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Original Paper

Shadow Banking Activities of Non-Financial Enterprises and Corporate Risk-Taking in China: Evidence from the Perspective of Information Disclosure

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Abstract

Based on the theoretical modelling of shadow banking's impact mechanism on corporate risk-taking behaviour, this study empirically investigates the relationship between shadow banking activities and corporate risk-taking using data from non-financial A-share listed companies during 2007-2022. The findings reveal that corporate engagement in shadow banking activities significantly increases their risk-taking levels, with this positive correlation being more pronounced in non-state-owned enterprises and regions with lower digital financial inclusion development. Furthermore, information disclosure quality effectively weakens the positive correlation between shadow banking and corporate risk-taking, indicating that companies with higher quality information disclosure significantly reduce their risk-taking levels associated with shadow banking activities. This study provides policy implications for government and regulatory authorities on mitigating excessive corporate participation in shadow banking activities.

Keywords

Shadow bank, Risk-taking, Information disclosure

1. Introduction

Since the financial crisis in 2008, small and medium-sized enterprises (SMEs) have faced severe credit constraints. In particular, since the COVID-19 pandemic, SMEs' financing difficulties and high financing costs have received widespread attention in China. Against this background, various forms of shadow banking have gradually developed in addition to traditional bank credit. These credit forms have rapidly expanded in scale due to their advantages, such as fast approval, simple processes, and

lower lending thresholds. According to Moody's (Moody's investors service) Investment Report, China's broad shadow banking assets reached 48.5 trillion yuan (RMB) in the first half of 2023, accounting for 39.2% of nominal GDP. Although the scale has contracted under strict supervision, it remains substantial.

Shadow banking, as an important innovative financial activity after the subprime crisis in China, is generally considered to have dual effects. On the one hand, as an important component of the financial intermediary system, shadow banking significantly reduced the impact of traditional credit scale contraction on the macroeconomy after the subprime crisis and met some funding needs of real enterprises, especially small and medium-sized real enterprises, which has a positive significance. However, on the other hand, shadow banking reduces the transparency of market information, provides channels for financial institutions to conduct regulatory arbitrage, encourages the shift from real to virtual economy, and increases the fragility of the financial system and the possibility of systemic financial risks.

Shadow banking in China mainly includes three categories: Credit intermediary institutions without financial licenses and completely unregulated, including new internet financial companies and third-party wealth management institutions. Second, credit intermediary institutions are without financial licenses but with insufficient regulation, including financing guarantee companies and small loan companies. Third, institutions holding financial licenses but with insufficient regulation or regulatory avoidance, including money market funds, asset securitization, and certain wealth management businesses (Note 1).

Academic research on shadow banking phenomena has been extensive domestically and internationally over the past few years. Regarding shadow banking and risk, existing literature has conducted research from both macro and micro perspectives. At the macro level, studies generally believe that shadow banking will trigger systemic financial risks, mainly due to two reasons: one is the risk source characteristics of shadow banking itself, and the other is that shadow banking causes the risk to spread over a wider range through business connections with commercial banks and non-bank financial institutions. Shadow banking, which lacks supervision, promotes the formation of a financial system with high leverage, high degree of maturity mismatch, and complex relationships through credit expansion, accumulating and amplifying a large amount of financial risk (Lin et al., 2016; Feng & Qin, 2021; Eugene & Ilias, 2022; Jing et al., 2023). At the micro level, Lin et al. (2016) point out that shadow banking has high leverage and high correlation characteristics, which will spread risks to different entities and markets, aggravating enterprise risk. Chen et al. (2016) also point out that China's shadow banking affects enterprise risk through dual interest rates and credit channels. On the one hand, shadow banking influences financing costs through flexible interest rate adjustments, thereby changing enterprises' willingness to take risks; on the other hand, enterprises obtain funds through shadow banking credit support, increasing their risk-taking level (Li & Wu, 2011). Qian et al. (2020) use listed company entrusted loan announcement data to empirically find that the overall default rate of entrusted

loans is higher than the non-performing loan rate of banks during the same period because entrusted loans have more significant information asymmetry and moral hazard problems. In summary, existing literature primarily discusses systemic financial risks at the macro level arising from shadow banking phenomena. In contrast, micro-level research primarily focuses on the impact on enterprise credit and investment, thereby affecting enterprise risk, but pays less attention to the heterogeneity of this risk among enterprises of different natures and regions with different levels of financial inclusion.

Regarding the relationship between shadow banking and enterprise information disclosure quality as well as between information disclosure quality and enterprise risk-taking, existing literature mostly believes that enterprise shadow banking behaviour will worsen information disclosure quality (Adrian et al., 2012; Iacoviello et al., 2010; Wang et al., 2016). Enterprise shadow banking businesses operate outside the regulatory system and cannot be disclosed well in financial statements. Since financial statement information is important for investors when making investment decisions, shadow banking businesses will worsen the quality of information disclosure for enterprises. In addition, enterprises engaging in shadow banking usually increase their financial risks, thus being motivated to polish financial statements to obtain funds, worsening information disclosure quality. On the other hand, the decline in information disclosure quality will increase the degree of information asymmetry between investors and management, which is not conducive to stable enterprise operation and will aggravate enterprise risk-taking (Jin & Myers, 2006; Si et al., 2021; Li et al., 2022).

In summary, listed companies' excessive participation in shadow banking lending will bring them higher risks, but does this risk level have differences within enterprises? Digital financial inclusion will reduce information asymmetry and alleviate credit resource misallocation. So, do enterprises in regions with different levels of digital financial inclusion development have differences in risk-taking levels brought by shadow banking business? What role does information disclosure quality play in this risk transmission chain? Based on these questions, the relationship between shadow banking and listed companies' risk levels is focused on this paper, using empirical tests to answer these questions.

The remaining content of this paper is arranged as follows: Part 2 is theoretical analysis and research hypotheses; Part 3 is research design; Part 4 is empirical result analysis; Part 5 is heterogeneity test; Part 6 further discusses the impact of information disclosure quality on shadow banking risk-taking effect; Part 7 is the conclusion.

2. Theoretical Analysis and Research Hypotheses

2.1 Subhead

This paper draws on Wu et al.'s (2023) model and, based on China's reality, conducts a preliminary analysis of the risk transmission mechanism of listed companies engaging in shadow banking business from the perspective of enterprise dual structure. It lays the foundation for subsequent empirical analysis of listed companies' shadow banking risk-taking and heterogeneity analysis.

Assume there are two representative enterprises in the market with financing advantages and

disadvantages p, corresponding to China's state-owned and private enterprises, respectively. State-owned enterprises can obtain financing at lower prices through their unique advantages, while private enterprises face financing difficulties. In addition, this paper chooses an endogenous growth model with constant marginal capital scale as the enterprise production function, namely $y_i = A_i k_i, (i = s, p)$, where Ai represents the output efficiency of enterprise i, and is capital input. To simplify the analysis, this paper assumes that the initial capital is 0; that is, enterprise capital input comes entirely from bank borrowing, assuming that the total loanable capital of banks is $\bar{k} = k_s + k_p$. Disadvantaged financing enterprises need to mortgage a proportion m of financing to banks. Enterprise borrowing costs consist of two parts: social financing costs and enterprise financing costs. Social financing costs are rk_i, where r represents the general interest rate. The ease of enterprise financing determines the difference in enterprise financing costs. Assume that financing costs increase marginally with borrowed funds, we define the degree of financing difficulty as θ_i, obviously $\theta_p > \theta_s$, and let enterprise financing costs be $c_i = 1/2\,\theta_i k_i^2$. Then, in the initial period, when no enterprise participates in shadow banking lending, the enterprise's profit maximization problem can be expressed as:

$$\max_{k_i} \pi_i = A_i k_i - r k_i - \frac{1}{2}\theta_i k_i^2 \tag{1}$$

Solving the maximization problem yields: $k_i = (A_i - r)/\theta_i$, where is the capital borrowing amount needed when enterprise i only engages in production activities.

For enterprises with financing advantages, this paper assumes that the advantaged financing enterprises are risk-neutral and will not default. Its production function is $A_s k_s$; financing cost is $C_s = r k_s + 1/2\,\theta_s k_s^2$. Assume that the proportion of advantaged financing enterprises participating in shadow banking lending is δ, then $0 < \delta < 1$, the return from participating in shadow banking lending is r^*, and enterprises are willing to participate in the shadow banking business $r^{**} > r$, then the profit maximization problem of advantaged financing enterprises can be expressed as:

$$\max_{k_s} \pi_s = A_s(1-\delta)k_s + (1-R(e))r^*\delta k_s - rk_s - \frac{1}{2}\theta_s k_s^2 \tag{2}$$

Where e is the risk faced by disadvantaged financing enterprises, R(e) is the default probability of disadvantaged financing enterprises, and the higher the enterprise risk, the higher the default probability; here, we assume that the risk of advantaged financing enterprises participating in shadow banking business only comes from the default risk of disadvantaged financing enterprises as shadow banking borrowers. Solving the maximization problem of advantaged financing enterprises yields:

$$k_s = \frac{A_s(1-\delta)+(1-R(e))r^*\delta - r}{\theta_s} \tag{3}$$

From equation (3), it can be seen that when the shadow banking interest rate r* is higher, advantaged financing enterprises will have more motivation to borrow more funds from banks and increase the proportion of shadow banking business, which will also crowd out the bank lending quota of disadvantaged financing enterprises, thus further worsening the financing predicament of disadvantaged financing enterprises.

Disadvantaged financing enterprises' borrowed funds mainly come from banks and the shadow banking business of advantaged financing enterprises, so financing costs are $C_p = rk_p + 1/2\,\theta_p k_p^2 + r^*\delta(\bar{k} - k_p)$. The production function of disadvantaged financing enterprises is $A_p k_p$; assuming that the risk faced by disadvantaged financing enterprises is e, and they need to mortgage a proportion m of financing quota, then the profit maximization problem of disadvantaged financing enterprises can be expressed as:

$$\max_{k_p} \pi_p = A_p(1-e)[(1-m)k_p + \delta k_s] + (1-em)rk_p - r^*\delta(\bar{k} - k_p) - \frac{1}{2}\theta_p k_p^2 \tag{4}$$

Taking the first-order condition of equation (4) yields:

$$k_p = \frac{A_p(1-e)(1-m)-(1-em)r+r^*\delta}{\theta_p} \tag{5}$$

Then, taking the first-order partial derivative of disadvantaged financing enterprises' capital concerning risk e yields:

$$\frac{\partial k_p}{\partial e} = \frac{-A_p(1-m)+mr}{\theta_p} \tag{6}$$

For disadvantaged financing enterprises, as their risk level e rises, it becomes more difficult for

disadvantaged financing enterprises to obtain financing from banks, that is, $\frac{\partial k_p}{\partial e} < 0$, which means:

$$A_p(1-m) - mr > 0 \tag{7}$$

On the other hand, transforming equation (5) yields:

$$e = 1 + \frac{(m-1)r - \theta_p k_p + r^*\delta}{A_p(1-m) - mr} \tag{8}$$

Based on equation (8), taking the partial derivative of risk-taking level e concerning shadow banking fund proportion yields:

$$\frac{\partial e}{\partial \delta} = \frac{r^*}{A_p(1-m) - mr} > 0 \tag{9}$$

Equation (9) very clearly reflects the risk transmission mechanism of shadow banking to enterprises. When advantaged financing enterprises increase shadow banking business, that is, δ increases, it will necessarily crowd out the regular bank credit quota of disadvantaged financing enterprises, thus forcing disadvantaged financing enterprises to engage in shadow banking borrowing with looser financing conditions, which also means that disadvantaged financing enterprises will face higher costs and higher risk e than bank credit channels. As the risk of disadvantaged financing enterprises increases, their default probability will also increase, increasing the risk-taking level of advantaged financing enterprises, and the overall risk level rises. Therefore, based on the above analysis, we propose Hypothesis 1:

Hypothesis 1: Enterprise engagement in shadow banking business will increase their risk-taking level.

Compared with state-owned enterprises, non-state-owned enterprises often have more significant financing difficulties. When non-state-owned enterprises engage in more shadow banking business in pursuit of higher returns, since non-state-owned enterprises find it more difficult to obtain loan support from banks than state-owned enterprises, after shadow banking borrower enterprises default, the impact on non-state-owned enterprises is far more significant than on state-owned enterprises. Shadow banking businesses will significantly increase the risk-taking level of non-state-owned enterprises. Therefore, this paper proposes the second hypothesis:

Hypothesis 2: The impact of shadow banking on risk-taking levels is heterogeneous between state-owned and non-state-owned enterprises, with non-state-owned enterprises significantly higher than state-owned enterprises.

The development of digital finance can effectively alleviate credit resource misallocation, promote credit resource circulation, and ease the financing difficulties of SMEs (Fang & Liu, 2025). Therefore, compared with regions with low levels of digital finance development, regions with high levels of digital finance development often have higher credit resource allocation efficiency, enterprises have

lower demand for shadow banking business, and the overall participation in shadow banking in the region is not high. Thus, the effect of shadow banking on enterprises' risk-taking levels is insignificant. Therefore, this paper proposes the third hypothesis:

Hypothesis 3: The risk-taking effect of shadow banking business has heterogeneity across regions with different levels of digital financial inclusion development, with regions with low development levels significantly higher than regions with high development levels.

Information disclosure quality is closely interlinked with shadow banking. On one hand, higher corporate information disclosure quality reduces information asymmetry, which in turn mitigates credit misallocation and alleviates corporate financing pressure. Under these conditions, firms have incentives to reduce their shadow banking activities, thereby lowering their risk-taking levels. On the other hand, improved information disclosure quality increases the difficulty for enterprises to deliberately conceal information about their shadow banking operations, thus constraining shadow banking activities and reducing risk exposure. Furthermore, enhanced corporate information disclosure quality enables regulatory authorities to better supervise shadow banking operations, thereby standardizing related business practices and lowering corporate risk-taking levels. Therefore, this paper proposes the fourth hypothesis:

Hypothesis 4: Information disclosure quality can weaken the risk-taking level brought by shadow banking business.

3. Result

To test Hypothesis 1 of this paper, the following baseline regression model is constructed:

$$Risk = \alpha_0 + \alpha_1 shadow_{i,t} + \alpha_2 controls_{i,t} + id + year + \varepsilon_{i,t} \quad (10)$$

In equation (10), the explained variable is the enterprise's risk-taking level ($Risk_{i,t}$) in year t, and the core explanatory variable is the enterprise's shadow banking scale ($Shadow_{i,t}$) in year t. In addition, referring to related research by Wu et al. (2023) and Si et al. (2022), this paper adds financial liability ratio (*finlib*), difference between financial return rate and real return rate (*finre*), intangible asset ratio (*intang*), enterprise size (*size*), equity structure (*share*), internal cash flow (*cash*), and enterprise current ratio (*current*) as control variables of the model. Finally, the model also controls for individual and year-fixed effects.

For the construction of the explained variable enterprise risk-taking level indicator, this paper draws on the approach of John et al. (2008), calculating enterprise risk-taking level using the three-year rolling standard deviation of $Adj\_roa_{i,t}$, with specific calculation formulas as follows:

$$Adj\_roa_{i,t} = \frac{EBIT_{i,t}}{Asset_{i,t}} - \frac{1}{N}\sum_{i=1}^{N}\frac{EBIT_{i,t}}{Asset_{i,t}} \quad (11)$$

$$Risk_{i,t} = \sqrt{\frac{1}{T-1}\sum_{t=1}^{T}\left(Adj_{roa_{i,t}} - \frac{1}{T}\sum_{t=1}^{N} Adj_{roa_{i,t}}\right)^2} \quad (T \geq 3) \tag{12}$$

The construction of this paper's core explanatory variable draws on the research of Han et al. (2017), using the ratio of private lending, entrusted wealth management, entrusted loans and quasi-financial assets to total enterprise assets to measure enterprise shadow banking scale (*shadow*). Considering the concealment of private lending, the private lending scale uses "other receivables" as a proxy indicator, and quasi-financial assets include bank wealth management, trust products, structured deposits, etc., obtained through classification and summation of detailed subjects in "other current assets" in the notes to statements.

This paper utilizes annual data from China's A-share listed companies on the Shanghai and Shenzhen Stock Exchanges from 2007 to 2022. The following data processing procedures were implemented: (1) financial and insurance companies were excluded; (2) companies with missing values for core variables were removed; (3) a winsorization at the 1st and 99th percentiles was performed to mitigate the impact of outliers. The final sample consists of 35,913 firm-year observations. All data were obtained from the China Stock Market and Accounting Research (CSMAR) database.

The variable construction and data sources in this paper are shown in Table 1:

Table 1. Main Variable Definitions and Data Sources

Variable Name	Variable Definition	Data Source
Risk	Enterprise risk-taking level	CSMAR
shadow	Shadow banking scale	CSMAR
fire	(Financial return/Financial assets)-(Operating profit/Operating assets)	CSMAR
finlib	Financial liabilities/Total liabilities	CSMAR
intang	Net intangible assets/Total assets	CSMAR
size	Natural logarithm of total enterprise assets	CSMAR
share	The proportion of ownership held by the actual controller in a listed company	CSMAR
cash	Net cash flow from operating activities/Total assets	CSMAR
current	Current assets/Current liabilities	CSMAR

4. Empirical Analysis

The main regression results are presented in Table 2. To determine the appropriate estimation method, we first conduct the Hausman test, which strongly rejects the null hypothesis that random effects

estimation is consistent and efficient. Consequently, we employ a fixed-effects panel regression model, controlling for both individual and year-fixed effects to address potential unobserved heterogeneity and time-varying factors that might affect our results.

Column 1 reports the baseline regression results without control variables, where the coefficient of shadow banking is positive and statistically significant. Column 2 presents the results after incorporating all control variables, including finre, finlib, intang, firm size, share, cash and current. The model with control variables demonstrates notably better goodness of fit, as evidenced by the increased adjusted R-squared from 0.0342 to 0.0684, suggesting that our comprehensive model captures a substantial portion of the variation in corporate risk-taking.

The regression results indicate that, ceteris paribus, non-financial enterprises' participation in shadow banking activities significantly increases listed companies' risk-taking levels at the 1% significance level. This economic significance highlights the substantial impact of shadow banking engagement on firms' risk-taking. The finding suggests that firms' one-dimensional pursuit of shadow banking expansion generates a "backfire" effect, elevating their risk-taking levels through multiple channels. This empirical evidence supports Hypothesis 1 of our study.

Table 2. Main Regression Results

Variable	(1)	(2)
	Risk	Risk
shadow	0.0035***	0.0034**
	(3.0368)	(2.2565)
fire		0.0000**
		(2.4741)
finlib		-0.0061**
		(-2.2564)
intang		0.0302**
		(2.0346)
size		-0.0103***
		(-9.0919)
share		-0.0001**
		(-2.4245)
cash		-0.0074
		(-1.3754)
current		0.0003
		(0.6821)

Constant	0.0389***	0.2587***
	(41.7005)	(10.7422)
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	35913	19274
R-squared	0.0342	0.0684

Note. t-values are in parentheses, regressions use robust standard errors clustered at the firm level, ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

5. Robustness Tests

5.1 Endogeneity Issues

The instrumental variable method is used because this paper may have reverse causality between regression variables. Referring to El Ghoul et al. (2011), the average shadow banking scale of other enterprises in the same industry in the same year is selected as an instrumental variable for regression. Using the average shadow banking scale of other enterprises in the same industry in the same year (*IV_shadow*) as an instrumental variable has certain rationality: On one hand, the average shadow banking scale of other enterprises in the same industry in the same year has specific correlation with the shadow banking business scale of the studied enterprise in that year; on the other hand, the average shadow banking scale of other enterprises in the same industry in the same year can only indirectly affect the risk-taking level of the studied enterprise in that year by influencing the shadow banking scale of the studied enterprise, thus satisfying the correlation and homogeneity of instrumental variables.

Table 3 shows the two-stage least squares (2SLS) regression results. After using instrumental variables, the results remain robust, and the F value of the first-stage regression is 251.7132, far greater than the critical value of 10. This passes the weak instrumental variable test, further verifying the effectiveness of the instrumental variables.

Table 3. Two-Stage Least Squares Regression Results

Variable	(1)	(2)
	First-stage	Second-stage
shadow		0.0250***
		(3.4276)
IV_shadow	0.5137***	
	(15.8655)	
Control Variables	Yes	Yes

Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	19238	19238
F	251.7132	

5.2 Other Robustness Tests

5.2.1 Alternative Dependent Variable

This paper uses the five-year rolling standard deviation of of studied non-financial listed companies to calculate risk-taking level (*Risk1*). After controlling for other variables, the regression coefficient remains significantly positive at the 5% level, verifying the robustness of the results.

Table 4. Alternative Dependent Variable

Variable	(1)	(2)
	Risk1	Risk1
shadow	0.0035***	0.0034**
	(2.9045)	(2.4395)
Control Variables	No	Yes
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	35913	19274
R-squared	0.0411	0.0815

5.2.2 Excluding Interference Factors

Given that our sample period encompasses several major global economic disruptions, we carefully considered the potential impact of exogenous shocks that could introduce significant volatility into our sample data. These shocks include the 2008 global financial crisis, which severely impacted international financial markets; the 2013 liquidity crisis that stressed the Chinese banking system; the 2015 Chinese stock market crash that led to substantial market value erosion; the 2018 U.S.-China trade tensions that introduced policy uncertainties; and the 2019 COVID-19 pandemic that caused unprecedented economic disruptions globally.

To ensure the reliability of our findings and mitigate the potential bias introduced by these extraordinary events, we conducted additional robustness tests by excluding the data points corresponding to these periods of market turbulence. The regression analyses were then performed on this refined sample set. Notably, our main findings remained statistically significant both in the baseline model without control variables and in the full model with comprehensive control variables. This

consistent statistical significance across different model specifications strongly supports the robustness of our empirical findings and suggests that the documented relationship between shadow banking activities and corporate risk-taking is not driven by these external shock events.

Table 5. Excluding Interference Factors

Variable	(1)	(2)
	Risk	Risk
shadow	0.0040***	0.0039**
	(3.2078)	(2.4533)
Control Variables	No	Yes
Firm Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
Observations	34654	18728
R-squared	0.0333	0.0726

6. Heterogeneity Analysis

To test Hypothesis 2, this paper extracted listed companies' equity nature data from the CSMAR database, assigned state-owned enterprises a value of 1, other enterprises collectively termed non-state-owned enterprises assigned a value of 0 and conducted grouped regression. Table 6 shows the grouped regression results. Columns (1) and (2) conducted grouped regression on the correlation between shadow banking and enterprise risk-taking without control variables; the difference between the two is significant at the 1% significance level, and the shadow banking and enterprise risk-taking are significantly positively correlated in the non-state-owned enterprise sample, indicating that non-state-owned enterprises engaging in shadow banking business significantly increases enterprise risk-taking level, consistent with the theoretical analysis results above. Columns (3) and (4) conducted grouped regression on the correlation between shadow banking and enterprise risk-taking after adding control variables; results show that the coefficient is significant for non-state-owned enterprises but not significant for state-owned enterprises, and there is a significant difference between the two at the 5% significance level, which also corroborates the theoretical analysis above.

Table 6. Enterprise Nature, Shadow Banking and Enterprise Risk-Taking

Variable	(1)	(2)	(3)	(4)

	SOE	Non-SOE	SOE	Non-SOE
shadow	0.0026	0.0049***	-0.0011	0.0055***
	(1.0784)	(3.7610)	(-0.3524)	(3.2703)
Control Variables	No	No	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Between-group Test (P-value)	0.000***		0.010**	
R-squared	0.0195	0.0554	0.0422	0.1004
N	14556	21199	8031	11190

To test Hypothesis 3, this paper uses the Peking University Digital Financial Inclusion Index (Guo et al., 2020). Limited by the years of the financial inclusion index, this section's sample period is 2011-2022. Samples higher than the median of the financial inclusion index are assigned a value of 1, representing a high digital financial inclusion level; samples lower than the median are assigned a value of 0, representing a low digital financial inclusion level. The grouped regression results are shown in Table 7. Columns (1) and (2) of the table present a regression of the relationship between shadow banking and corporate risk-taking without control variables. The differences between the two are statistically significant at the 5% significance level. Specifically, there is a significant positive correlation between shadow banking and corporate risk-taking in samples with a low level of digital inclusive finance. This suggests that the development of shadow banking in regions with low digital inclusive finance significantly increases corporate risk-taking, consistent with the theoretical analysis discussed earlier. Columns (3) and (4) of the table show the results of the grouped regression between shadow banking and corporate risk-taking after adding control variables. The results indicate that the regression coefficients for both groups are positive, with the coefficient for the digital inclusive finance sample being significant. Moreover, there is a significant difference between the two at the 10% significance level, corroborating the earlier theoretical analysis.

Table 7. Digital Financial Inclusion Level, Shadow Banking and Enterprise Risk-Taking

Variable	(1)	(2)	(3)	(4)
	High Digital Financial Inclusion	Low Digital Financial Inclusion	High Digital Financial Inclusion	Low Digital Financial Inclusion
shadow	0.0024	0.0038**	0.0029	0.0038*
	(1.4760)	(2.2305)	(1.4730)	(1.8933)

Control Variables	No	No	Yes	Yes
Firm Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Between-group Test (P-value)	0.008**		0.028*	
R-squared	0.0431	0.0276	0.0924	0.0553
N	14406	14660	8403	7815

7. Further Analysis

To test Hypothesis 4, this paper follows Kim and Verrecchia (2001) and Zhai et al. (2014)'s approach, adding the KV index reflecting enterprise information disclosure quality. The index is constructed as follows:

$$Ln|(P_t - P_{t-1})/P_{t-1}| = \lambda_0 + \lambda(Vol_t - Vol_0) + \varepsilon \quad (13)$$

Pt and Volt are the stock closing price and trading volume (number of shares) on day t, respectively, and Vol0 is the average daily trading volume during the study period. To facilitate coefficient interpretation, this paper takes the opposite of the calculated KV index and constructs the following regression equation:

$$Risk = \alpha_0 + \alpha_1 shadow_{i,t} + \alpha_2 KV_{i,t} + \alpha_3 KV_{i,t} * shadow_{i,t} + \alpha_4 controls_{i,t} + id + year + \varepsilon_{i,t} \quad (14)$$

As per the empirical results presented in Table 8, the interaction term coefficient between the KV index and shadow banking exhibits a statistically significant negative correlation at the 1% significance level. From an econometric perspective, this significant interaction effect provides robust evidence that enterprise information disclosure quality serves as a crucial moderating variable in the relationship between shadow banking activities and corporate risk-taking behavior. Specifically, after controlling for various potential determinants of corporate risk-taking, our findings demonstrate that higher levels of information disclosure quality substantially attenuate the positive association between shadow banking operations and firms' risk-taking propensity, verifying Hypothesis 4.

This empirical evidence can be interpreted through multiple theoretical lenses: First, high-quality information disclosure effectively mitigates information asymmetry between corporations and their external stakeholders, enabling market participants to better monitor and evaluate firms' operational conditions, which can also alleviate the credit mismatches for enterprises. Second, comprehensive disclosure mechanisms constrain managerial opportunism, promoting more prudent decision-making in shadow banking engagements. Third, enhanced transparency facilitates regulatory authorities' ability to identify and preempt potential risk exposures arising from shadow banking activities.

Table 8. Information Disclosure Quality, Shadow Banking and Enterprise Risk-Taking

Variable	Risk
shadow	0.0006
	(0.4306)
KV	0.0224***
	(8.0893)
KV*shadow	-0.0273***
	(-5.1495)
Control Variables	Yes
Firm Fixed Effects	Yes
Year Fixed Effects	Yes
Observations	18931
R-squared	0.0739

8. Conclusion

This study employs theoretical modeling to analyze how corporate shadow banking borrowing activities affect firms' risk-taking levels and their transmission mechanisms. Based on data from non-financial listed companies in China's A-share market from 2007 to 2022, we empirically investigate the relationship between corporate shadow banking borrowing behavior and risk-taking. Our empirical findings reveal that engagement in shadow banking activities significantly increases corporate risk-taking levels, with this positive correlation being more pronounced among non-state-owned enterprises due to their disadvantaged position in traditional credit markets. Meanwhile, digital transformation has substantially mitigated credit resource misallocation, thereby alleviating the zombie firm phenomenon. Our empirical results further indicate that firms in regions with low digital inclusive finance development demonstrate a more significant increase in risk-taking levels when engaging in shadow banking activities. Additionally, information disclosure quality is closely linked to shadow banking engagement. Enhanced information disclosure quality effectively weakens the positive correlation between shadow banking and corporate risk-taking, suggesting that firms with better information disclosure quality significantly reduce their risk-taking levels associated with shadow banking activities.

Based on this paper's conclusions, the following policy implications are proposed: On one hand, the government and relevant departments should pay attention to local SMEs' financing difficulties. Banks and other financial institutions can appropriately relax loan requirements for these enterprises to create a loose, healthy, and equal financing environment. On the other hand, regulatory authorities should also strengthen control over enterprise information disclosure quality to reduce adverse selection and moral

hazard brought by information asymmetry.

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Note

Note 1. See "Notice on Strengthening the Supervision of Shadow Banking" issued by the General Office of the State Council, Guobanfa [2013] No. 107.