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How does corporate financialization affect operational risk? Evidence from Chinese listed companies

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ABSTRACT

Using a sample of China's non-financial listed companies from 2009 to 2020, this paper examines the impact of corporate financialization on operational risk. Our results show that there is a positive relationship between corporate financialization and operational risk, indicating that the risk amplification effect of corporate financialization is dominant, and this effect is more pronounced among companies with higher financing constraints. The analysis of the impact mechanism shows that corporate financialization fails to alleviate underinvestment by means of capital 'reservoir', but will lead to an increase in operational risk by damaging the profitability of the company's main business. In addition, we find that product market competition mitigates the risk amplification effect of corporate financialization. The conclusions of this paper have certain significance for the government and corporations to understand the microeconomic consequences of financialization.

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Non-financial companies; corporate financialization; operational risk; product market competition

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1. Introduction

Financial liberalization has profoundly changed the structure of the global economy over the past decades, and the rise of finance has been a key factor in the economic changes in developed countries, which many scholars call 'financialization' (Krinpper, 2005; Epstein, 2005; Stockhammer, 2010; Davis, 2016; Aalbers, 2019). Although scholars have different understandings of financialization, such as financial deepening, financial development, and the expansion of the pan-financial sector, there is general agreement that the financial sector is becoming increasingly important in the national economy. It is no coincidence that a similar phenomenon of 'financialization' has also emerged in China. The McKinsey report showed that despite China's gradual shift toward interest rate marketization, more than 80% of China's economic profits come from the financial sector, compared to 20% in the United States.¹ In addition,

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the value added of China's financial sector reached 7.7% of GDP in 2019, surpassing that of developed economies over the same period.

It is noteworthy that financialization is manifested not only at the macro level as changes in the financial sector, but also at the micro level as changes in the investment behavior of non-financial companies. Corporate financialization refers to the increasing importance of financial investment as an income-generating activity of non-financial companies (Akkemik & Ozen, 2014). There is strong evidence that non-financial companies are keen to invest in financial products and focus on financial returns. From January 2020 to January 2021, a total of 1,218 listed companies in China bought wealth management products, and 1,072 of them invested more than 100million yuan, accounting for 88.09% (Zhai et al., 2021). On average, non-financial companies derive more than 20% of their earnings from financial sources. More and more funds are transferred from the real sector to the financial sector, and the characteristics of financialization of companies are increasingly revealed. Despite the large economic size of China's financial market, its financial system is dominated by banks and lacks diversity of financial products. Such characteristics indicate that having money capital or access to credit resources is a condition for the financialization of Chinese non-financial companies (Xu & Guo, 2021), which also makes it meaningful to discuss the issue of financialization in China. In particular, how does the financialization of non-financial companies affect their operational activities?

The phenomenon of financialization of companies with a bias toward financial operations has also been discussed in the literature. Some studies have argued that corporate financialization can have a 'crowding out' effect. High rates of return in the financial sector drive firms to invest in financial assets for short-term gains rather than long-term fixed asset investments (Demir, 2009), thereby crowding out real investments (Orhangazi, 2008; Barradas, 2017; Davis, 2018; Tori & Onaran, 2018). Other studies have argued that corporate financialization has a 'reservoir' effect. Compared to other assets, financial assets have stronger liquidity and lower adjustment costs. In the event of a shortage of funds, companies can sell their financial assets to reduce the negative impact of a break in the financial chain on their operations (Stulz, 1996; Opler et al., 1999; Han & Qiu, 2007). For emerging markets, in particular, corporate financialization is more of a complement to an imperfect system of allocating financial resources.

This paper extends the existing literature by further analyzing the impact of corporate financialization on operational risk. Operational risk is defined here as the risk of a change in the company's profitability level due to managerial errors resulting in a decrease in investors' expected returns.² It is closely related to operational activities and is a source of risk within the companies (Mitra et al., 2015), and has received a lot of attention from the media, regulators and company executives. Previous studies have mainly dealt with the classification of operational risk issues and the modeling of risk management (Moosa, 2007; Xu et al., 2017, 2020), but empirical studies are lacking. We believe that corporate financialization implies a change in the allocation of resources within the company, which affects future earnings volatility and has a significant impact on the company's operational activities. It is worth studying whether corporate financialization plays the role of 'risk hedging' or 'risk

amplification'. Especially in the current context of structural imbalance between the real economy and the virtual economy, the Chinese government is taking a series of regulatory measures to further prevent the trend of economic virtualization. Curbing asset bubbles and preventing systemic risks are important issues. Thus, the study of financialization and operational risk at the company level will help to provide guidance to the relevant authorities in their decision making.

In view of this, this paper uses the data of China's non-financial listed companies from 2009 to 2020 to empirically examine the impact of corporate financialization on operational risk. We find that corporate financialization will amplify operational risk, and this result remained robust after using instrument variables, matching propensity scores, alternative metrics, and changing sample sizes. In addition, we find that this impact is more pronounced in companies with higher financing constraints. Further analysis shows that corporate financialization not only directly affects operational risk, but also indirectly exacerbates operational risk by damaging the profitability of the company's main business. Finally, our research also shows that there is a certain governance effect in the product market competition, which can mitigate the positive impact of corporate financialization on operational risk.

Our study mainly contributes to the following aspects. First, many previous studies have discussed the economic consequences of financialization mainly at the macro level (Stockhammer, 2010, 2013; Ortiz et al., 2014; Luo & Zhu, 2014), with a relatively small number of studies analyzing financialization at the micro level. Financialization is a complex process, and although the analysis of macro-level data can capture broad trends as a whole, it cannot capture the heterogeneous factors of firm behavior (Orhangazi, 2008; Du et al., 2017; Xu & Guo, 2021), and the issue of financialization at the micro level needs further research. Therefore, this paper discusses the economic consequences of corporate financialization in the context of China, an emerging market, by using a firm-level database.

Second, the existing literature mainly focuses on the relationship between corporate financialization and corporate performance, corporate innovation, capital accumulation or fixed investment (Klinge et al., 2021), and this paper starts from the perspective of corporate risk, constructing micro-indicators and exploring the risks that may arise from corporate financialization in China, which complements the theoretical research on the economic consequences of corporate financialization. We point out that the aim of allocating financial assets by China's non-financial companies is mainly to pursue short-term interests, rather than a kind of capital savings behavior. And the financialization of China's non-financial companies at this stage is a key factor leading to operational risk.

Finally, this paper not only directly examines the impact of corporate financialization on operational risk, but also further analyzes the specific channels for impact of financialization on operational risk through the construction of an intermediary effect model. Our study shows that corporate financialization will amplify operational risk by damaging the profitability of the main business. This provides micro-level empirical evidence of the current deviation of Chinese non-financial companies from their main business.

The subsequent arrangement of the paper is as follows: The second part is the literature review and hypothesis development; The third part is the research design;

The fourth part is the analysis of empirical results, and the fifth part is the analysis of the impact mechanism; The sixth part is expansibility analysis; Finally, there are the research conclusions and implications.

2. Literature review and hypothesis development

2.1. Motivation for corporate financialization

In the context of the prevalence of financial assets held by non-financial companies, it is crucial to discuss the motives of corporate financialization. First, companies cannot operate without access to external resources, and external financing is not easy, especially in a bank-dominated financial system (Li et al., 2021; Xu & Guo, 2021). Compared with long-term assets such as fixed assets and intangible assets, financial assets have higher liquidity and lower adjustment costs, thus companies can allocate financial assets to solve the problem of temporary shortage of capital and underinvestment. On the other hand, the international business environment has become increasingly complex under globalization, and the company faces many uncertainties. When uncertainty increases, the option value of real assets changes relatively more and is relatively irreversible. In order to take advantage of investment opportunities, companies may invest less in physical assets and more in financial assets (Zhao & Su, 2022). Duchin et al. (2017) point that in the face of economic policy uncertainty, companies will increase their financial asset holdings in response to potential cash flow risks. Thus, it seems that the motivation for corporate financialization may be for capital savings, which will help the company's development in the long run.

However, the literature based on the principal-agent view gives an alternative explanation. Because of the separation of ownership and operation, managers have greater decision-making power over corporate operations, and then they are more motivated to seek private gain (Du et al., 2017). High profits in financial markets shorten the planning horizon of managers, making them prioritize financial investments over physical investments that bring long-term gains. Moreover, managers are often under pressure from performance appraisals, and financial investments provide a convenient way for them to obtain short-term gains, but this may lead to a mismatch of company resources and inhibit the development of their main business. Thus, corporate financialization may be the result of management's cross-industry arbitrage motive.

2.2. Research hypothesis

Although both of these motives can lead to a company's allocation of financial assets, their impact on corporate operational risk is significantly different. On the one hand, corporate financialization based on a capital reserve perspective helps reduce operational risk. According to the theory of 'reservoir' of funds, financial assets have the characteristics of strong liquidity, low adjustment costs, and fast realization speed, so that in the face of capital shortages, companies can quickly sell financial assets to obtain abundant cash flow, thereby ensuring the smooth progress of physical capital investment and innovative investment (Opler et al, 1999; Han & Qiu, 2007).

Companies can reduce their dependence on external financing through financialization, which can make up for the liquidity gap, and reduce the possibility of insufficient investment and financial difficulties. In addition, according to the CASBE (Chinese Accounting Standards for Business Enterprises), most financial assets and investment real estate are measured according to fair value attributes. Thus, with the rise in the price of financial assets, the company's asset-liability situation and credit rating would improve (Qi & Zhang, 2018), thereby helping the company to refinance (Stulz, 1996), and thus reducing the risk caused by insufficient physical investment. Based on the analysis above, corporate financialization helps to smooth out operational risk, that is, there is a negative correlation between corporate financialization and operational risk.

On the other hand, corporate financialization based on a principal-agent view can amplify operational risk. Many studies have shown that an important reason for non-financial companies to get involved in the field of finance and real estate is to share excess profits, which is an alternative means of investment (Wang et al., 2017), and companies may not be willing to use funds for investment in the main business for a long return time after profiting from financial channels, but continue to invest in financial assets, falling into the speculation cycle of 'allocating financial assets - obtaining revenue - allocating financial assets' (Du et al., 2017). Therefore, if the NFCs chase and rely on financial returns excessively, the company's production and operation would gradually deviate from the main business, thereby damaging the profitability of the main business, which greatly aggravates operational risk. In addition, high profits in the financial and real estate sectors will lead to 'short-sightedness' of management and aggravate the risk investment tendencies of management. Xu and Zeng (2010) also point out that the company's compensation incentive for managers is an incomplete contract, the higher the company's performance, the higher the manager's compensation will be. But with the lack of punitive measures for performance losses, this asymmetrical compensation structure will stimulate managers to invest in risky projects. Therefore, if non-financial companies are engaged in higher-risk financial investment activities for a long time, and once the cash flow cannot be recovered, it will inevitably cause the company's production and operation activities to be negatively impacted, and even lead to the risk of bankruptcy (Li and Han, 2019), which shows that corporate financialization will amplify operational risk.

Based on the above analysis, we propose the following competitive research hypotheses:

H1a: Corporate financialization helps reduce operational risk, that is, there is a negative relationship between corporate financialization and operational risk;

H1b: Corporate financialization will amplify operational risk, that is, there is a positive relationship between corporate financialization and operational risk.

To understand the strength of the impact of corporate financialization on operational risk, further analysis is needed in combination with the degree of financing constraints to which companies are subjected.

On the one hand, if a company allocates financial assets for allocate financial assets for the saving motive, then the company will purchase financial assets when the funds are rich (low financing constraints) , and sell financial assets when the funds are tight

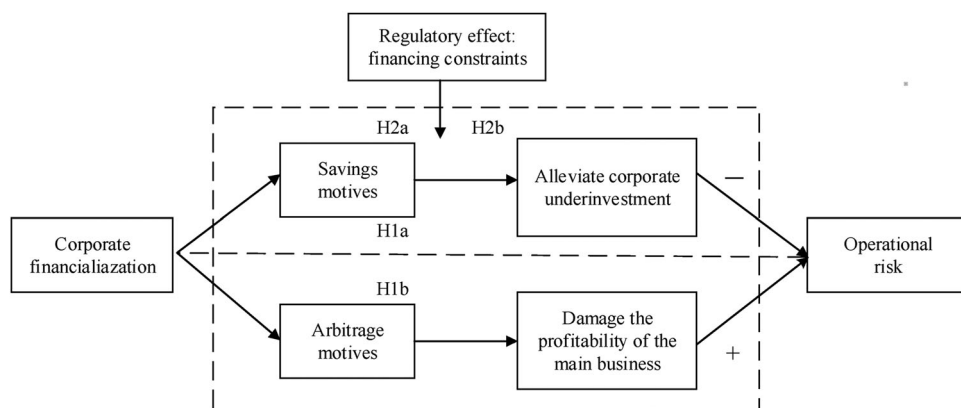


Figure 1. Analytical framework.

Source: made by authors.

(high financing constraints), thereby regulating the main business investment (Zhai et al., 2021). Therefore, for non-financial companies with a low degree of financing constraints, the negative relationship between corporate financialization and operational risk is more obvious.

On the other hand, if a company allocates financial assets for arbitrage motives, then the company with a high degree of financing constraints has a more obvious ‘crowding out’ effect on its allocation of financial assets due to limited sources of funds, or limited funds available within the company, and its deviation from the main business leads to greater operational risks. Companies with low financing constraints have stronger risk response capabilities, so the ‘crowding out’ effect caused by investment in financial assets is weaker, and the possibility of triggering operational risk is also lower.

Based on the above analysis, we propose the following hypotheses:

H2a: If there is a negative correlation between corporate financialization and operational risk, then this relationship is more significant in companies with a lower degree of financing constraint;

H2b: If there is a positive correlation between corporate financialization and operational risk, then this relationship is more significant in companies with a higher degree of financing constraint.

Lastly, the analytical framework for this paper is shown in Figure 1.

3. Research design

3.1. Sample selection and data sources

We select Chinese listed companies from 2009–2020 as our study sample and remove the companies in the financial and real estate categories, companies that are specially handled due to operational problems, companies that are insolvent, and companies that are listed in the current year. Finally, we obtain 15292 annual observations. The data used in this paper is mainly from the CSMAR (The China Stock Market & Accounting Research) database. In order to reduce the influence of extreme values,

we apply tailoring to the 1% and 99% quartiles for all continuous variables at the firm level.

3.2. Variable definitions

3.2.1. Operational risk

Based on the previous definition, we use the volatility of earnings to measure operational risk faced by the company. In the study of Mitra et al. (2015), they use the indicators related to the volatility of stock prices to calculate operational risk. However, considering that the capital market in China is not yet developed and the stock price contains a lot of ‘noise’, the information content of the stock price is low and the synchronization is high (Zhong & Lu, 2018), which leads to the stock price not reflecting the company’s operating condition better. Therefore, we use company’s earnings volatility to measure corporate operational risk. Moreover, the company’s earnings are compulsorily disclosed and can be easily obtained from the financial statements. Specifically, referring to Acharya et al. (2011) and Wang et al. (2017), we calculate it as follows:

$$risk_{i,t} = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (E_{i,t} - \frac{1}{T-1} \sum_{t=1}^T E_{i,t})^2} \quad |T = 4 \quad (1)$$

$$E_{i,t} = \frac{EBITDA_{i,t}}{A_{i,t-1}} \quad (2)$$

In formula (1), $risk_{i,t}$ indicates the operational risk of the i company in the t year (i.e., the degree of profit volatility); In Formula (2), $E_{i,t}$ represents $EBITDA$ for the i company in the t year. $A_{i,t-1}$ represents the total assets of the i company in $t-1$. We calculate operational risk for the t year using the standard deviation of the rolling $EBITDA$ of each company from $t-4$ to $t-1$ years. Taking into account the lagging effect of corporate financialization, we push the $risk$ forward by one year.

3.2.2. Corporate financialization

There are two main ways to measure corporate financialization in existing studies: the perspective of financial asset allocation and the perspective of financial profit sources. Our main focus is on the allocation of financial assets by companies, with respect to Demir (2009), Zhang and Zheng (2020), financial assets are calculated using the following formulas:

For the 2009–2017 sample, financial assets = (monetary funds + trading financial assets + net financial assets available for sale + net investment held to maturity + derivative financial assets + net loans and advances issued + net investment real estate).

For the 2018–2020 sample, financial assets = (monetary funds + trading financial assets + derivative financial assets + net loans and advances + net investment in real

estate + debt investment + other debt investment + other equity instrument investment + other non-current financial assets).³

In this paper, net investment real estate is included because in recent years, many entity companies have invested in real estate for speculative arbitrage rather than production and operation. Real estate is thus increasingly revealing the characteristics of financial derivatives and must be included in the category of financial assets. Corporate financialization (*fin*) is measured by the proportion of financial assets in the total assets of the company.

3.2.3. Financing constraints

Referring to Kaplan and Zingales (1997), we construct the KZ Index based on five factors, including operating net cash flow, cash dividends, cash holdings, debt level, and growth. They are used as proxy variables for financing constraints. With reference to the study of Chen and Wang (2012), we divide the KZ Index into four groups from small to large. The three ones with relatively smaller KZ index take the value of 0, indicating a low degree of financing constraints. And the group with the highest set of the KZ Index takes a value of 1, which indicates a higher degree of financing constraints.

3.2.4. Control variables

Referring to existing studies, we set several variables in the study, which are defined and described in Table 1 below.

Table 1. Variable definitions.

Variable names	Symbols	Specific instructions
Operational risk	<i>risk</i>	The fluctuation degree of the company's profits
Corporate financialization	<i>fin</i>	assets/total assets
Financing constraints Financial	<i>kz</i>	The value of the smallest three groups of KZ index is 0, and the value of the largest group is 1
Company size	<i>size</i>	Natural logarithm of total assets
Profitability	<i>roa</i>	Net profit / total assets
Liquidity	<i>cfo</i>	Net cash flow from operating activities / total assets
Corporate leverage	<i>lev</i>	Total liabilities / total assets
Capital intensity	<i>fata</i>	Fixed assets / total assets
Company growth	<i>growth</i>	(Current operating income / previous operating income) - 1
Company value	<i>tobin</i>	Market value / total assets
Equity concentration	<i>top1</i>	Shareholding ratio of the largest shareholder
Board size	<i>board</i>	Natural logarithm of the board members
Independent director	<i>indep</i>	Number of independent directors / number of board members
Two duties	<i>twoduty</i>	Whether the chairman and the CEO are one person; 0: No; 1: Yes
Management shareholding	<i>manage</i>	Number of shares held by management / total shares
Equity balances	<i>balance</i>	Proportion of the second to fifth largest shareholders / proportion of the first largest shareholder
Institutional investor Shareholding	<i>inprop</i>	Proportion of shares of listed companies held by institutional investors
Year dummy	<i>Year</i>	When the company is in this year, the value is 1, otherwise it is 0
Industry dummy	<i>Industry</i>	When the company is in this industry, the value is 1, otherwise it is 0

Source: made by authors.

3.2.5. Basic regression model

We set up the following model to test the above research hypothesis:

$$risk = \alpha_0 + \alpha_1 fin + \alpha_i \sum control + \varepsilon \quad (3)$$

$$risk = \beta_0 + \beta_1 fin + \beta_2 fin \times KZ + \beta_3 KZ + \beta_i \sum control + \varepsilon \quad (4)$$

Model (3) is used to test the impact of corporate financialization on operational risk. If H1a (H1b) is accepted, we should be able to observe that α_1 is significantly negative (positive). The model (4) is used to test the strength of the impact of corporate financialization on operational risk, and if H2a (H2b) is accepted, β_2 is significantly negative (positive).

4. Analysis of empirical results

4.1. Descriptive statistics and correlation analysis

Table 2 reports the descriptive statistical results for the main variables. It can be seen that the mean and median of *risk* are 0.056 and 0.027, respectively, indicating a right-side distribution of *risk* and the existence of a proportion of companies with relatively high operational risk. Its standard deviation is 0.133, indicating that there is some variation in the level of operational risk among different companies. We find similar conclusions in the descriptive statistics of *fin*. The mean and standard deviation of *lev* are 0.448 and 0.447, respectively, which are within a reasonable range, indicating that overall, the companies have a good debt structure. Its standard deviation is 0.195, indicating a large variation in debt ratios between companies. *inprop* has a mean value of 0.462, indicating a large percentage of shares held by institutional investors in companies. The other variables are not overly described and we have not found outliers.

Table 2. Descriptive statistics.

Variables	N	Mean	Std.Dev.	Min	Median	Max
<i>risk</i>	15292	0.056	0.133	0.002	0.027	2.49
<i>fin</i>	15292	0.203	0.133	0.014	0.169	0.766
<i>size</i>	15292	22.349	1.213	19.568	22.200	26.366
<i>roa</i>	15292	0.037	0.057	-0.379	0.033	0.220
<i>cfo</i>	15292	0.050	0.067	-0.224	0.048	0.290
<i>lev</i>	15292	0.448	0.195	0.035	0.447	0.886
<i>fata</i>	15292	0.242	0.168	0.002	0.206	0.784
<i>growth</i>	15292	0.177	0.433	-0.645	0.102	5.076
<i>tobin</i>	15292	2.080	1.311	0.819	1.668	13.527
<i>shrcr1</i>	15292	0.342	0.146	0.086	0.321	0.758
<i>board</i>	15292	2.153	0.199	1.609	2.197	2.708
<i>indep</i>	15292	0.372	0.053	0.250	0.333	0.600
<i>twoduty</i>	15292	0.217	0.412	0	0	1
<i>manage</i>	15292	0.0816	0.151	0	0	0.690
<i>sbalance</i>	15292	0.645	0.569	0.017	0.477	2.901
<i>inprop</i>	15292	0.462	0.227	0	0.481	0.913

Source: made by authors.

In addition, we have plotted the correlation coefficient matrix of the variables. We find that the correlation coefficient between *fin* and *risk* is 0.027, and it is statistically significant at the 1% level, indicating that when the influence of other factors is not considered, the higher the level of corporate financialization, the greater the operational risk.⁴ It partially supports hypothesis H1b and rejects hypothesis H1a. Furthermore, we will test it with multiple regression analysis.

4.2. Multiple regression analysis

4.2.1. The impact of corporate financialization on operational risk

Table 3 reports the results of the hypothesis H1 test. Column (1) does not include control variables. Column (2) only includes control variables other than year and industry, and column (3) includes all control variables. According to the results of column (3), the regression coefficient of *fin* and *risk* is 0.0412, and it is significant at

Table 3. The effect of corporate financialization on operational risk.

	(1) <i>risk</i>	(2) <i>risk</i>	(3) <i>risk</i>	(4) <i>risk</i> (low <i>fin</i>)	(5) <i>risk</i> (high <i>fin</i>)
<i>fin</i>	0.0272*** (3.3742)	0.0360*** (3.9022)	0.0412*** (4.3532)	0.0640 (0.7011)	0.1093*** (4.8539)
<i>size</i>		-0.0081*** (-6.7453)	-0.0085*** (-6.5031)	-0.0098*** (-3.8063)	-0.0099*** (-3.4639)
<i>roa</i>		-0.0577*** (-2.6171)	-0.0417* (-1.8606)	-0.0947** (-2.0898)	0.0425 (0.9016)
<i>cfo</i>		0.0174 (0.9654)	0.0015 (0.0822)	0.0065 (0.1636)	0.0338 (0.9271)
<i>lev</i>		0.0279*** (4.1223)	0.0418*** (5.7530)	0.0435*** (2.8697)	0.0575*** (3.7991)
<i>fata</i>		0.0078 (1.0351)	0.0058 (0.7048)	0.0046 (0.3248)	-0.0204 (-0.8288)
<i>growth</i>		0.0547*** (21.9446)	0.0555*** (22.2212)	0.0417*** (7.9014)	0.0625*** (11.8017)
<i>tobin</i>		0.0004 (0.4436)	0.0001 (0.1183)	-0.0024 (-0.9445)	0.0010 (0.5242)
<i>shrcr1</i>		0.1148*** (7.6795)	0.1025*** (6.8191)	0.1426*** (4.7701)	0.0760** (2.3454)
<i>board</i>		-0.0209*** (-3.2312)	-0.0278*** (-4.2683)	-0.0600*** (-4.6625)	0.0015 (0.1047)
<i>indep</i>		0.0097 (0.4239)	-0.0042 (-0.1853)	-0.1047** (-2.2781)	0.1238** (2.5099)
<i>twoduty</i>		0.0011 (0.4321)	0.0020 (0.7471)	-0.0073 (-1.3090)	-0.0005 (-0.0891)
<i>manage</i>		-0.0020 (-0.1657)	0.0045 (0.3831)	0.0146 (0.5998)	-0.0068 (-0.2682)
<i>sbalance</i>		0.0275*** (8.9563)	0.0264*** (8.5394)	0.0311*** (4.9164)	0.0213*** (3.2212)
<i>inprop</i>		0.0467*** (4.6690)	0.0495*** (4.9296)	0.0421** (2.0969)	0.0413* (1.8670)
<i>_cons</i>	0.0504*** (25.7517)	0.1680*** (5.7181)	0.1971*** (6.2637)	0.3227*** (5.2137)	0.1049 (1.5129)
<i>Industry</i>	No	No	Yes	Yes	Yes
<i>Year</i>	No	No	Yes	Yes	Yes
Adj.R ²	0.0007	0.0553	0.0730	0.0513	0.1003
N	15292	15292	15292	3823	3823

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.

Source: made by authors.

the statistical level of 1%, indicating that corporate financialization has a significant positive effect on operational risk, which supports the hypothesis H1b.

In addition, we further analyze the impact of different degrees of corporate financialization on operational risk. We will sort *fin* from small to large, defining the first 25 percentile of *fin* as a low financialization level, and the last 25 percentile as a high financialization level. The columns (4) and column (5) of Table 2 show that a high financialization level can significantly increase operational risk compared with a low financialization level.

4.2.2. Corporate financialization, financing constraints and operational risk

In order to test the strength of the impact of corporate financialization on operational risk, we include an interaction term between firm financialization and financing constraints for the test, and report the results in Table 4. Column (1) does not control year and industry effects, and column (2) include all control variables. The results from column (2) show that *fin*'s coefficient is still significantly positive. The interaction term we focus on, $fin \times KZ$, has a coefficient of 0.0875, which is also significant at the statistical level of 1%. This shows that financing constraints will exacerbate the positive impact of corporate financialization on operational risk. To enhance the credibility of the results, we also use the nature of property rights as an alternative variable to financing constraints. This is because in China, state-owned enterprises naturally have budgetary soft constraints that allow them to obtain loans at a lower cost, while also making it easier to obtain financial support from the government (Li et al., 2009). We find that the test results have not changed, H2b is thus accepted.

4.3. Robustness tests

4.3.1. Endogenous test

Referring to Du et al. (2017), we use instrumental variables- generalized method of moments (IV-GMM) to mitigate possible endogeneity problems, and then select instrumental variables two lags and three lags of *fin*. The tests show that there are no problems of unidentifiability, weak instrumental variables, and over-identification, so

Table 4. Financialization, financing constraints and operational risk.

	(1) <i>risk</i>	(2) <i>risk</i>
<i>fin</i>	0.0344*** (3.4953)	0.0414*** (4.1181)
$fin \times KZ$	0.0834*** (3.5402)	0.0875*** (3.7244)
<i>KZ</i>	0.0099** (2.1281)	0.0124*** (2.6644)
<i>_cons</i>	0.1502*** (5.0994)	0.1821*** (5.7893)
<i>Control</i>	Yes	Yes
<i>Industry</i>	No	Yes
<i>Year</i>	No	Yes
Adj.R ²	0.0587	0.0772
N	15292	15292

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.

Source: made by authors.

Table 5. Endogenous test.

	(1) <i>fin</i> (the first-step)	(2) <i>risk</i> (the second step)
<i>L2.fin</i>	0.5410*** (29.3404)	
<i>L3.fin</i>	0.0919*** (5.3756)	
<i>fin</i>		0.0331** (2.3192)
<i>_cons</i>	0.1854*** (6.4262)	0.0682*** (2.5763)
<i>Control</i>	Yes	Yes
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
Adj.R ²	0.5956	0.0832
F-test	1434.53	
N	7707	7707

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.

Source: made by authors.

Table 6. Propensity score matching.

	(1) <i>risk</i> (neighbor matching)	(2) <i>risk</i> (caliper matching)	(3) <i>risk</i> (kernel matching)
<i>fin</i>	0.0308** (2.4305)	0.0419*** (4.3946)	0.0419*** (4.3946)
<i>_cons</i>	0.0931* (1.7731)	0.1796*** (5.5681)	0.1796*** (5.5681)
<i>Control</i>	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes
Adj.R ²	0.0808	0.0709	0.0709
N	5015	14922	14922

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.

Source: made by authors.

the instrumental variables are valid. According to column (2) of Table 5, *fin* is still significantly positively correlated with *risk* after controlling for endogeneity, indicating that the result is robust.

4.3.2. Propensity score matching

Considering the sample may have a selection bias problem, we use propensity score matching for robustness testing. Considering that if the company is over-financialized, the company's internal operating mechanism may change (for instance operating in the model of a financial company), which has an impact on the conclusions of the study. Therefore, we set the sample at the bottom 25th percentile of the financialization level as the treatment group, the rest of the sample as the control group. The remaining control variables are matched as covariates to test the actual causal effect of corporate financialization on operational risk. In order to ensure the reliability of the results, this paper adopts three matching methods: one-to-one neighbor matching, caliper matching, and kernel matching. We further substitute the matched samples into the model (3), and based on Table 6, we can see again that corporate financialization will significantly increase operational risk, consistent with the previous conclusions.

Table 7. Replace the independent variable and the dependent variable.

	(1) <i>risk</i> (replace the independent variable)	(2) <i>risk2</i> (replace the dependent variable)
<i>fin_s</i>	0.0493*** (4.6196)	
<i>fin</i>		0.0219*** (2.6272)
<i>_cons</i>	0.1982*** (6.3062)	0.1962*** (7.0598)
<i>Control</i>	Yes	Yes
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
<i>r2_a</i>	0.0732	0.0639
<i>N</i>	15292	15292

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.
Source: made by authors.

Table 8. Test the nonlinear relationship and narrow the sample interval.

	(1) <i>risk</i> (test nonlinear relationship)	(2) <i>risk</i> (exclude special years)	(3) <i>risk</i> (retain manufacturing)
<i>fin</i>	0.0076 (0.6108)	0.0377*** (3.6532)	0.0398*** (3.6535)
<i>fin_2</i>	0.1782*** (4.1452)		
<i>_cons</i>	0.2064*** (6.5472)	0.2057*** (5.9332)	0.0200 (0.5875)
<i>Control</i>	Yes	Yes	Yes
<i>Industry</i>	Yes	Yes	Yes
<i>Year</i>	Yes	Yes	Yes
<i>Adj.R²</i>	0.0740	0.0723	0.0712
<i>N</i>	15292	13586	10130

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.
Source: made by authors.

4.3.3. Replace the independent variable and the dependent variable

Considering the measurement bias problem, we substitute the independent variables and the dependent variable for robustness testing, respectively. (1) Replace the original independent variable (*fin*) with the proportion of monetary funds and trading financial assets in total assets (*fin_s*); (2) Replace the original dependent variable with the standard deviation (*risk2*) of the rolling value of *EBIT* from *t-3* period to *t* period. The test results in Table 7 show that the original conclusions are robust.

4.3.4. Test nonlinear relationships

Taking into account the nonlinear relationship between the two, we estimate the quadratic term (*fin_2*) included in model (3), and the result is shown in column (1) of Table 8. The coefficient of the primary term (*fin*) is positive but not significant, and the coefficient of the quadratic term (*fin_2*) is significantly positive. This shows that when the level of financialization is greater than 0, there is still a positive correlation between corporate financialization and operational risk, which proves that the original conclusion is robust.

4.3.5. Narrow the sample interval

We choose the following two ways to narrow the sample for robustness testing: (1) Considering the impact of macroeconomic conditions (such as financial crisis and COVID-19) on the company, we exclude the samples of three years 2009, 2010 and 2020 three years to re-estimate relevant models; (2) The manufacturing industry is the pillar industry of the national economy and the main body of economic growth, so this paper retains the manufacturing sample to re-estimate the relevant model. we can see from Table 8 that *fin* is still significantly positive, which proves the robustness of the original conclusion.

5. Analysis of impact mechanisms

5.1. Test whether corporate financialization can alleviate underinvestment

The above tests show that corporate financialization will mainly produce a ‘risk amplification effect’. However, as mentioned above, corporate financialization can reduce the dependence on external financing through the ‘reservoir’ of funds. This makes up for the shortage of liquidity, and then reduces the possibility of the company falling into financial difficulties due to underinvestment. In order to test whether corporate financialization can really alleviate underinvestment and reduce operational risk (the first path of Figure 1), refer to Richardson (2006) and Du et al. (2017), we construct the model (5) to estimate the efficiency of a company’s investment:

$$\begin{aligned} inv_t = & \alpha_0 + \alpha_1 inv_{t-1} + \alpha_2 growth_{t-1} + \alpha_3 lev_{t-1} + \alpha_4 cash_{t-1} + \alpha_5 age_{t-1} \\ & + \alpha_6 size_{t-1} + \alpha_7 ret_{t-1} + \alpha_i \sum year + \alpha_j \sum industry + \varepsilon \end{aligned} \quad (5)$$

Where inv_t is the new investment expenditure of the company in t period. Inv_{t-1} is the company’s new investment expenditure in $t-1$ period. $Growth_{t-1}$ is a growth opportunity for the company. Lev_{t-1} is the asset-liability ratio for the company. $Cash_{t-1}$ is the company’s cash flow. age_{t-1} is the age of the company. $Size_{t-1}$ is the size of the company. Ret_{t-1} is the company’s stock yield, expressed as the annual return on individual stocks that takes into account the reinvestment of cash dividends. In addition, year and industry effects are also controlled.

We performed a regression on the model (5) to obtain a residual, and the absolute value of the residual represents the degree of inefficient investment. A residual of less than 0 indicates underinvestment, and a residual of greater than 0 indicates an overinvestment. We exclude the overinvested samples, define the samples with less than 0 residuals as underinvested samples, and constructed a model (6) to test the path:

$$under = \beta_0 + \beta_1 fin + \beta_i \sum control + \varepsilon \quad (6)$$

Table 9 reports the test results. According to the result of column (1), the coefficient of *fin* is -0.0006 , the t-value is -0.2399 , and it fails the significance test, indicating that corporate financialization does not have a ‘reservoir’ effect of funds to alleviate underinvestment, thus the path of ‘corporate financialization—alleviate underinvestment- reduce operational risk’ is not confirmed.

Table 9. Test the capital ‘reservoir’ effect of corporate financialization.

	(1) <i>under</i>	(2) <i>under</i>
<i>fin</i>	−0.0019 (−0.7268)	−0.0008 (−0.2987)
<i>_cons</i>	−0.0544*** (−6.5299)	−0.0540*** (−6.0320)
<i>Control</i>	Yes	Yes
<i>Industry</i>	No	Yes
<i>Year</i>	No	Yes
Adj.R ²	0.0631	0.0858
N	8390	8390

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.
Source: made by authors.

5.2. Testing whether corporate financialization has damaged the main business

As mentioned above, if a company uses too many limited resources for the allocation of financial assets, it will make the company’s production and operation gradually deviate from the main business. This will inevitably weaken the company’s profitability and thereby increasing operational risk. Therefore, we speculate that corporate financialization will play a role through the path of ‘corporate financialization - damage to the profitability of the main business - increase operational risk’. To test this path, we construct the following mediation effect model:

$$risk = \alpha_0 + \alpha_1 fin + \alpha_j \sum control + \varepsilon \quad (7)$$

$$mbc = \beta_0 + \beta_1 fin + \beta_j \sum control + \varepsilon \quad (8)$$

$$risk = \gamma_0 + \gamma_1 fin + \gamma_2 mbc + \gamma_j \sum control + \varepsilon \quad (9)$$

Where *mbc* indicates the strength of the profitability of the company’s main business, and refer to Ye et al. (2020), we calculate *mbc* as: (operating income – operating cost)/total profit. According to the new mediation effect test process proposed by Wen and Ye (2014), the regression coefficients of each course need to be tested in turn.

The estimated results of the mediation effect model are shown in columns (1), (2), and (3) of Table 10. According to column (3), the regression coefficient of *mbc* is −0.0010 and is significantly negative at the statistical level of 1%, indicating that stronger main business profitability can reduce operational risk. The coefficient of *fin* is 0.0395, which is significantly positive at a statistical level of 1%, indicating that corporate financialization will still increase operational risk. According to column (2), *fin* has a regression coefficient of −1.6942, which is significantly negative at a statistical level of 1%, indicating that corporate financialization significantly reduces the profitability of the company’s main business. According to the above results, it can be seen that corporate financialization will aggravate operational risk by harming the profitability of the main business, so the above path is proved.

Table 10. Testing whether corporate financialization has damaged the main business.

	(1) <i>risk</i>	(2) <i>mbc</i>	(3) <i>risk</i>	(4) <i>mbc</i>
<i>fin</i>	0.0412*** (4.3532)	-1.6942*** (-3.8974)	0.0395*** (4.1744)	-2.0178*** (-4.6175)
<i>mbc</i>			-0.0010*** (-5.7425)	
<i>fin</i> × <i>fpr</i>				-22.1420*** (-4.2383)
<i>fpr</i>				-4.6143*** (-6.5428)
_cons	0.1971*** (6.2637)	10.3030*** (7.1235)	0.2075*** (6.5906)	9.9175*** (6.8922)
Control	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes
Adj.R ²	0.0730	0.0463	0.0750	0.0491
N	15292	15292	15292	15292

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.

Source: made by authors.

In addition, refer to Qi and Zhang (2018), we also include the interaction term between the return on financial assets and corporate financialization ($fin \times fpr$) for testing. The test results are shown in column (4) of Table 10. We can see that the coefficient of $fin \times fpr$ is also significantly negative at the statistical level of 1%, indicating that with the rise of the rate of return on financial assets, the damage effect of corporate financialization on the profitability of the main business is greater.

6. Expansibility analysis: considering product market competition

Product market competition, as an external corporate governance mechanism, will have an important impact on the company's decisions. In a highly competitive environment, individual companies have less monopoly on the resources involved, so information asymmetry is greatly reduced, which helps to reduce proxy problems (Griffith, 2001; Baggs & Bettignies, 2014). Huang and Peyer (2012) argue that product market competition can replace high-cost supervision and incentive mechanisms, increase the cost of management laziness, reduce inefficient behavior, and therefore constrain management's profit-seeking behavior.

Therefore, we believe that the relationship between corporate financialization and operational risk will be affected by product market competition. When market competition is high, external monitoring is strengthened, management's opportunistic and profit-seeking behavior can be effectively controlled, and the external governance of the market makes management take stakeholders' interests more into account when making investment decisions, thus mitigating the 'risk amplification effect' of corporate financialization. In order to test it, we set the following model:

$$risk = \alpha_0 + \alpha_1 fin + \alpha_2 fin \times HHI(CR_{-10}) + \alpha_3 HHI(CR_{-10}) + \alpha_j \sum control + \varepsilon \quad (10)$$

Table 11. Test the regulatory effect of product market competition.

	(1) <i>risk</i>	(2) <i>risk</i>
<i>fin</i>	0.0588*** (4.9606)	0.0563*** (4.8716)
<i>fin</i> × <i>HHI</i>	−0.0395** (−2.4883)	
<i>HHI</i>	0.0034 (0.8378)	
<i>fin</i> × <i>CR</i>		−0.0390** (−2.3987)
<i>CR_10</i>		−0.0012 (−0.2750)
<i>_cons</i>	0.1958*** (6.2175)	0.1985*** (6.2924)
<i>Control</i>	Yes	Yes
<i>Industry</i>	Yes	Yes
<i>Year</i>	Yes	Yes
Adj.R ²	0.0735	0.0741
N	15292	15292

Notes: ***, ** and * represent t-values significant at the 1%, 5% and 10% statistical levels, respectively.

Source: made by authors.

In model (10), we use two metrics to measure the degree of product market competition: (1) the *HHI* index (Herfindahl-Hirschman index). The *HHI* index indicates the market share of a single company in the industry, and the larger the *HHI* index, the higher the concentration of the industry and the smaller the degree of market competition. We set the sample to 1 if the *HHI* index is below the annual median, indicating that the degree of market competition is high, otherwise it is 0; (2) *CR_10*. We take the top 10 companies in terms of market share (*CR_10*) in the main operating income industry as the proxy variable of the degree of market competition. The larger the *CR_10*, the higher the industry concentration, and the smaller the market competition. For the same reason, sample with below annual median *CR_10* index is set to 1, otherwise it is 0.

The test results are shown in Table 11. Column (1) shows that *fin*×*HHI* is significantly negative, indicating that product market competition has an external governance effect, which can alleviate the positive impact of corporate financialization on operational risk. At the same time, we find in column (2) that the result does not change when *CR_10* is used as a proxy variable.

7. Conclusions and implications

Using a company-level database, this paper examines the impact of corporate financialization on operational risk and the mechanisms involved. This study yields several important findings. First, we find that overall, corporate financialization will amplify corporate operational risk. After including an indicator for financing constraints, we find that this effect is more significant in the sample subject to a greater degree of financing constraints, implying that companies hold financial assets primarily for arbitrage motives. Second, mechanistic tests suggest that corporate financialization cannot alleviate corporate underinvestment, but rather leads to increased operational risk by damaging the profitability of the main business. Finally, we also find that

product market competition has a governance effect that helps reduce the risk amplification effects of corporate financialization.

The conclusions of this study have certain theoretical and practical implications. On the theoretical side, our study supports the literature that corporate financialization can hinder the development of the real economy, and clarifies that under the market conditions of China, corporate financialization is a myopic behavior of the management, which is not conducive to the future development of corporations. As Wang and Mao (2021) point out that financialization may bring about shifts in business models that hinder or slow down capital accumulation and sustainable development. On the practical side, our conclusions indicate that the relevant authorities need to pay attention to the potential risks of financialization and be alert to the negative impact of virtual economy overheating on the real economy.

There are some shortcomings in this paper. For example, we have not considered the effects of executive characteristics, such as managerial overconfidence and whether the executive has a financial background. Because the executives hold the power of operational decisions, they are likely to influence corporate financialization. Also, we have not considered the moderating role of macroeconomic policies, which needs to be further studied in the future.

Disclosure statement

No potential conflict of interest was reported by the authors.

Notes

1. According to a McKinsey report, *China's Choice: Seizing the \$5 Trillion Productivity Opportunity*, 80% of China's economic profits come from the financial sector, compared to 20% in the United States. Regarding the concept of economic profit, the McKinsey Institute explains that it differs from what is commonly referred to as (accounting/operating) profit in that the cost of capital needs to be subtracted, which equates to it taking into account opportunity costs. For some companies that still have a positive operating profit, once the cost of capital is subtracted, the economic profit becomes negative. The aforementioned report also states that this measurement of economic profits in China and the United States is based on more than 3,500 Chinese listed companies (with revenues equivalent to 55% of China's total GDP in 2015) and 7,000 U.S. listed companies (with revenues equivalent to 85% of total U.S. GDP in 2015). You can also visit <https://www.mckinsey.com.cn>
2. In fact, there is no consensus among academics on the definition of operational risk. Crouchy (2001) suggests that operational risk is a fuzzy concept because "it is hard to make a clear-cut distinction between operational risk and the normal uncertainties faced by the organization in its daily operations". The Basel Committee (2001) states that operational risk is the risk of loss resulting from inadequate or failed internal processes, people or systems or from external events. However, this definition is considered too broad as it covers many risks, including fraud, theft, litigation risk, information entry errors, loss of information, etc. (Keller & Bayraksan, 2012). Even so, the concept of operational risk is still widely used in financial institutions such as banks as a separate risk category from credit risk and market risk (Xu et al., 2020). It is also often associated with operational losses, such as the rogue trader incident at the Barings Bank and the MasterCard information database security breach. Binet et al. (2021) also note that these

possible losses can also include significant losses that have not yet occurred in the company but are likely to occur in the future or have occurred in other organizations. In the measurement of operational risk, it also includes expected losses and unexpected losses, and one of the methods (AMA model) is based on operational loss data (EI Arif & Hinti, 2014). On balance, we believe that for companies in general, the meaning of corporate operational risk is closer to the general meaning of "corporate risk", which reflects more the losses caused by the company's operational activities, especially the loss of earnings, which is, after all, related to the interests of all kinds of investors. The ultimate goal of understanding operational risk is to explain the volatility of earnings arising from the direct impact of losses on the financial results (Moosa, 2007). In this regard, we refer to Archaarya et al. (2011), where the volatility of earnings is used to measure operational risk faced by the company, that is, the potential loss.

3. On January 1, 2018, the newly revised AS 22 – 'Recognition and Measurement of Financial Instruments' came into effect and the Company's accounting accounts were changed accordingly. In the revised new standard, the accounts of 'net investment held to maturity' and 'net financial assets available for sale' are no longer used, while 'debt investment', 'other debt investments' and 'other equity investment instruments' are added.
4. To save space, the correlation coefficient matrix of variables is not provided here.

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