associated with the two SPCR metrics. Additionally, consistent with prior research (Habib et al., 2021) *ABRPT* is positively associated with two SPCR measures, demonstrating that abnormal related-party transactions increase SPCR.

4.2. Replication of Zhong et al. (2024)

We use data from 2012 to 2022 to replicate the study by Zhong et al. (2024). The results presented in Table 3 align with the findings of Zhong et al. (2024) showing that supply chain list disclosure exhibits a negative correlation with two SPCR indicators, with significance at the 5% level.

Table 3. Supply chain list disclosure and SPCR.

Dependent variable	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
SCLD	-0.062***			-0.047***		
	(-3.78)			(-4.49)		
SLD		-0.077***			-0.056***	
		(-4.95)			(-5.62)	
CLD			-0.033**			-0.028***
			(-2.16)			(-2.82)
NCSKEW	0.042***	0.042***	0.043***	0.031***	0.030***	0.031***
	(5.92)	(5.86)	(5.99)	(6.58)	(6.52)	(6.66)
SIZE	0.021***	0.021***	0.023***	0.000	-0.000	0.001
	(3.83)	(3.68)	(4.04)	(0.06)	(-0.09)	(0.27)
MB	0.017***	0.017***	0.017***	0.010***	0.010***	0.010***
	(9.15)	(9.09)	(9.20)	(7.80)	(7.74)	(7.85)
ROA	-0.052	-0.050	-0.050	-0.091*	-0.090	-0.091*
	(-0.62)	(-0.60)	(-0.60)	(-1.66)	(-1.64)	(-1.65)
RET	0.969***	0.967***	0.972***	0.597***	0.596***	0.599***
	(5.29)	(5.28)	(5.30)	(5.02)	(5.01)	(5.03)
LEV	-0.144***	-0.142***	-0.148***	-0.057**	-0.055**	-0.059**
	(-3.62)	(-3.56)	(-3.71)	(-2.15)	(-2.09)	(-2.23)
ABACC	0.009	0.009	0.008	0.010	0.010	0.009
	(0.26)	(0.28)	(0.24)	(0.46)	(0.47)	(0.43)
DTURN	-0.017	-0.017	-0.018	-0.002	-0.001	-0.002
	(-0.80)	(-0.78)	(-0.83)	(-0.13)	(-0.10)	(-0.16)
SIGMA	7.866***	7.849***	7.888***	4.383***	4.372***	4.398***
	(6.90)	(6.89)	(6.91)	(5.90)	(5.89)	(5.92)
Constant	-1.047***	-1.026***	-1.077***	-0.348***	-0.335***	-0.368***
	(-8.03)	(-7.88)	(-8.27)	(-3.99)	(-3.85)	(-4.23)
N	21301	21301	21301	21301	21301	21301
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.042	0.042	0.041	0.046	0.047	0.046

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

4.3. The Moderating Role of Industry Competition

Suppose that revealing the supply chain list comes with high proprietary costs and makes management more likely to hide bad news because of increased market competition. This could mean that competition in the industry will weaken the link between list disclosure and SPCR, as suggested in H1. Table 4 shows the results of industry competition as a moderator. Panel A displays findings that use *LNFN* to measure industry competition. For three types of supply chain list disclosure, the coefficients are negative, and for two types of SPCR, they are significant at level 1%. Notably, the interaction terms *SCLD*LNFN*, *SCD*LNFN*, and *CLD*LNFN*, which capture the interaction between supply chain list disclosure and the number of firms within the industry, are significant and positive at the 1% or 5% level for two SPCR proxies. From an economic significance perspective, the coefficients for *SCLD*LNFN*

in columns (1) and (4) indicate that a one-standard-deviation increase in *SCLD*LNFN* corresponds to a 6.56% (0.042*1.562) and a 4.22% (0.027*1.562) increase in *NCSKEW* and *DUVOL*, respectively. Similar results are observed in Panel B, where *LOWCONCT* is used to measure industry competition. Overall, the results in Table 4 imply that industry competition attenuates the mitigating effect of supply chain list disclosure on SPCR.

Table 4. The moderating effect of industry competition.

Panel A	**NCSKEW$_{t+1}$**			**DUVOL$_{t+1}$**		
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
SCLDxLNFN	0.042***			0.027***		
	(2.64)			(2.68)		
SLDxLNFN		0.040***			0.024**	
		(2.59)			(2.47)	
CLDxLNFN			0.035**			0.024**
			(2.37)			(2.52)
SCLD	-0.243***			-0.165***		
	(-3.48)			(-3.70)		
SLD		-0.248***			-0.160***	
		(-3.66)			(-3.72)	
CLD			-0.182***			-0.130***
			(-2.84)			(-3.14)
LNFN	-0.058	-0.059*	-0.056	-0.043*		-0.041*
	(-1.62)	(-1.65)	(-1.57)	(-1.75)		(-1.70)
NCSKEW	0.042***	0.041***	0.042***	0.030***	0.030***	0.030***
	(5.82)	(5.77)	(5.90)	(6.48)	(6.43)	(6.56)
SIZE	0.021***	0.020***	0.022***	-0.000	-0.001	0.001
	(3.75)	(3.58)	(3.98)	(-0.02)	(-0.18)	(0.21)
MB	0.017***	0.017***	0.017***	0.010***	0.010***	0.010***
	(9.07)	(9.01)	(9.14)	(7.72)	(7.66)	(7.78)
ROA	-0.052	-0.051	-0.052	-0.092*	-0.091*	-0.092*
	(-0.62)	(-0.61)	(-0.61)	(-1.67)	(-1.66)	(-1.67)
RET	0.977***	0.976***	0.978***	0.603***	0.602***	0.604***
	(5.34)	(5.34)	(5.34)	(5.08)	(5.08)	(5.09)
LEV	-0.144***	-0.141***	-0.148***	-0.057**	-0.055**	-0.059**
	(-3.62)	(-3.54)	(-3.72)	(-2.14)	(-2.07)	(-2.24)
ABACC	0.015	0.015	0.014	0.014	0.014	0.013
	(0.44)	(0.45)	(0.40)	(0.65)	(0.66)	(0.62)
DTURN	-0.018	-0.018	-0.019	-0.002	-0.002	-0.003
	(-0.84)	(-0.81)	(-0.88)	(-0.17)	(-0.14)	(-0.21)
SIGMA	7.913***	7.902***	7.929***	4.419***	4.411***	4.430***
	(6.95)	(6.95)	(6.96)	(5.96)	(5.95)	(5.97)
Constant	-0.780***	-0.753***	-0.823***	-0.153	-0.136	-0.181
	(-3.74)	(-3.61)	(-3.95)	(-1.09)	(-0.97)	(-1.29)
N	21301	21301	21301	21301	21301	21301
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.042	0.043	0.042	0.047	0.047	0.046
Panel B	NCSKEW$_{t+1}$			DUVOL$_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
SCLDxLOWCONCT	0.066**			0.056***		
	(2.16)			(2.83)		
SLDxLOWCONCT		0.051*			0.041**	
		(-1.73)			(-2.19)	

Panel A	$NCSKEW_{t+1}$			$DUVOL_{t+1}$		
	(1)	(2)	(3)	(4)	(5)	(6)
CLDxLOWCONCT			0.067**			0.058***
			(2.35)			(3.13)
SCLD	-0.092***			-0.072***		
	(-4.34)			(-5.26)		
SLD		-0.100***			-0.074***	
		(-4.90)			(-5.67)	
CLD			-0.063***			-0.054***
			(-3.21)			(-4.17)
LOWCONCT	0.007	0.010	0.006	-0.010	-0.006	-0.011
	(0.34)	(0.54)	(0.32)	(-0.79)	(-0.51)	(-0.86)
NCSKEW	0.042***	0.042***	0.042***	0.030***	0.030***	0.031***
	(5.86)	(5.81)	(5.92)	(6.52)	(6.48)	(6.58)
SIZE	0.021***	0.021***	0.023***	0.000	-0.000	0.001
	(3.80)	(3.65)	(4.02)	(0.01)	(-0.13)	(0.23)
MB	0.017***	0.017***	0.017***	0.010***	0.010***	0.010***
	(9.12)	(9.06)	(9.18)	(7.77)	(7.72)	(7.83)
ROA	-0.048	-0.047	-0.047	-0.088	-0.088	-0.088
	(-0.57)	(-0.56)	(-0.56)	(-1.60)	(-1.59)	(-1.60)
RET	0.969***	0.966***	0.972***	0.596***	0.594***	0.598***
	(5.30)	(5.29)	(5.31)	(5.02)	(5.01)	(5.04)
LEV	-0.145***	-0.142***	-0.149***	-0.057**	-0.055**	-0.060**
	(-3.64)	(-3.57)	(-3.73)	(-2.16)	(-2.10)	(-2.26)
ABACC	0.007	0.008	0.006	0.010	0.010	0.009
	(0.21)	(0.22)	(0.18)	(0.46)	(0.48)	(0.43)
DTURN	-0.018	-0.018	-0.019	-0.002	-0.002	-0.003
	(-0.84)	(-0.81)	(-0.88)	(-0.15)	(-0.11)	(-0.20)
SIGMA	7.861***	7.839***	7.890***	4.375***	4.361***	4.396***
	(6.90)	(6.89)	(6.92)	(5.90)	(5.88)	(5.92)
Constant	-1.046***	-1.028***	-1.077***	-0.339***	-0.328***	-0.359***
	(-7.97)	(-7.83)	(-8.22)	(-3.86)	(-3.74)	(-4.10)
N	21301	21301	21301	21301	21301	21301
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R^2	0.042	0.043	0.042	0.047	0.047	0.046

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

4.4. The Mechanism Effect of Abnormal Related-Party Transactions

To test the second hypothesis, we divide the sample into two groups based on the median of *ABRPT* and examine whether the effect of list disclosure on SPCR is pronounced in firms with higher levels of abnormal related-party transactions. Table 5 shows the results for each subsample. It can be found that regardless of the SPCR measurement employed, the coefficients for *SCLD*, *SLD*, and *CLD* are negative and significant for firms with high *ABRPT*. In contrast, the coefficients are not significant in the subsample with low *ABRPT*. Furthermore, the difference in the coefficients for *SCLD*, *SLD*, and *CLD* between the two subsamples is statistically significant at conventional levels (p-value = 0.015, 0.003, and 0.096, respectively). In conclusion, these results show that supply chain list disclosure has a big impact on SPCR in companies that have a lot of abnormal related-party transactions. This supports the idea that reducing abnormal related-party transactions could be one way that supply chain list disclosure lowers SPCR.

Table 5. The effect of abnormal related-party transactions.

Panel A NCSKEW as the dependent variable						
Dependent variable	**$NCSKEW_{t+1}$**		**$NCSKEW_{t+1}$**		**$NCSKEW_{t+1}$**	
Abnormal related-party transactions level	**High ABRPT**	**Low ABRPT**	**High ABRPT**	**Low ABRPT**	**High ABRPT**	**Low ABRPT**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
SCLD	-0.091***	-0.027				
	(-4.43)	(-1.08)				
SLD			-0.110***	-0.035		
			(-5.70)	(-1.48)		
CLD					-0.050***	-0.013
					(-2.63)	(-0.55)
NCSKEW	0.047***	0.033***	0.046***	0.032***	0.048***	0.033***
	(4.79)	(3.25)	(4.72)	(3.24)	(4.89)	(3.27)
SIZE	0.018**	0.021***	0.017**	0.021***	0.019**	0.022***
	(2.11)	(2.67)	(1.98)	(2.61)	(2.29)	(2.73)
MB	0.012***	0.020***	0.012***	0.020***	0.012***	0.020***
	(3.81)	(8.60)	(3.76)	(8.58)	(3.85)	(8.62)
ROA	-0.122	0.029	-0.119	0.029	-0.121	0.030
	(-1.05)	(0.25)	(-1.03)	(0.25)	(-1.04)	(0.26)
RET	0.628**	1.234***	0.631**	1.231***	0.624**	1.238***
	(2.39)	(4.78)	(2.41)	(4.77)	(2.38)	(4.80)
LEV	-0.098*	-0.182***	-0.095*	-0.181***	-0.104*	-0.184***
	(-1.80)	(-3.20)	(-1.74)	(-3.18)	(-1.90)	(-3.22)
ABACC	-0.036	0.047	-0.035	0.047	-0.037	0.047
	(-0.73)	(1.00)	(-0.71)	(1.00)	(-0.76)	(0.99)
DTURN	-0.023	-0.018	-0.023	-0.017	-0.024	-0.018
	(-0.74)	(-0.61)	(-0.73)	(-0.60)	(-0.77)	(-0.62)
SIGMA	6.498***	8.948***	6.511***	8.926***	6.485***	8.971***
	(4.03)	(5.50)	(4.04)	(5.49)	(4.02)	(5.51)
Constant	-0.916***	-1.084***	-0.892***	-1.072***	-0.954***	-1.098***
	(-4.71)	(-5.80)	(-4.58)	(-5.74)	(-4.91)	(-5.88)
N	10650	10648	10650	10648	10650	10648
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.038	0.049	0.039	0.049	0.037	0.049
Empirical p-value	0.015**		0.003***		0.096*	
Panel B DUVOL as the dependent variable						
Dependent variable	$DUVOL_{t+1}$		$DUVOL_{t+1}$		$DUVOL_{t+1}$	
Abnormal related-party transactions level	High ABRPT	Low ABRPT	High ABRPT	Low ABRPT	High ABRPT	Low ABRPT
	(1)	(2)	(3)	(4)	(5)	(6)
SCLD	-0.073***	-0.016				
	(-5.56)	(-0.99)				
SLD			-0.082***	-0.022		
			(-6.59)	(-1.48)		
CLD					-0.047***	-0.006
					(-3.80)	(-0.38)
NCSKEW	0.032***	0.026***	0.031***	0.026***	0.033***	0.026***
	(4.91)	(4.04)	(4.85)	(4.02)	(5.02)	(4.05)
SIZE	-0.000	-0.002	-0.001	-0.003	0.001	-0.002
	(-0.05)	(-0.41)	(-0.16)	(-0.48)	(0.13)	(-0.35)
MB	0.007***	0.011***	0.007***	0.011***	0.007***	0.011***
	(3.70)	(6.91)	(3.66)	(6.89)	(3.75)	(6.92)
ROA	-0.112	-0.077	-0.110	-0.077	-0.112	-0.076
	(-1.45)	(-0.98)	(-1.42)	(-0.98)	(-1.45)	(-0.97)

RET	0.492***	0.677***	0.493***	0.675***	0.489***	0.680***
	(2.85)	(4.15)	(2.86)	(4.13)	(2.83)	(4.16)
LEV	-0.034	-0.078**	-0.032	-0.078**	-0.038	-0.079**
	(-0.95)	(-2.08)	(-0.90)	(-2.06)	(-1.05)	(-2.10)
ABACC	-0.006	0.022	-0.006	0.022	-0.007	0.022
	(-0.20)	(0.72)	(-0.18)	(0.73)	(-0.23)	(0.71)
DTURN	-0.001	-0.006	-0.001	-0.006	-0.002	-0.006
	(-0.05)	(-0.32)	(-0.05)	(-0.31)	(-0.08)	(-0.33)
SIGMA	4.015***	4.696***	4.023***	4.680***	4.005***	4.712***
	(3.80)	(4.50)	(3.82)	(4.48)	(3.79)	(4.51)
Constant	-0.317**	-0.309**	-0.304**	-0.301**	-0.343***	-0.319**
	(-2.48)	(-2.47)	(-2.37)	(-2.40)	(-2.68)	(-2.55)
N	10650	10648	10650	10648	10650	10648
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.043	0.055	0.044	0.055	0.042	0.055
Empirical p-value	0.002***		0.000***		0.012**	

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

4.5. Robustness Checks

4.5.1. Alternative Measurement for Supply Chain List Disclosure

According to Shi et al. (2024) this study adopts an alternative measure for list disclosure by introducing a dummy variable (*S_DUMMY*) to indicate whether a company has made its list public. *S_DUMMY* equals 1 if a firm discloses at least one supplier or customer in a year and 0 otherwise. Panel A of Table 6 presents the moderating role of industry competition. For both SPCR measures, the interaction terms *S_DUMMY*LNFN* and *S_DUMMY*LOW* are significant and positive at the 1% or 5% level. Panel B displays the impact of list disclosure on SPCR after firms were grouped based on unusual related-party transactions. The coefficients for *S_DUMMY* are negative and significant for firms with higher abnormal related-party transactions but not significant for those in the lower group. These results are consistent with the main analysis.

Table 6. Results obtained with an alternative measurement of the independent variable.

Panel A The moderating role of industry competition				
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**
	NCSKEW $_{t+1}$	**NCSKEW** $_{t+1}$	**DUVOL** $_{t+1}$	**DUVOL** $_{t+1}$
S_DUMMYxLNFN	0.035***		0.023***	
	(2.67)		(2.70)	
LNFN	-0.058		-0.043*	
	(-1.63)		(-1.76)	
S_DUMMYxLOW		0.013**		0.010***
		(2.55)		(3.11)
LOWCONCT		0.005		-0.010
		(0.25)		(-0.85)
S_DUMMY	-0.197***	-0.073***	-0.133***	-0.056***
	(-3.34)	(-4.08)	(-3.47)	(-4.78)
Control variables	Yes	Yes	Yes	Yes
Constant	-0.794***	-1.059***	-0.164	-0.350***
	(-3.81)	(-8.07)	(-1.17)	(-3.99)
N	21301	21301	21301	21301
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
adj. R^2	0.042	0.042	0.046	0.046
Panel B The mechanism role of abnormal related-party transactions				
Dependent variable	(1)	(2)	(3)	(4)
	NCSKEW $_{t+1}$		DUVOL $_{t+1}$	

Abnormal related-party transactions level	High ABRPT	Low ABRPT	High ABRPT	Low ABRPT
S_DUMMY	-0.059***	-0.024	-0.050***	-0.011
	(-3.39)	(-1.15)	(-4.42)	(-0.79)
Control variables	Yes	Yes	Yes	Yes
Constant	-0.941***	-1.083***	-0.335***	-0.312**
	(-4.84)	(-5.79)	(-2.61)	(-2.49)
N	10650	10648	10650	10648
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
adj. R^2	0.037	0.049	0.042	0.055
Empirical p-value	0.094*		0.007***	

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

4.5.2. Additional Control Variables

To mitigate the potential impact of corporate governance on SPCR, we further include board size (*BS*), the shareholding ratio of institutional investors (*INST*), the percentage of the board's independent directors (*INDE*), and the ownership percentage of the largest shareholder (*TOP1*) as control variables in the regression for robustness (Jin, Su, Wang, & Xiao, 2022; Xu, Li, Yuan, & Chan, 2014). In Table 7, Panel A presents the moderating effect of competition after controlling for corporate governance variables. When you look at corporate governance factors, Panel B shows how abnormal related-party transactions can be a way that supply chain list disclosure lowers SPCR. All the results are consistent with the former analysis.

Table 7. Results obtained with more control variables.

Panel A The moderating role of industry competition				
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**
	NCSKEW $_{t+1}$	**DUVOL** $_{t+1}$	**NCSKEW** $_{t+1}$	**DUVOL** $_{t+1}$
SCLDxLNFN	0.042***	0.027***		
	(2.62)	(2.65)		
LNFN	-0.058	-0.043*		
	(-1.61)	(-1.76)		
SCLDxLOW			0.067**	0.056***
			(2.19)	(2.87)
LOWCONCT			0.007	-0.010
			(0.35)	(-0.81)
SCLD	-0.242***	-0.164***	-0.092***	-0.072***
	(-3.45)	(-3.66)	(-4.37)	(-5.27)
NCSKEW	0.041***	0.029***	0.041***	0.029***
	(5.67)	(6.26)	(5.70)	(6.30)
SIZE	0.016**	-0.004	0.016**	-0.004
	(2.46)	(-0.92)	(2.46)	(-0.94)
MB	0.016***	0.009***	0.016***	0.009***
	(8.41)	(7.13)	(8.44)	(7.16)
ROA	-0.044	-0.088	-0.040	-0.084
	(-0.52)	(-1.59)	(-0.47)	(-1.52)
LEV	-0.133***	-0.049*	-0.133***	-0.049*
	(-3.34)	(-1.84)	(-3.35)	(-1.86)
ABACC	0.010	0.012	0.002	0.008
	(0.29)	(0.54)	(0.06)	(0.35)
DTURN	-0.020	-0.003	-0.020	-0.002
	(-0.90)	(-0.18)	(-0.89)	(-0.15)
SIGMA	7.655***	4.248***	7.603***	4.204***
	(6.72)	(5.71)	(6.67)	(5.64)
RET	0.945***	0.581***	0.937***	0.574***
	(5.18)	(4.89)	(5.13)	(4.83)
BS	-0.007*	-0.005*	-0.007*	-0.004*
	(-1.95)	(-1.85)	(-1.89)	(-1.79)

Panel A The moderating role of industry competition				
Dependent variable	**(1)**	**(2)**	**(3)**	**(4)**
	NCSKEW $_{t+1}$	**DUVOL** $_{t+1}$	**NCSKEW** $_{t+1}$	**DUVOL** $_{t+1}$
INDR	0.005	0.012	0.010	0.015
	(0.04)	(0.17)	(0.09)	(0.20)
INST	0.001***	0.001***	0.001***	0.001***
	(4.08)	(4.05)	(4.16)	(4.14)
TOP1_SHARE	-0.002***	-0.001***	-0.002***	-0.001***
	(-3.90)	(-3.57)	(-3.92)	(-3.61)
Constant	-0.586***	-0.030	-0.850***	-0.215**
	(-2.69)	(-0.21)	(-5.84)	(-2.21)
N	21287	21287	21287	21287
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
adj. R^2	0.043	0.048	0.043	0.048
Panel B The mechanism role of abnormal related-party transactions				
Dependent variable	NCSKEW $_{t+1}$		DUVOL $_{t+1}$	
Abnormal related-party transactions level	High ABRPT	Low ABRPT	High ABRPT	Low ABRPT
	(1)	(2)	(3)	(4)
SCLD	-0.091***	-0.027	-0.073***	-0.016
	(-4.44)	(-1.11)	(-5.55)	(-1.01)
NCSKEW	0.041***	0.029***	0.041***	0.029***
	(5.67)	(6.26)	(5.70)	(6.30)
SIZE	0.016**	-0.004	0.016**	-0.004
	(2.46)	(-0.92)	(2.46)	(-0.94)
MB	0.016***	0.009***	0.016***	0.009***
	(8.41)	(7.13)	(8.44)	(7.16)
ROA	-0.044	-0.088	-0.040	-0.084
	(-0.52)	(-1.59)	(-0.47)	(-1.52)
LEV	-0.133***	-0.049*	-0.133***	-0.049*
	(-3.34)	(-1.84)	(-3.35)	(-1.86)
ABACC	0.010	0.012	0.002	0.008
	(0.29)	(0.54)	(0.06)	(0.35)
DTURN	-0.020	-0.003	-0.020	-0.002
	(-0.90)	(-0.18)	(-0.89)	(-0.15)
SIGMA	7.655***	4.248***	7.603***	4.204***
	(6.72)	(5.71)	(6.67)	(5.64)
RET	0.945***	0.581***	0.937***	0.574***
	(5.18)	(4.89)	(5.13)	(4.83)
BS	-0.007*	-0.005*	-0.007*	-0.004*
	(-1.95)	(-1.85)	(-1.89)	(-1.79)
INDR	0.005	0.012	0.010	0.015
	(0.04)	(0.17)	(0.09)	(0.20)
INST	0.001***	0.001***	0.001***	0.001***
	(4.08)	(4.05)	(4.16)	(4.14)
TOP1_SHARE	-0.002***	-0.001***	-0.002***	-0.001***
	(-3.90)	(-3.57)	(-3.92)	(-3.61)
Constant	-0.717***	-0.907***	-0.180	-0.224
	(-3.36)	(-4.40)	(-1.30)	(-1.59)
N	10650	10648	10650	10648
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
adj. R2	0.039	0.050	0.044	0.055
Empirical p-value	0.014**		0.000***	

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

4.5.3. Firm-Fixed Effect

This study uses firm-fixed effect models to look at how list disclosure affects SPCR. This is done to control the effect of unobservable firm-level factors and improve the accuracy of casual inference. To comprehensively assess the moderating role of industry competition in this relationship, the study divides the sample based on industry

competition levels and conducts regression analysis on different sub-samples. The level of industry competition is measured using two indicators: (1) whether the peer firms in the industry are above the industry median and (2) whether the ratio of the top four companies' main business income to the total industry income is below the industry-year median.

Column (1) in Panel A of Table 8 shows the overall impact of supply chain list disclosure (*SCLD*) on SPCR, as measured by *NCSKEW*, after introducing firm fixed effects. In contrast to the results from the previous model, the coefficient for *SCLD* is no longer significant after introducing firm-fixed effects. Columns (2) and (3) display the results for subsamples with higher and lower industry competition, classified by the number of firms in the industry. In the high-industry-competition subsample (column (2)), *SCLD*'s coefficient is positive but not statistically significant. In contrast, in the low-industry-competition subsample (column (3)), the coefficient for *SCLD* is -0.07 and significant at the 5% level. Columns (4) and (5) present the subsample analysis results using industry competition measured by the revenue proportion of the top four firms within the industry. The results are the same as those in Columns (2) and (3), which adds to the evidence that competition in the industry acts as a buffer between supply chain list disclosure and SPCR.

Panel B of Table 8 presents the regression results using *DUVOL* as the proxy variable for SPCR. The conclusions align with the previous analysis, providing further confirmation of the findings' robustness. Overall, the results show that industry competition moderates the association between supply chain list disclosure and SPCR. More precisely, supply chain list disclosure effectively reduces SPCR only in companies facing lower competitive pressure. On the other hand, releasing supply chain lists in industries with a lot of competition doesn't lower SPCR and might even make it worse, though the coefficients aren't statistically significant.

Table 8. Results after adopting firm-fixed effect model.

Panel A	**NCSKEW** $_{t+1}$	**NCSKEW** $_{t+1}$		**NCSKEW** $_{t+1}$	
		More firms	**Less firms**	**Low market concentration**	**High market concentration**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
SCLD	-0.034	0.022	-0.070**	0.020	-0.081**
	(-1.28)	(0.52)	(-1.96)	(0.47)	(-2.25)
Control variables	Yes	Yes	Yes	Yes	Yes
Constant	-2.650***	-2.961***	-2.838***	-3.226***	-3.170***
	(-7.08)	(-5.19)	(-5.03)	(-5.57)	(-5.10)
N	20907	10154	10516	10046	10458
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.085	0.099	0.088	0.076	0.111
Empirical p-value		0.044**		0.031**	
Panel B	DUVOL $_{t+1}$	DUVOL $_{t+1}$		DUVOL $_{t+1}$	
		More firms	Less firms	Low market concentration	High market concentration
	(1)	(2)	(3)	(4)	(5)
SCLD	-0.020	0.011	-0.039*	0.011	-0.052**
	(-1.18)	(0.41)	(-1.69)	(0.40)	(-2.16)
Control variables	Yes	Yes	Yes	Yes	Yes
Constant	-1.422***	-1.556***	-1.469***	-1.694***	-1.803***
	(-5.61)	(-4.19)	(-3.70)	(-4.39)	(-4.33)
N	20907	10154	10516	10046	10458
Year FE	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
adj. R^2	0.085	0.091	0.094	0.073	0.111
Empirical p-value		0.074*		0.041**	

Note: * p < 0.1, ** p < 0.05, *** p < 0.01.

5. DISCUSSION

We first replicate the findings of Zhong et al. (2024) which demonstrate that supply chain list disclosure can reduce SPCR. However, we contend that they overlooked a critical factor: industry competition. Recipients of supply chain lists include not only investors, analysts, and banks but also competitors (Ellis et al., 2012; Kalkanci & Plambeck, 2020). Building on this premise, this study investigates the relationship between supply chain list disclosure and stock price crashes under the moderating influence of industry competition. Furthermore, we explore the mechanistic role of abnormal related-party transactions in the impact of disclosure on SPCR.

Through the interaction between industry competition and list disclosure, we find that industry competition weakens the impact of list disclosure on SPCR. Further analysis reveals that contrary to previous studies (Peng & Wang, 2016; Zhong et al., 2024) supply chain list disclosure does not always reduce SPCR. Our findings suggest that supply chain list disclosure effectively reduces SPCR only in firms operating within less competitive industries. This finding aligns with two perspectives: First, the proprietary costs of supply chain disclosure are particularly high in highly competitive industries (He et al., 2022; Xie et al., 2023). Second, industry competition increases the management's tendency to conceal negative information, and bad news hoarding behavior is a critical trigger for stock price crashes (Li & Zhan, 2019; Meng et al., 2023).

Although Peng and Wang (2016) and Zhong et al. (2024) have explored the impact of supply chain disclosures on SPCR, one has not conducted an in-depth study of the impact channels, and another one has only examined the mechanisms of earnings management and tax avoidance, without addressing the mechanism role of abnormal related-party transactions. We find that the suppressing effect of supply chain list disclosure on SPCR is only effective in companies with a high degree of abnormal related-party transactions. In these cases, the marginal utility of such disclosure is greater. When a company has normal related-party transactions, on the other hand, list disclosure doesn't play as big of a role, and it may not be as clear how it affects SPCR. This result indicates that supply chain list disclosure can reduce SPCR by decreasing abnormal related-party transactions, which fills the research gaps. This result also confirms the two prior viewpoints: First, related-party transactions in some listed companies are often motivated by managerial self-interest, using related-party sales and unfair pricing to "embellish" financial statements (Jian & Wong, 2010) which undermines the representativeness, authenticity, and verifiability of accounting data, thereby increasing the SPCR (Habib et al., 2021). Second, disclosing supply chain lists helps external investors assess the company's financial position more accurately (Ellis et al., 2012) and reduces the likelihood of abnormal related-party transactions (Gong et al., 2022).

6. CONCLUSION

The research looks at how industry competition affects the link between supply chain list disclosure and SPCR as well as the role of abnormal related-party transactions in the relationship itself. Using a sample of Chinese-listed firms from 2012 to 2022, we first confirm the findings of Zhong et al. (2024) which suggest that supply chain list disclosure can reduce SPCR. Based on this, our study finds that industry competition weakens the relationship between list disclosure and SPCR. Further analysis reveals that proactive supply chain list disclosure effectively reduces SPCR only in companies with lower industry competition. This result suggests that the proprietary cost of supply chain list disclosure is higher in highly competitive industries. Increased competitive pressure after disclosure raises management's propensity to conceal negative news, thereby exacerbating SPCR. In addition, we find that the reduction of abnormal related-party transactions is a potential mechanism through which supply chain list disclosure reduces SPCR, with a greater marginal effect of list disclosure observed in companies with higher levels of abnormal related-party transactions.

Our research contributes to the academic literature on SPCR and supply chain list disclosure. First, our results demonstrate that the proprietary cost of supply chain list disclosure is high, particularly in highly competitive markets, where disclosure may weaken a firm's competitive advantage and intensify market competition. Since

industry competition heightens management's tendency to conceal bad news (Li & Zhan, 2019; Ma et al., 2024) it weakens the suppressive effect of supply chain list disclosure on SPCR. Our research shows that supply chain list disclosure does not always lower SPCR, contrary to what other studies have found (Peng & Wang, 2016; Zhong et al., 2024) by separating between industries with high and low levels of competition. Our analysis indicates that supply chain list disclosure effectively reduces SPCR only in companies with lower industry competition.

Second, this study expands the investigation into the mechanism through which supply chain list disclosure reduces SPCR. Existing literature primarily focuses on mechanisms such as earnings management and tax avoidance (Zhong et al., 2024) while overlooking abnormal related-party transactions. Opaque supply chain lists enable companies to engage in abnormal related-party transactions (Gong et al., 2022). These deals between Chinese public companies hurt the accuracy, completeness, and usefulness of financial information, leading to higher SPCR (Habib et al., 2021). We find that the suppressive effect of supply chain list disclosure on SPCR is effective only in companies with higher levels of abnormal related-party transactions. Because of this, the marginal benefit of this kind of disclosure is higher. This shows that sharing supply chain lists can lower SPCR by lowering abnormal transactions involving related parties.

Third, the findings offer practical implications for managers, investors, and policymakers. Firm managers can adjust disclosure strategies based on the competitive environment of their industry to strike a balance between transparency and competitiveness. Investors can more accurately assess a company's SPCR by considering the firm's list disclosure and the level of industry competition. Investors should also be aware of other potential risks arising from increased competitive pressure following the disclosure of supply chain lists. Furthermore, this study provides a reference for policymakers to improve the relevant disclosure regulations. Improving the transparency of listed companies has long been a demand of the capital markets and a goal of policymakers. Therefore, policymakers could establish sector-specific requirements for supply chain list disclosures, such as requiring firms in less competitive industries to disclose their partners' identities with business proportions exceeding 10%, while setting a higher threshold of around 30% for highly competitive industries.

In addition, our results can be applied to other emerging markets where supply chain list disclosure is also voluntary, such as Malaysia and Hong Kong. Although disclosing supply chain lists can reduce information asymmetry, it also incurs high proprietary costs. Balancing the benefits and risks of disclosure is, therefore, a common challenge. Our findings provide valuable insights into the list disclosure for firms in these regions. Furthermore, our study serves as a reference for research on the economic consequences of other high proprietary cost disclosures, such as innovation and operating information.

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Appendix A. Variables definitions.

Variables	Descriptions
NCSKEW	The negative conditional skewness
DUVOL	Down-to-up volatility
SCLD	The number of disclosed suppliers and customers / 10
SLD	The number of disclosed suppliers / 5
CLD	The number of disclosed customers / 5
LNFN	The natural logarithm of the number of the industry's firms
LOWCONCT	A dummy variable that equals 1 if the ratio of the top four companies' main business income to the total industry income is below the industry-year median, and 0 otherwise.
ABRPT	The abnormal related-party transactions.
MB	Market value/Book value of equity.
LEV	Total liabilities/Total assets.
SIZE	Natural logarithm of the total assets.
ROA	Net profit/Total assets.
ABACC	The absolute value of abnormal accruals.
DTURN	The average monthly turnover rate
SIGMA	Standard deviation of firm-specific abnormal weekly returns
RET	Annual average firm-specific weekly returns/100
SCLD_DUMMY	A dummy variable that equals 1 for a firm discloses at least one supplier or customer in a year, and 0 otherwise.