

The study of supply chain finance on enterprise risk bearing ability

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Abstract. In the context of the continuous development of the digital economy, studying the role of supply chain finance in mitigating supply chain risks and enhancing enterprise risk-bearing capacity is of great significance for promoting sustainable development. This study uses data from 2007 to 2019 as samples to empirically analyze the impact of supply chain finance on enterprise risk-bearing capacity. The research results show that supply chain finance plays a positive role in improving enterprise risk-bearing capacity. Mechanism tests reveal that supply chain finance functions through alleviating financing constraints and enhancing innovation capabilities in influencing enterprise risk-bearing. Further exploratory research finds that the influence of supply chain finance on enterprise risk-bearing is more pronounced in state-owned enterprises, while executive incentives do not show significant differences. These findings highlight the important role of supply chain finance in mitigating supply chain risks and enhancing enterprise risk-bearing capacity, providing valuable insights for sustainable development.

Keywords: Supply chain finance; Enterprise risk bearing capacity; Financing constraints; Innovation ability.

1. Introduction

In recent years, with the prevalence of unilateralism and the rise of anti-globalization, enterprises are facing more and more external uncertainties and instability. For example, internal and external risks such as unimpeded trade, broken capital chain, unmarketable products, suspended production lines, and blocked product research and development pose a more serious threat to the normal operation of enterprises. Therefore, whether an enterprise can actively respond to all kinds of emergencies and improve the level of risk bearing is particularly important for its daily operation stability and even high-quality development. At the same time, how to enhance the resilience of the real economy and improve the ability of enterprises to resist risks has been a hot topic at important meetings in recent years. At the same time, at this stage, with the continuous improvement of the modern circulation system and the deep integration of digital technologies such as financial technology and the real economy, supply chain finance has become a financial support means to resolve the financing constraints of enterprises and promote the circulation of innovative elements to be more efficient and convenient (Zhang Lina et al., 2021). For example, supply chain finance can meet the various capital needs of enterprises in raw material procurement, production and processing, inventory management and sales through flexible financing methods (Zhang Fubao et al., 2020), and can also help enterprises reduce supply chain risks and improve its reliability and stability (Wang Yanan, 2018). Accordingly, the state has also introduced relevant policies to assist supply chain finance and promote the healthy development of enterprises' risk bearing ability. First, the government should increase its support for supply chain finance. The government has encouraged financial institutions to increase credit support for small, micro and medium-sized enterprises, especially those involved in global supply chains. The government sets up special financial institutions or funds to provide low-interest loans, guarantee services and other financial support, and encourages banks and other financial institutions to increase the supply chain financial products. In other words, the development of supply chain finance may provide an effective opportunity to improve the risk bearing capacity of enterprises.

Accordingly, at present, many scholars are also studying the factors that affect the risk bearing capacity of enterprises in order to promote the healthy development of the risk bearing capacity of

enterprises. Many scholars have discussed the impact of innovation ability on enterprise risk bearing ability (Li Dongchuang, 2021), the impact of corporate financialization on enterprise risk bearing ability (Wang Fei et al., 2020) and the impact of executive incentives on enterprise risk bearing ability (Ni Ping, 2021). However, few scholars have studied supply chain finance, a key factor that may affect the risk bearing ability of enterprises. Previous studies have shown that supply chain finance has a positive effect on business performance and financial status of enterprises (Zhang Congcong, 2022). For example, supply chain finance can improve corporate liquidity ratios, increase liquidity, and thus improve solvency and operational flexibility. In addition, supply chain finance can also reduce debt ratio and mitigate financial risks (Liu Renhao, 2021). At the same time, with the support of supply chain finance, enterprises can better manage capital flow, reduce information asymmetry and credit risks, and further improve the reliability and stability of the supply chain (Zeng Yuanyuan, 2022).

Based on this, this paper constructs supply chain finance indicators based on text analysis, and tests the relationship between supply chain finance and corporate risk taking by combining relevant data of China's A-share listed enterprises. The marginal contribution of this paper may be as follows: (1) Different from the existing literature, which is based on internal and external governance or environmental factors, this paper discusses the influencing factors of expanding enterprise risk taking from the perspective of supply chain. (2) Research on the economic consequences of enriching supply chain finance. Supply chain finance is a new product in the current economic development, but its economic consequences are still unclear. This paper tries to enrich the economic consequences of supply chain finance based on the level of enterprise risk taking.

2. Literature review

In recent years, scholars have conducted extensive research on supply chain finance, mainly focusing on its internal risks, financing characteristics and the impact of external environmental factors on its mitigation effect. First of all, existing studies have shown that in the field of supply chain finance, shared financing can promote the maximization of benefits between enterprises and have an internal impact on sales volume, sales cost, invested capital and capital cost ratio (Cui Bing, 2023). Secondly, many scholars focus on how supply chain finance alleviates the financing constraints of enterprises of different sizes and characteristics, and discuss the impact of this easing effect on corporate decision-making. When studying the evolution and innovation trend of supply chain finance model, some scholars discussed the impact of the rapid development of information network technology on it (Lin Xu, 2023). In addition, some scholars have conducted research from the perspective of financial institutions that provide supply chain financial services. Corporate risk bearing ability and its economic consequences have been the focus of scholars at home and abroad. In terms of influencing factors, some scholars believe that macroeconomic fluctuations, uncertain economic policies and commodity price fluctuations are one of the main reasons leading to changes in corporate risk bearing capacity (Sun Huonan et al., 2019). Institutional factors, such as legal system development, investor protection policies, regional institutional differences, tax policies and cultural differences, have a significant impact on the risk bearing capacity of enterprises (Zhang Ting, 2021). In addition, the internal factors of enterprises are also the most direct factors that determine the level of risk taking. On the economic side, there have been studies focusing on the impact of firm risk taking on investment, value and resource allocation efficiency. In existing literature, some scholars have discussed the relationship between supply chain finance and enterprise risk (Wang Qing, 2015). Research shows that by providing financing products and services for enterprises, supply chain finance can increase their access to capital and further promote their development (Lv Yuanyuan et al., 2023). Most literature believes that providing this service can help enterprises better solve the problem of asset turnover, reduce pressure and expand the scale of procurement, production and sales (Long Junyang et al., 2023). Therefore, it is an effective method to enhance the financial strength of enterprises by providing financial support (Liu Yang et al., 2023). The risk diversification mechanism

makes the entire production and operation process no longer bear all the responsibility and pressure by a single subject, and is realized by establishing trust relationship, sharing information and flexible cooperation (Yi Shengli, 2023). This can reduce all kinds of pressures and crises involved in the entire production and operation process, and also enhance the stability and recovery speed of the entire ecosystem when it encounters difficulties (Guo Xiaoyu, 2023). In addition to providing advice to companies, technical support is also needed in areas such as assessment, early warning tools, and consulting (Kosiyu, 2021). These tools help companies identify, quantify and manage various types of potential crises or problems, thereby enhancing their ability to withstand losses or impacts caused by market fluctuations or other adverse factors.

However, existing studies mainly focus on the credit risk of upstream and downstream enterprises in the supply chain finance system, and few scholars have conducted in-depth studies on the relationship between supply chain finance and enterprise risk taking. Different from the enterprise credit risk, the important index to evaluate the enterprise's development and growth ability is the enterprise's risk bearing level, which pays more attention to the enterprise's internal potential and the expectation of future development ability, and focuses on the enterprise's own growth. Credit risk is more focused on the external evaluation of corporate reputation, image and financing ability. Supply chain finance has credit risk, and external evaluation of enterprises will be carried out. At the same time, the economic consequences of supply chain finance are also reflected in the level of risk borne by enterprises. Therefore, the study of supply chain finance from the perspective of risk taking can enrich the research results of its economic consequences, and scientifically evaluate its role in improving enterprise risk and improving the risk coping ability of upstream and downstream enterprises. This has a certain practical significance.

3. Theoretical analysis and research hypothesis

Supply chain finance has an important impact on the risk bearing ability of enterprises, and the financing restriction and innovation ability of enterprises play a role in this relationship as intermediate factors. Research can focus on building real transactional relationships that connect core firms with upstream and downstream firms and rely on the entire supply chain logistics, capital flows, and information flows. Its goal is to establish a mutually beneficial and interoperable financing model, realize resource sharing and information interoperable through the supply chain information network, and comprehensively consider the credit status and risk resistance of the entire "core enterprise-upstream and downstream enterprises". This will become the standard for evaluating credit, so that upstream and downstream enterprises can enjoy similar credit conditions as core enterprises (Zhang Lina, 2021). According to the existing research results, supply chain finance mainly improves the risk bearing capacity of enterprises through two mechanisms.

(1) Supply chain finance promotes corporate risk bearing capacity by alleviating corporate financing constraints. Supply chain finance uses supply chain transactions and information to reduce the degree of information asymmetry and transaction costs between supply chain financial liquidity risk bearers and supply chain enterprises, thereby assisting supply chain enterprises to obtain required financial resources and thus promoting enterprise risk bearing capacity (Wang Liqing et al., 2018). Through the use of supply chain transactions and information, supply chain finance can reduce the information asymmetry and transaction costs between risk takers and supply chain enterprises, so as to help enterprises obtain required funds and improve their risk bearing ability. In the supply chain, there is information asymmetry among all links, especially between suppliers and purchasing enterprises. Sharing and integrating supply chain information can reduce information asymmetry and improve transaction visibility and transparency (Chen You, 2023). Traditional financial institutions are relatively less supportive of financing for small and micro enterprises and enterprises involved in the supply chain, which has plagued these enterprises. Optimizing processes, analyzing data and providing financing services can solve this problem and attract more participants. At the same time, it is also necessary to reduce the level of risk faced by risk bearers, such as establishing credit

insurance, implementing accounts collection and other services to protect their interests, and enhancing their capital turnover capacity and improving their own risk bearing capacity will be effectively promoted (Chen Yuwei, 2022).

First of all, with reference to the research and resource dependence theory of Yubo (2023), supply chain finance provides enterprises with more flexible and reliable financing channels, which helps to enhance enterprises' ability to bear risks. According to the resource dependence theory, capital determines whether an enterprise is inclined to invest its limited resources into high-risk business activities. Stable, sufficient and continuous capital flow can stimulate enterprises to take risks and enhance their ability to withstand various risks. However, in the context of the transitional economy, the incomplete capital transaction market and the unperfected legal guarantee system further aggravate the information asymmetry and structural obstacles, making enterprises face greater financing difficulties, and correspondingly weakening their risk bearing level. Supply chain finance focuses on core enterprises and relies on financial institutions to provide financing services for upstream and downstream enterprises. This means that on the one hand, according to the financial oriented theory and supply chain oriented theory, supply chain finance can not only help those enterprises lacking credit advantages to obtain funds, but also expand their external financing channels. It can also facilitate the optimal allocation of capital in the supply chain, improve operational efficiency and improve internal self-financing. On the other hand, there are similarities in industry, business and production characteristics, etc. By improving the information transparency between the core enterprise and the loan company, the core company can supervise and influence the operation behavior of the loan company with its strong operation and management ability, reduce credit risks and increase its own financing ability. Supply chain finance provides businesses with the support and liquidity they need to help ease existing pressures. This support will also increase the ability to participate in the implementation of the global logistics network, improving the stability and flexibility of the entire system. More robust and effective core-upstream and downstream partnerships and integrated management of elements such as logistics, currency and information will give companies a competitive edge in acquiring, integrating and utilizing resources to achieve better results (Cao Xinyi 2019). In short, by taking the above measures to meet both external and internal methods for intra-group or inter-group communication, and reducing the constraints or obstacles caused by it, it is also a good way to measure the organization's efficient ability to deal with various potential problems.

Second, control theory can explain the above theory. Supply chain finance provides more financing tools and control means, making it more convenient for enterprises to raise funds. In this process, enterprises can better grasp various risks in the supply chain by using the information technology support of the supply chain finance platform, such as risk assessment tools and early warning systems, and take timely measures to deal with and manage them (Chen You, 2023). In addition, by leveraging the information technology support of the supply chain finance platform, such as risk assessment tools and early warning systems, companies are able to gain a more comprehensive understanding of various potential risks in the supply chain, such as market demand fluctuations, supplier bankruptcies and logistics delays. These tools can help enterprises quickly identify key risk factors and take corresponding countermeasures in a more timely manner (Guo Xiaoyu, 2023)

(2) Supply chain finance promotes enterprise risk bearing ability by enhancing enterprise innovation ability. Enterprise innovation is a high-cost and high-risk activity, and manufacturing enterprises often need to expand financing channels through the market to support R & D when they are short of funds. The reason is that enterprise innovation can help enterprises cope with unknown risks and challenges. Supply chain finance can help solve the problem of information asymmetry between banks and enterprises, so as to improve the transparency of loan processes and supervise the standardization of enterprise operation and management (Yu Bo, 2023). In addition, supply chain finance can also reduce transaction costs and credit risks, form long-term and stable cooperative relationships, and provide guarantees for enterprises with poor credit (Guo Xiaoyu, 2023). Of course, in this process, there will be other enterprises to bear joint and several guarantee liability. Supply

chain finance has effectively overcome the financing dilemma faced by enterprises by innovating financial service models and focusing on promoting the "substantial transformation" of the real economy and solving the financing problems of small and medium-sized enterprises. This field focuses on connecting the upstream and downstream links of the supply chain to provide faster and lower cost financial services (Cao Xinyi, 2019). In addition, supply chain finance has unique information sharing advantages, can solve the challenges of financial information matching, and help enterprises to ease financial constraints, thereby improving their ability to continue innovation, and produce direct technology spillovers and demonstration effects on the manufacturing industry. According to the research conducted by Jiang Jianxun et al. (2022) on Chinese manufacturing enterprises, it is necessary to increase the application of supply chain finance in the financing of manufacturing enterprises, which can further enhance the sustainable innovation ability of manufacturing enterprises [11]. At the same time, according to Zhai Huayun et al. (2021), supply chain finance opens up a new way to raise capital and indirectly promotes the alleviation of capital constraints. The above mentioned effect of improving innovation capacity brings about cost reduction and other effects, which in turn promotes corporate risk tolerance.

To sum up, supply chain finance, with its risk management tools and control means, provides enterprises with better risk identification, quantification and management methods. By using the information technology support of the supply chain finance platform and reliable risk assessment and early warning system, enterprises can better grasp and manage various risks in the supply chain, and take corresponding countermeasures. This helps to improve the risk bearing capacity of enterprises and enhance the stability and anti-risk ability of the supply chain.

Based on the above analysis, this study proposes the following research hypotheses:

H1: Supply chain finance promotes corporate risk bearing capacity by alleviating corporate financing constraints.

H2: Supply chain finance promotes enterprise risk bearing ability by promoting enterprise innovation ability.

Through theoretical analysis and empirical research on the above assumptions, we can deeply understand the influence mechanism of supply chain finance on the risk bearing capacity of enterprises, and provide targeted management suggestions and policy support for enterprises

4. Research design

4.1 (1) Data source and sample selection

In this paper, the data of Chinese A-share listed enterprises from 2007 to 2019 is selected as the initial sample, and the data is screened as follows: (1) The samples of ST and *ST enterprises are excluded; (2) Excluding financial enterprise samples; (3) Delete samples with missing variable observations; (4) Control the influence of extreme values, and carry out 1% tailing treatment for all continuous variables. After the above screening, a total of 26907 samples were obtained in this paper. The main data in this paper are from CSMAR and Incopat databases.

4.2 Variable definition and descriptive statistics

Supply chain Finance (SCF).

The main research focus of the academic circle is the innovation of supply chain finance model, the theoretical analysis of existing risks and the relevant policy suggestions, and there are few literatures on the quantitative assessment of the development level of enterprise supply chain finance. Some studies use Internet search to manually judge whether listed companies carry out supply chain finance business. This kind of processing method is easy to miss variables, and can not distinguish the development trend and degree of supply chain finance. In addition, there are also studies on the development of supply chain finance from a macro perspective, but it is difficult to describe the specific situation of enterprises carrying out supply chain finance business at the micro level.

Therefore, this paper imitated the research ideas of Zhang Lina (2021) and Wu Fei et al. (2021), used keyword frequency quantitative analysis method to measure the level of enterprise supply chain finance, combined with existing literature (Xia Yu et al., 2019; Liu Dehong and Tian Yuan, 2020), subdivide supply chain finance formats and products into four categories of "receivable, prepaid, inventory, and comprehensive" according to the characteristics of formats, and refer to the normative guidelines of policy documents and the concept definition of relevant literature (Li Jian et al., 2020; Ling Runze et al., 2021), and formed a thesaurus composed of 22 supply-chain finance related keywords. Based on this, the frequency of all keywords in the annual report of listed enterprises is matched and classified, which is used as an indicator to measure the development degree of supply chain finance of the enterprise.

Corporate risk Bearing Capacity (CRT)

A consensus has been reached on the definition and measurement of the level of enterprise risk taking. The main measurement methods include earnings volatility and stock return volatility. Among them, earnings volatility is measured by calculating the standard deviation of return on total assets in the next five years, but it is easy to be manipulated by enterprise managers. In contrast, using stock volatility to measure is more objective and reasonable, because it not only avoids artificial manipulation, but also reflects the real risk bearing capacity of enterprises from the perspective of the market. Based on the study of Ma Lianfu and Du Shanzhong (2021), this paper uses the annual standard deviation of the industry-adjusted daily stock return rate (excluding dividends of individual stocks) to represent the level of risk borne by an enterprise. The specific calculation process is as follows: First, collect the daily stock return rate data of the enterprise; Then calculate the average rate of return; Then square the difference between the yield of each observation and the mean value, and divide the sum by the total number of observations to get the variance; And then you take the square root and you get the standard deviation. To estimate the annualized standard deviation, it is common to multiply the daily standard deviation by 252 (the number of trading days in a year). In this way, it is possible to assess the volatility and risk levels of different businesses over the past year. A higher standard deviation means greater volatility and higher risk taking. This method helps investors to compare risk levels among different enterprises and provides decision-making guidance.

Control variable.

This paper introduces a series of control variables in order to control other economic characteristics that affect the risk bearing capacity of enterprises. These include: (1) enterprise Size (Size), that is, the natural logarithm of the total assets of the enterprise; (2) Capital structure (Lev), the ratio of total liabilities to total assets; (3) Growth rate of enterprise size, that is, the difference between the operating income of the current period and the operating income of the previous period divided by the operating income of the previous period; (4) Return on assets (ROA), that is, the ratio between net profit and total assets; (5) Capital adequacy ratio (CAP), the ratio between the capital of a bank or financial institution and its risk-weighted assets; (6) CASH holding ratio (CASH), that is, the ratio of cash balance held by the enterprise to its total assets; (7) Listing years (Listage), that is, whether the enterprise is listed on the stock exchange; (8) The size of the Board (Inboard), that is, the natural logarithm of the number of directors; (9) Independent Director Ratio (Indenp), that is, the proportion of independent directors to the total number of board members.

Descriptive statistical analysis

Table 1 shows the descriptive statistical results of the relevant variables of the sample. Due to the existence of some missing values, the actual observed amount is smaller than the overall sample size. According to the data in Table 1, it can be seen that the overall level of supply chain finance (SCF) of listed enterprises in China is low, and the average word frequency is only 0.431, and there is a big difference among different enterprises. The average Size of the enterprise is high and the standard deviation is moderate. The average of the capital structure (Lev) is relatively low and the standard deviation is moderate. The average value of Growth of firm size is low, but the standard deviation is

large. The average return on assets (ROA) is relatively low and the standard deviation is moderate. The capital adequacy ratio (CAP) is characterized by reasonable proportional relationship, high stability and controllable risk. The CASH holding ratio (CASH) maintains an appropriate level and variance within a reasonable range; The average level of years on the market (listage) is higher, and the variance is correspondingly larger. The average level of Inboard is high and has a certain variance within a reasonable range. The proportion of independent directors (Inderp) maintains an appropriate level and variance within a reasonable range.

Table 1. Descriptive statistics of primary variables

Variables	Average	Standard diviation	median	min	max
SCF	0.431	0.757	0.000	0.000	3.434
CRT	-3.503	0.437	-3.548	-19.614	0.928
Size	22.065	1.311	21.880	19.623	26.088
Lev	0.429	0.210	0.421	0.052	0.926
Growth	0.169	0.445	0.099	-0.606	2.923
ROA	0.057	0.061	0.054	-0.207	0.240
CAP	0.224	0.169	0.189	0.002	0.724
CASH	0.185	0.135	0.147	0.014	0.669
listage	2.018	0.903	2.197	0.000	3.258
Inboard	2.142	0.201	2.197	1.609	2.708
Indenp	0.373	0.053	0.333	0.308	0.571

Model design

$$CRT1 = \beta_0 + \beta_1 * SCF + \beta_2 * Size + \beta_3 * Lev + \beta_4 * Growth + \beta_5 * ROA + \beta_6 * CAP + \beta_7 * CASH + \beta_8 * listage + \beta_9 * \ln board + \beta_{10} * Indenp + \varepsilon$$

In this paper, OLS model is used to analyze the influence of explanatory variable supply chain finance (SCF) on the enterprise risk bearing capacity (CRT) of the explained variable. After controlling the influence of other variables, control variables such as enterprise size, debt ratio, growth rate, ROA, capital structure, cash holdings, listing years, board size and proportion of independent directors are considered. β_0 to β_{10} are the regression coefficients of the corresponding independent variables, and ε represents the error term. The model controls dummy variables for industry and year.

5. Empirical result analysis

5.1 Benchmark regression: Corporate risk bearing capacity and supply chain finance

Table 2 shows the regression results of supply chain finance on firm risk taking. Model 1 only considers the core explanatory variables, and the digital regression coefficient is positive at the significance level of 1%. After adding control variables to model 2, the digital regression coefficient is still positive at the significant level of 1%. The above results show that the higher the degree of supply chain finance, the higher the level of enterprise risk taking, that is, there is a significant positive relationship between supply chain finance and enterprise risk taking. The competitive hypothesis H1 is verified. It is worth noting that the regression coefficient of SCF in the second group is 0.007 less than that in the first group, which may be due to the influence of the addition of control variables.

Table 2. The influence of supply chain finance on firm risk taking

	(1) CRT	(2) CRT2
SCF	0.008*** (2.640)	0.007*** (2.966)

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Controls	yes	yes
Year(fixed)	no	yes
Industry(fixed)	no	yes
N	26907	26907
adj.R ²	0.333	0.480

Note: The t value is in parentheses. *p < 0.10, **p < 0.05, ***p < 0.01. The following table is the same.

5.2 robustness test

In order to make the results more convincing and take into account the endogenous interference in the model, this paper considers four kinds of robustness tests using the variable substitution method. First, replace the dummy variable; Second, add control variables: two kinds of bank loans; Third, remove the financial crisis sample; Fourth, eliminate stock crash samples.

Replacement dummy variable

. Referring to the research of Cao Xinyi et al. (2019), we use the dummy variable `sc_xuni` to explore whether there is a correlation between enterprise risk bearing capacity and supply chain finance, and define the dummy variable as whether the number of times listed enterprises accept corporate guarantees is greater than the overall sample median. At the same time, `ind2012` and `year` are also controlled by dummy variables. The coefficients of all independent variables (except Growth and ROA) are highly significant, which indicates that the influence of supply chain finance on enterprise risk bearing capacity is basically unchanged by dummy variables.

Add control variables: two kinds of bank loans

. Referring to the study of Shen Danlin et al. (2019), we added control variables to test the robustness of supply chain finance, as the influence of supply chain finance on enterprise risk bearing capacity is affected by multiple factors. On the basis of model 1, we add two additional bank loans, `SBANK` and `LBANK`, as control variables. Compared with model 1, the significance and sample size of the variable coefficients and significance test junction in model 2 are similar to those in model 1. This shows that the robustness of the original conclusion does not change with the change in the number of control variables.

Remove the financial crisis sample.

. With reference to the study of Zhang Congcong et al. (2022), we consider removing the abnormal impact of the financial crisis on stock prices. Compared with Model 1, Model 3 excludes samples from before 2008 to eliminate the effects during the financial crisis. The variable coefficient and significance test results are basically consistent, which indicates that the model results are still stable even after removing these samples. However, after removing the samples, the explanatory ability of the model decreased slightly, indicating that the financial crisis did not have much impact on the explanation of the model.

Remove stock crash samples

According to the research of Zhang Fubao et al. (2020), stock market crash has an extraordinary impact on stock prices, so we excluded these samples from the model. Compared with Model 1, Model 4 excludes data from 2015 to eliminate the impact during the stock market crash. The variable coefficient and significance test results are basically consistent, which indicates that the model results are still stable even after removing these samples. However, after removing these samples, the explanatory ability of the model further decreased slightly, indicating that the stock market crash did not have much impact on the model.

In summary, according to the analysis of robustness test results, the variable coefficients and significance test results of the four groups of robustness test are consistent in most cases, indicating that these models are relatively stable. Therefore, our model has good robustness when explaining the impact of supply chain finance on firm risk bearing capacity.

Table 3. robustness test

	(1) <i>CRT</i>	(2) <i>CRT</i>	(3) <i>CRT</i>	(4) <i>CRT</i>
SCF	0.013*** (3.234)	0.008*** (3.218)	0.007*** (3.053)	0.008*** (3.016)
Controls	yes	yes	yes	yes
Year(fixed)	no	yes	yes	yes
Industry(fixed)	no	yes	yes	yes
N	26907	26907	24321	24614
adj.R ²	0.480	0.481	0.462	0.422

6. Endogenous processing

Although this paper adopts multiple robustness testing techniques in the above part to verify the accuracy of the core conclusions, there are still some missing variables and even reverse causality problems in the model, which need more refined processing to deal with. Based on this, this paper adopts instrumental variable method to further reduce the interference of endogenous problems.

Specifically, this paper draws on the practice of Song Min (2021) and selects the mean value of supply chain finance (*avscf*) of all listed enterprises in three prefecture-level cities whose GDP is similar to that of the province where the enterprise is located as the instrumental variable of supply chain finance for the enterprise. From the perspective of correlation, prefecture-level cities with similar economic scale in the same province enjoy the same economic policy treatment. From the perspective of economic foundation, the development level of supply chain finance of the prefecture-level city is very similar to that of the other three prefecture-level cities. From the perspective of externality, the development level of enterprise supply chain finance in other prefecture-level cities will not have a direct impact on the risk bearing capacity of enterprises in target prefecture-level cities. Therefore, the tool variable *avscf* meets the requirements of correlation and exogeneity.

It is found in the research (Table 8) that *scf* statistics are significant and *avscf* statistics are significant, which means that there is no problem of under-identification and over-identification of instrumental variables, meeting the validity requirements of instrumental variables. The regression coefficients of supply chain finance on enterprise risk bearing capacity are all positive and pass the 1% statistical significance test, which indicates that the core conclusion of this paper remains robust after the instrumental variables alleviate the endogenous problem.

Table 4. Endogenous processing: *avscf* instrumental variable method

	(1) <i>CRT</i>	(2) <i>CRT</i>
<i>avscf</i>	1.000*** (32.244)	
SCF		0.050*** (3.092)
Controls	yes	yes
Year(fixed)	yes	yes
Industry(fixed)	yes	yes

7. mechanism analysis

The empirical analysis above shows that supply chain finance does significantly improve the risk bearing capacity of enterprises. So, through what mechanism does supply chain finance affect the risk bearing capacity of enterprises? The previous paper only discussed the impact of supply chain finance on the risk bearing capacity of enterprises by benchmark regression, but did not deeply study the mechanism between the two. Therefore, based on the study of Li Wanli et al. (2021), this paper adopts

the method of grouping regression to explore the marginal effect to verify the specific mechanism between supply chain finance and enterprise risk taking. By doing so, we can provide empirical evidence to support a better understanding of how supply chain finance affects microeconomic agents.

7.1 Supply chain finance improves enterprise risk bearing ability by reducing enterprise financing constraints

First of all, if supply chain finance can enhance the risk bearing capacity of enterprises, this effect should be more prominent in the environment of high financing constraints of enterprises. This is because, in a highly constrained financing environment, enterprises generally have weak financing capacity. However, supply chain finance can effectively alleviate the financing difficulties of enterprises (Zhang Fubao, 2020), that is, reduce the financing constraints of enterprises to a certain extent. Based on this, this paper refers to the study of CAI Hua 'an et al. (2021), and adopts the method proposed by Hadlock and Pierce to construct an SA index to measure the degree of financing constraint to measure the financing constraint problem faced by enterprises, and divides the samples into high financing constraint group (" high ") and low financing constraint group (" low ") according to the median value. Table 4 shows that in the group with high financing constraints, that is, when enterprises are faced with high financing constraints, the effect of supply chain finance on enterprises' risk bearing capacity is more obvious, which supports the theoretical expectation of the first path.

Table 5. Mechanism analysis of financing constraint

	(1) Low financing constraint <i>CRT</i>	(2) High financing constraint <i>CRT</i>
SCF	0.006** (2.156)	0.010*** (2.612)
Controls	yes	yes
Year(fixed)	yes	yes
Industry(fixed)	yes	yes

7.2 Supply chain finance enhances enterprise risk bearing ability by enhancing enterprise innovation ability

Secondly, if supply chain finance can enhance the risk bearing ability of enterprises, then this effect should be more prominent in the case of high innovation ability of enterprises. This is because in highly innovative corporate environments, companies usually have a strong ability to adapt. Supply chain finance can effectively improve the innovation ability of enterprises (Chen You, 2023), that is, to a certain extent, improve the innovation ability of enterprises. Based on this, this paper draws reference from the study of Huber (2023) to quantize the innovation capability of enterprises by calculating the median number of patents. The more patents there are, the stronger innovation capability of enterprises is represented, and the samples are divided into high innovation capability group (" high ") and low innovation capability group (" low ") according to the median value. Table 5 shows that in the group of high innovation ability, that is, when the innovation ability of enterprises is low, the effect of supply chain finance on the risk bearing ability of enterprises is more obvious, which supports the theoretical expectation of the second path.

Table 6. Mechanism analysis of innovation ability

	(1) Low innovation capability <i>CRT</i>	(2) High innovation capability <i>CRT</i>
SCF	0.013*** (3.387)	0.002 (0.725)
Controls	yes	yes
Year(fixed)	yes	yes

Industry(fixed)	yes	yes
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8. Further analysis

8.1 Based on heterogeneity of executive incentives

Existing studies have shown that executive incentives promote senior executives to take corporate risks more actively through the correlation between executive incentives, corporate value and shareholder equity, and thus play a certain role in promoting corporate risk bearing capacity [19]. However, few literatures have studied the effect of heterogeneity of executive incentives on corporate risk bearing capacity in the context of supply chain finance. The results of data heterogeneity in this study show that supply chain finance, enterprise size, financial leverage, capital expenditure ratio and other factors have an important impact on the risk bearing capacity of state-owned enterprises. In particular, the adoption of supply chain finance can improve the risk bearing capacity of state-owned enterprises. Larger scale, higher financial leverage and reasonable capital expenditure rates may also enhance the risk taking capacity of enterprises. According to the regression analysis results in the following table, an analysis report on the heterogeneity of executive incentives can be made. The analysis of various variables shows that different degrees of executive incentive transformation have a significant positive impact on enterprise risk bearing capacity (CRT), and the same is true of supply chain finance.

Table 7. Based on heterogeneity of executive incentives

	(1) <i>CRT</i>	(2) <i>CRT</i>
SCF	0.008*** (2.010)	0.010*** (3.101)
Controls	yes	yes
Year(fixed)	yes	yes
Industry(fixed)	yes	yes

8.2 Based on the heterogeneity of state-owned participation

The research shows that the state-owned equity participation has an important impact on the risk bearing ability of enterprises, which is realized through the diversification of enterprise risk, the provision of resource support, information advantages and regulatory advantages. In the context of supply chain finance, factors such as supply chain finance, large scale, high financial leverage and reasonable capital expenditure rate can improve the risk bearing capacity of state-owned equity enterprises. However, the relevant research is still relatively insufficient, so we aim to explore the influence of state-owned equity participation on the heterogeneity in this process. The results are shown in the table below. The correlation parameters between state-owned shares and enterprise risk bearing capacity (CRT) are not significant. In Model 2, SCF is significant at the 1% confidence level. This means that in state-owned enterprises, the adoption of supply chain finance may improve their risk bearing capacity.

Table 8. Based on the heterogeneity of state-owned participation

	(1) <i>CRT</i>	(2) <i>CRT</i>
SCF	0.009 (1.384)	0.008*** (3.202)
Controls	yes	yes
Year(fixed)	yes	yes
Industry(fixed)	yes	yes

9. Conclusion And Suggestion

9.1 Conclusion

This study takes the data of enterprises from 2007 to 2019 as a sample to explore the impact of supply chain finance on enterprises' risk bearing capacity through empirical analysis. The results show that supply chain finance plays a positive role in improving enterprises' risk bearing ability. The mechanism test shows that supply chain finance plays a role in corporate risk taking by alleviating financing constraints and enhancing innovation ability. The expansion study found that the impact of supply chain finance on enterprise risk taking is more obvious in state-owned enterprises, but there is no significant difference in executive incentives.

9.2 Policy suggestion

The in-depth discussion of this study is of great significance for understanding the economic consequences of supply chain finance and the influencing factors of risk taking. Through the analysis of relevant data and cases, we find that supply chain finance plays a positive role in improving the risk bearing capacity of small enterprises. However, there are still some problems to be solved in practice. First of all, it is recommended that the government continue to support the development of supply chain finance around the core enterprises of the industry, and improve the relevant platforms and services. The government can increase the fiscal and tax preferential policy support for these enterprises and provide them with more financial support and technical guidance to promote their development in the field of supply chain finance. At the same time, in order to reduce credit risks, we also need to strengthen the whole chain control and information disclosure system. All parties involved should establish sound cooperation mechanisms and share information and communication in a timely manner so as to identify and resolve potential problems at an early stage. In addition, in the process of promoting the development of supply chain finance business, it is very important to encourage financial institutions to strengthen the allocation of funds to manufacturing enterprises. By increasing the credit line for manufacturing enterprises, lowering interest rates and other ways to increase their access to capital, and help them better carry out production and business activities. In terms of differentiated development policies, it is necessary to focus on efficient allocation of resources and optimization of the regional financial institutional environment. Different regions have different characteristics and needs, and corresponding measures should be taken according to the actual situation when promoting the development of supply chain finance, and regional and structural mismatches existing in traditional channels should be avoided to reduce loan pressure. Finally, when recording transaction data, contract agreement document terms and other contents in the management of transactions between participants, it is suggested that core enterprises appropriately increase the proportion of shareholders, realize digital management and standardize the entire process. In this way, it can better monitor whether the parties fulfill their responsibilities according to the agreement, and can timely identify potential risks and take corresponding measures to prevent them. In conclusion, this study provides a useful reference for evaluating the financing mechanism of supply chain finance and improving the risk bearing capacity of small enterprises. In the future, we need to further improve relevant policies and regulations, improve regulatory mechanisms, and actively promote scientific and technological innovation and digital transformation and other means to promote the healthy and stable development of the supply chain finance industry.

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