Journal of Innovation Economics ISSN: 2960-1835
DOI: 10.5281/zenodo.15804431 Volume 1, Issue 2, 2025

Can Supply Chain Finance Reduce the Risk of Debt Default?

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Abstract: This paper takes non-financial A-share listed companies from 2011 to 2023 as a sample to study the impact of supply chain finance on debt default risk. It is found that (1) supply chain finance can significantly reduce the risk of debt default, and the conclusion still holds after the robustness test; (2) the mechanism analysis finds that supply chain finance reduces the risk of debt default of enterprises by scaling down the cost of financing and reducing the agency cost, and the digital transformation can strengthen the inhibitory effect of supply chain finance on the risk of debt default; and (3) the analysis of heterogeneity shows that the inhibitory effect of supply chain finance on the risk of debt default is more obvious in the eastern region and non-state-owned enterprises. The paper explores the influence factors of enterprise debt default risk from the new perspective of supply chain finance, and also enriches the research on the influence effect of supply chain finance, while providing ideas for enterprises to carry out supply chain finance.

Keywords: Supply Chain Finance, Debt Default Risk, Financing Costs, Agency Costs

1. Introduction

The real economy, as an important part of the modernized economic system, is not only a key area concerning the national economy and people's livelihood, but also a basic condition for moving towards a higher level of common prosperity, as well as an important support for constructing strategic advantages for future development. However, in recent years, China's economy has faced multiple challenges such as slowing growth, structural adjustment and increased uncertainty in the external environment, and corporate profitability has declined. At the same time, corporate debt pressure has risen significantly, threatening their healthy and sustainable development. Debt defaults not only lead to bankruptcy or restructuring, but may also affect the upstream and downstream industry chains, resulting in employment pressure and shrinking economic activities. Especially at the current critical stage of China's economic transformation and upgrading, preventing the risk of debt default can help create a stable financing environment for enterprises and support the development of enterprises, especially small and medium-sized enterprises (SMEs). In addition, preventing the risk of debt default is also an important guarantee to protect investor confidence and promote high-quality economic development. In the current complex economic environment, strengthening the prevention and control of debt default risk has important practical significance and long-term strategic value.

Supply chain finance is a financial service model that centers around core enterprises and manages the capital flow and logistics of upstream and downstream SMEs. It is committed to optimizing the flow of funds in the supply chain through financial tools and services, solving the financing problems of enterprises in the supply chain, and improving the overall efficiency. General Secretary Xi Jinping emphasized in his important speech at the seminar on promoting high-quality financial development for provincial-level leading cadres that "we should insist on taking financial services for the real economy as the fundamental purpose". Nowadays, the development of real economy is facing multiple pressures, especially the risk of debt default, which creates a stronger demand for supply chain finance and also brings uncertainty. In the critical period, it is a test for supply chain finance to do a good job of serving the real economy with financial services as well as early warning and risk control.

Therefore, can supply chain finance actually reduce the risk of debt default through its special model? Through what channels will supply chain finance affect the risk of corporate debt default? Is there a significant difference in this effect among different enterprises? The study of the above issues can promote the relevant departments to further improve the construction of supply chain finance system, and also help enterprises optimize their production and operation mode and financing strategy, which has far-reaching theoretical significance and practical value for reducing risks and promoting economic growth.

Based on existing research, this paper selects A-share non-financial listed companies from 2011 to 2023 as the research sample. Through empirical analysis, it deeply explores the impact of supply chain finance on corporate debt default risk and its role path. The possible marginal contributions are: first, it enriches the research content of the influence factors of debt default risk. Existing literature has seldom explored whether supply chain finance can significantly reduce the risk of debt default from the perspective of supply chain finance. Second, the economic consequences of supply chain finance are analyzed in depth, and the impact mechanism is analyzed in terms of financing cost and agency cost, and the impact of digital transformation

of enterprises on the relationship between supply chain finance and debt default risk is also examined. Third, it explores the impact of supply chain finance on debt default risk based on the different regions and the nature of property rights, which provides a useful reference for the further development of supply chain finance.

2. Literature Review

2.1. Influence Effect of Supply Chain Finance

As an innovative financial model, supply chain finance plays a significant role in promoting economic development and optimizing industrial structure. First of all, supply chain finance can alleviate the financing constraints of SMEs. Under the traditional credit model, SMEs face financing problems due to insufficient collateral and low credit rating. Based on the real transaction background, supply chain finance provides SMEs with diversified financing channels, such as accounts receivable financing and inventory financing, with the help of core enterprise credit transfer (Zhou L, Wu HJ, 2022; Tang S, Xie XY, 2021). As Zhang WB and Liu K (2012) pointed out, supply chain finance enables SMEs to rely on business transactions with core enterprises to obtain funds, effectively alleviate the pressure of funds, and protect the normal production and operation of enterprises. Secondly, supply chain finance can improve the overall efficiency and stability of the supply chain. By integrating capital flow, logistics and information flow, supply chain finance can reduce transaction costs, shorten the order response cycle, and improve the operational efficiency of the supply chain (Wuttke et al., 2013). Through supply chain synergy and risk-sharing mechanisms, it reduces operational disruptions due to single-link capital chain breaks and enhances supply chain resilience, (Yu, ZJ and Zhao, YZ, 2024; Tang, S and Xie, XY, 2021). In addition, through stable financial support and strengthened supply chain collaboration, supply chain finance significantly enhances the R&D investment and patent output of core enterprises, driving their technological innovation and upgrading (Ling RZ et al., 2021). At the same time, stable supply chain relationship promotes upstream and downstream information sharing and technology collaboration, reduces innovation costs, and enhances the transformation efficiency of innovation results. More importantly, the adoption of supply chain finance strategies by firms often reflects that they have good growth potential. This initiative sends a signal to the capital market and other external stakeholders that the enterprise has an excellent developmental status, which enhances the confidence of the market in its future performance, thus helping the enterprise to obtain more resource support and inclination from stakeholders (Zhang LN et al., 2021).

2.2. Influencing factors of debt default risk

Existing research on the influencing factors of corporate debt default risk mainly centers on two perspectives: systemic factors and firm-specific factors. From the perspective of systemic factors, changes in the macro environment in which the enterprise is located will have an unavoidable impact on the enterprise itself. According to Wang B et al. (2019), monetary policy uncertainty can exacerbate the risk of corporate debt default and cause a decline in corporate output, which in turn affects the development of the real economy. Monetary policy affects the financial environment through the dual path of direct regulation and indirect transmission. According to Luo CY and Li XS (2020), cyclical fluctuations in the financial environment also affect the likelihood of debt default, especially the top region of the financial cycle (the credit crunch period) significantly increases the risk of bond default. Moreover, the negative shock of monetary policy uncertainty on output is stronger when the risk of debt default is higher. In terms of firm-specific factors, the financial health of firms is an important factor. Firms with high leverage are overly dependent on debt financing and have a high risk of liquidity crisis (Chen DQ et al., 2013). Insufficient profitability of a firm resulting in cash flow unable to cover debt principal and interest and insufficient liquid assets to meet debt maturities both affect the risk of corporate debt default to a certain extent (Altman, 1968; Wu, SN, and Lu, XY, 2001). Secondly, some scholars also analyze the influencing factors of debt default risk from the perspective of corporate governance and strategy. Agency costs arising from overinvestment or capital misuse due to conflicts of interest between shareholders and management increase debt default risk. Meanwhile, Salani é (2005) argues that management's limited knowledge is one of the main factors that lead to business risk. According to existing studies, business risk significantly affects the performance of firms. Firms' performance in terms of ESG can reduce the risk of debt default through three aspects: alleviating financing constraints, reducing agency costs, and enhancing corporate reputation (Liu D and Liu GQ, 2024). In addition, firms' access to external support through different channels can help reduce the risk of debt default. Zhai SP (2022) showed that the application of digital finance can mitigate default risk by broadening financing channels and reducing information asymmetry. In addition, enterprise social relationship networks help enterprises to obtain credit resources and reduce the probability of debt default (Xu HR and Jing X, 2016).

3. Theoretical Analysis and Research Hypothesis

Supply chain finance systematically reduces the financing cost of SMEs by reshaping the credit transmission mechanism, thus alleviating the pressure of debt default. Under the traditional financing model, SMEs face serious credit difficulties due to lack of collateral, incomplete credit records and other qualification problems, and are forced to bear high risk premiums. The core logic of supply chain finance lies in capitalizing the credit of the core enterprise and extending the strong credit of the core enterprise to the upstream and downstream enterprises through the modes of accounts receivable financing and prepayment financing. This credit extension is essentially a redistribution of the overall value of the supply chain: the credit decision of financial institutions shifts from the qualification of a single enterprise to the assessment of supply chain stability and transaction authenticity. From the perspective of risk pricing, supply chain finance transforms the decentralized credit risk in traditional financing into the centralized management of core enterprises and supply chain ecology, so that the risk premium can be apportioned in a more stable transaction

structure, and ultimately realize the structural reduction of financing costs.

Supply chain finance significantly reduces the agency cost of each link in the supply chain through digital tools, and suppresses the incentive of debt default. The agency cost stems from the conflict of objectives and information asymmetry in the principal-agent relationship, which is typically manifested in the moral hazard and adverse selection between upstream and downstream enterprises. Under the traditional model, financial institutions are difficult to recognize multi-layer trading relationships, resulting in risk control relying on financial statements and collateral guarantees, and are unable to effectively know the real risks. Supply chain finance, on the other hand, relies on blockchain, Internet of Things and other technologies to realize real-time synchronization and cross-validation of order flow, logistics and capital flow. In addition, supply chain finance makes the whole chain data traceable, enhances the reputation constraint mechanism, exposes corporate debt defaults to the supply chain ecosystem, and further reduces the incentive for active defaults.

Digital transformation transforms an enterprise's originally fragmented operational data into a standardized, real-time data stream, significantly enhancing the ability to identify risks. The digital system can collect micro-data from production, logistics and sales in real time, forming dynamic data and making it transparent. This overcomes the problem that traditional risk control relies on lagging financial statements and static collateral valuation, which makes it difficult to capture the dynamic state of business operations. Digital transformation enables key operational nodes of supply chain finance to form automatically executable procedures through smart contracts, RPA and other technologies, significantly reducing human operational risks. Under the traditional model, the execution of contract terms relies on manual review, which is time-consuming and laborious, and is prone to problems such as bill forgery and misappropriation of funds. Technologies such as smart contracts can automatically trigger payment instructions based on preset conditions, ensuring that funds flow to the real trading party. Digital transformation, through the multi-dimensional upgrading of capabilities as mentioned above, makes supply chain finance no longer limited to providing financing tools, but embedded in the operation of enterprises, and continues to inhibit the growth and spread of debt default risk. In summary, this paper proposes the following hypotheses.

H1: Supply chain finance reduces corporate debt default risk.

4. Research Design

4.1. Sample Selection and Data Sources

In this paper, A-share listed companies are selected as sample data from 2011 to 2023 and screened according to the following steps: (1) Samples with missing variable data and samples of financial and insurance enterprises are excluded; (2) In order to effectively identify and exclude abnormal data, ST, *ST, and PT enterprises with operating abnormalities are deleted, and finally 34,455 valid observations are obtained; (3) In order to minimize the impact of extreme values on the research results, the continuous variables are shrink-tailed by 1% up and down. All data in this paper comes from CSMAR database.

4.2. Model design

In order to examine the impact of supply chain finance on debt default risk, this paper constructs the following model:

$$EDF_{it} = \alpha_0 + \alpha_1 SCF_{it} + \alpha_2 Control_{it} + \sum Year + \sum Ind + \varepsilon_{it} \#(1)$$

Where, the explanatory variable EDF_{it} is the level of corporate debt default risk. The core explanatory variable SCF_{it} is supply chain finance. $Control_{it}$ is the control variable term, and ε_{it} is the random error term. In addition, this paper also controls for year and industry fixed effects.

4.3. Definition of Variables

4.3.1. Explained variable: risk of debt default (EDF)

This paper measures the debt default risk of listed companies based on Merton's (1974) KMV model, and refers to Guo Jingxian et al.'s (2023) study, which speculates the corporate debt default risk (EDF) through the corporate default distance (DD). Default distance (DD) reflects the relationship between the value of corporate assets and liabilities, whether the market value possessed by a company has the ability to repay its liabilities to ensure normal operation, and when the value of corporate assets is closer to the point of default, the greater the likelihood of corporate default. The calculation of default distance (DD) is shown in formula (2):

$$DD = \frac{\ln\left(\frac{V}{D}\right) + \left(u - \frac{\sigma_v^2}{2}\right)T}{\sqrt{T}\sigma_v} \#(2)$$

In equation (2), V is the market value of the firm's assets, which consists of the market value of the firm's debt (D) and the market value of equity (E), while the market value of debt (D) is the sum of current liabilities and 0.5 times non-current liabilities. T is the debt maturity, which is set to 1 year. u denotes the firm's stock return in the previous year. σ_v is the firm's value volatility, which consists of the stock volatility and the debt volatility, with debt volatility $\sigma_D = 0.05 + 0.25 \times \sigma_E$, where σ_E is the equity volatility. Further the volatility of the firm's asset value is obtained as shown in equation (3):

$$\sigma_v = \frac{E}{V}\sigma_E + \frac{D}{V}(0.05 + 0.25\sigma_E) \#(3)$$

The default distance (DD) is obtained by bringing equation (3) into the default distance formula. Then use the standard cumulative normal distribution function Normal ( ) to get the probability of corporate default, see formula (4):

$$EDF = N(-DD) \#(4)$$

The larger the value of EDF in formula (4), the higher the risk of corporate default.

4.3.2. Explanatory variable: supply chain finance (SCF)

There are three ways to measure supply chain finance, which are counting the frequency of keywords related to supply chain finance (Bu J and Zhu Y, 2024), setting whether the enterprise carries out supply chain finance as a dummy variable (Pan AL et al., 2023), and selecting multiple alternative variables to measure (Zhang WB and Liu K, 2012). Drawing on the studies of Raghavan et al. (2011) and Pan WH and Luo YH (2024), this paper adopts the continuous variable of the sum of short-term borrowings, notes payable, and accounts payable as a proportion of total assets to measure supply chain finance.

4.3.3. Intermediary variables

(a) Financing cost

Referring to the research of Yu ZJ and Zhao YZ (2024), this paper adopts the ratio of finance cost to principal business income to measure the size of financing cost (FER), and the larger the value of the index, the larger the cost of corporate finance.

(b) Agency cost

In this paper, we refer to the study of Liu YFS et al. (2025) and use the asset turnover ratio (Turn) to measure the agency cost and conduct the mediation effect test. Asset turnover ratio is calculated by the ratio of operating income to total assets. The larger the Turn, the lower the agency cost of the firm.

4.4. Moderating variable

This paper selects digital transformation (DT) as a moderating variable. Referring to the research of Wu F et al. (2021), this paper counts the frequency of digitization-related words in the five dimensions of artificial intelligence technology, digital blockchain technology, cloud computing technology, big data technology, and the use of digital technology, and adds 1 to take the natural logarithm to get the index of digital transformation.

4.5. Control variables

In order to improve the robustness and credibility of the regression results, this paper draws on existing research to control the following variables: listed years (ListAge), total asset growth rate (AssetGrowth), growth capacity (Growth), employee size (Employee), corporate solvency (Lev), net sales rate (NetProfitGrowth), book-to-market ratio (BM), gross sales margin (GrowthProfit), dual function (Dual), checks and balances on shareholding (Balence1), institutional investor ownership (Inst), percentage of intangible assets (IAR), market capitalization ratio (PB), percentage of women in management (Female), board Size (Board), percentage of fixed assets (Fixed). In addition, industry and year fixed effects are controlled in the study to ensure the accuracy and reliability of the results. The definitions and descriptions of each key variable are shown in Table 1.

Table 1: Variable Definition

Variable type	Variable name	Variable symbol	Variable definition
Explained variable	Risk of debt default	EDF	Approximate estimation based on the KMV model
Explanatory variable	Supply chain finance	SCF	(Short-term borrowings + Notes payable) / Total corporate assets at year-end
Intermediary variables	Financing cost	FER	Finance costs / Main operating income
	Agency cost	Turn	Asset turnover rate
Moderating variable	Digital transformation	DT	ln(Number of enterprise digital transformation keyword disclosures + 1)
Control variable	List age	ListAge	ln(Current year-Year of listing+1)
	Total asset growth rate	AssetGrowth	Total assets for the year / Total assets for the previous year -1
	growth capacity	Growth	Revenue growth rate
	Employee size	Employee	Natural logarithm of the number of employees
	Corporate solvency	Lev	Total liabilities / Total assets at end of year
	Net sales rate	NetProfit Growth	Net profit / Operating income
	Book-to-market ratio	BM	Book value / Total market value
	Gross sales margin	Gross Profit	(Operating income-operating costs) / Operating income
	Merging of two functions	Dual	The chairman and general manager are the same person take 1
	Checks and balances on shareholding	Balance1	Proportion of shares held by the second largest shareholder / proportion of shares held by the first largest shareholder
	Institutional investor shareholding	Inst	Total number of shares held by institutional investors / total number of share capital
	Percentage of intangible assets	IAR	Net intangible assets / total assets
	Market capitalization ratio	PB	Price per share / Net assets per share
	Percentage of women in management	Female	Number of women in management / total number in management
	Board size	Board	Logarithmic number of board members
	Percentage of fixed assets	Fixed	Net fixed assets / total assets
	Nature of business ownership	State	State-owned enterprises take 1

DOI: 10.5281/zenodo.15804431 Volume 1, Issue 2, 2025

5. Empirical Analysis

5.1. Descriptive Statistics

The descriptive statistics of this paper are shown in Table 2. The mean value of debt default risk (EDF) is 0.02, the median is 0, and the standard deviation is 0.09, which indicates that debt default risk varies among different enterprises. The mean value of supply chain finance (SCF) is 0.22, the minimum value is 0.01, the maximum value is 0.64, and the standard deviation is 0.14, which indicates that the development level of supply chain finance of the sample enterprises is still relatively low, and there is a large gap between the levels of different enterprises. The statistical results of the rest of the variables are within a reasonable range.

Table 2: Descriptive Statistics for Key Variables

Variable	Number	Mean	variances	Min	Median	Max
EDF	34455	0.02	0.09	0.00	0.00	0.77
SCF	34455	0.22	0.14	0.01	0.20	0.64
ListAge	34455	2.31	0.68	1.10	2.40	3.37
Asset Growth	34455	0.15	0.36	-0.42	0.08	5.60
Growth	34455	0.36	1.01	-0.77	0.12	7.47
employee	34455	7.71	1.25	4.16	7.64	11.15
Lev	34455	0.44	0.20	0.06	0.43	0.92
NetProfit Growth	34455	-0.45	3.94	-26.44	0.01	12.71
BM	34455	0.33	0.16	0.02	0.31	0.86
Gross Profit	34455	0.28	0.18	-0.07	0.25	0.88
Dual	34455	0.28	0.45	0.00	0.00	1.00
Balance1	34455	0.37	0.29	0.01	0.28	1.00
Inst	34455	0.43	0.24	0.00	0.45	0.92
IAR	34455	0.05	0.05	0.00	0.03	0.34
PB	34455	3.39	3.29	0.39	2.49	48.09
Female	34455	0.20	0.12	0.00	0.19	0.57
Board	34455	2.12	0.20	1.61	2.20	2.71
Fixed	34455	0.21	0.16	0.00	0.18	0.72

5.2. Panel Data Analysis

Table 3 reports the results of the benchmark regression of supply chain finance affecting debt default risk. In particular, column (1) does not include control variables and controls only for industry fixed effects and year fixed effects. The results show that the regression results of the explanatory variable supply chain finance (SCF) on debt default risk are significant but the sign of the coefficient is positive. This is due to not adding enough explanatory variables, too many interference terms, and poor model explanatory power. After adding control variables in column (2), the regression coefficient of the explanatory variable supply chain finance (SCF) is negative and holds at 1% significance level (-0.048***). This indicates that the previous research hypothesis H1 that supply chain finance reduces the risk of corporate debt default is valid.

Table 3: Risk of Debt Default and Supply Chain Finance

	(1) EDF	(2) EDF
SCF	0.079***	-0.048***
	(16.430)	(-6.226)
ListAge		-0.002**
		(-2.525)
AssetGrowth		-0.003***
		(-2.873)
Growth		0.000
		(0.564)
Employee		0.007***
		(10.990)
Lev		0.077***
		(15.513)
NetProfitGrowth		-0.001***
		(-3.849)
BM		-0.066***
		(-15.367)
GrossProfit		-0.019***
		(-5.887)
Dual		0.001
		(1.366)
Balance1		0.003*
		(1.898)
Inst		-0.006***
		(-3.350)
IAR		-0.016
		(-1.539)
PB		-0.003***
		(-14.501)
Female		-0.006
		(-1.381)
Board		-0.002
		(-0.566)
Fixed		-0.019***
		(-4.829)
_cons	-0.002***	-0.009
	(-2.724)	(-1.208)
N	34455	34455
indFE	YES	YES
YearFE	YES	YES
r2	0.099	0.137
r2_a	0.097	0.134

5.3. Robustness Tests

5.3.1. Endogeneity Test

There is an endogeneity problem of reverse causality between supply chain finance and debt default risk, i.e., firms with lower debt default risk are more likely to engage in supply chain finance. Therefore, in this paper, the mean value of supply chain finance (SCF_mean) and the value of the explanatory variable lagged by one period (LSCF) of firms in the same province are selected as instrumental variables for endogeneity test. Table 4 shows the regression results of endogeneity test, in which the instrumental variables SCF_mean and LSCF are significantly positive (0.123***, 0.716***) in the first period; according to the Kleibergen-Paap rk LM statistic and Cragg-Donald Wald F statistic, the two instrumental variables passed the unidentifiable and weak instrumental variable tests. With the addition of instrumental variables in the second stage, the regression coefficient for Supply Chain Finance (SCF) holds at the 1% significance level (-0.049***), indicating that the instrumental variables are valid. In conclusion, after dealing with the endogeneity issue, the findings remain robust.

Table 4: Instrumental Variable Results

	(1) SCF	(2) EDF
SCF_mean	0.123***	
	(9.097)	
LSCF	0.716***	
	(135.125)	
SCF		-0.049***
		(-4.887)
_cons	0.007	0.008
	(0.858)	(0.898)
Cragg-Donald Wald F statistic		21719.67
Kleibergen-Paap rk LM statistic(P-value)		(0.000)
Stock-Yogo 10% maximal IV size		19.93
N	28,411	28,411
indFE	YES	YES
YearFE	YES	YES

5.3.2. Changing the explanatory variable EDF Measures

Drawing on existing studies and to further validate the reliability of this paper's conclusions, the Zscore model is used to re-measure the risk of corporate debt default. Zscore= 0.012 × working capital / total assets + 0.014 × retained earnings / total assets + 0.033×EBITDA / total assets + 0.006 ×total market capitalization / book value of liabilities + 0.999 × sales revenue / total assets. By model replacement, the regression coefficient of supply chain finance in column (1) of Table 5 is significantly negative (-1.531***) at the 1% level, which validates the previous study.

5.3.3. Changing the Sample Interval Measures

Considering that the stock market crash in 2015 and the full-blown New Crown epidemic in 2020 during the sample period of this paper has a significant impact on corporate investment and financing. Therefore, this paper excludes the samples in 2015 and 2020 and then conducts the regression again. The results are shown in the second column of Table 5, and the regression coefficient of the explanatory variable supply chain finance (SCF) holds at the 1% significance level (-0.053***), indicating that the conclusions of this paper remain relatively robust.

Table 5: Robustness Test Results

	(1) Zscore	(2) SCF_
SCF	-1.531***	-0.053***
	(-3.995)	(-6.031)
_cons	19.526***	0.001
	(23.770)	(0.164)
N	34455	29274
indFE	YES	YES
YearFE	YES	YES
r2	0.383	0.152
r2_a	0.381	0.149

5.4. Heterogeneity Analysis

5.4.1. Impact of Geographic Region

As shown in columns (1), (2) and (3) of Table 6, the sample of enterprises in this paper is divided into three groups: "Eastern region", "Central region" and "Western region". It is found that the coefficient of supply chain finance (SCF) in the western region is negative but not significant, the coefficient of supply chain finance (SCF) in the central region is negative at the 5% significance level, and the coefficient of supply chain finance in the eastern region is negative at the 1% significance level (-0.053***). This indicates that supply chain finance in the eastern region significantly reduces the risk of corporate debt default compared with the western region and the central region.

The eastern region has a highly mature industrial chain and dense industrial clusters, with close collaboration between upstream and downstream enterprises, and strong credit endorsement ability of core enterprises, which can radiate their own credit to small and medium-sized suppliers through supply chain finance, and effectively alleviate the latter's difficulties in financing due to insufficient collateral. Secondly, the digital infrastructure in the eastern region is perfect, blockchain, Internet of Things and other technologies are widely used in supply chain management, realizing real-time transparency of transaction data, so that financial institutions can accurately assess the risks and reduce the financing threshold caused by information asymmetry.

5.4.2. Impact of the Nature of Business Ownership

Columns (4) and (5) of Table 6 show the regression results of grouping state-owned enterprises (SOEs) and non-state-owned enterprises (NSEs) in this paper. It can be observed that the coefficients of supply chain finance (SCF) of SOEs are negative only at the 10% significance level, and the coefficients of supply chain finance (SCF) of NSEs are negative at the 1% significance level (-0.048***), which indicates that the negative impact of supply chain finance on the debt of NSEs is more significant than the negative impact of supply chain finance on the default risk of SOEs.

Compared with state-owned enterprises, non-state-owned enterprises often face more stringent traditional financing constraints due to the lack of implicit government guarantees, limited collateralized assets or lower credit ratings. This makes them more dependent on supply chain finance as a financing model. Supply chain finance embeds the credit risk of non-state enterprises in the overall credit of the industrial chain through the credit transmission mechanism of core enterprises, thus breaking through the bottleneck of insufficient creditworthiness of a single enterprise and lowering the lending threshold of financial institutions. At the same time, non-state enterprises are generally characterized by high degree of marketization and short decision-making chain, which enables them to respond quickly to the technical requirements of supply chain finance, improve financing efficiency and optimize capital turnover.

Table 6: Heterogeneous Results

	(1) Western	(2) Central	(3) Eastern	(4) State-owned	(5) Non-state-owned
SCF	-0.024	-0.045**	-0.053***	-0.026*	-0.048***
	(-1.089)	(-2.189)	(-5.994)	(-1.823)	(-5.659)
_cons	0.025	-0.050**	-0.004	0.018	-0.001

	(1.159)	(-2.526)	(-0.553)	(1.083)	(-0.080)
N	4603	5527	24311	12141	21539
F	7.663	10.192	30.598	32.444	15.573
r2	0.193	0.164	0.134	0.182	0.109
r2_a	0.177	0.150	0.130	0.175	0.104

6. Further Analysis

6.1. Intermediation Effects

6.1.1. Reducing Financing Costs

The results in column (2) of Table 7 show that the coefficient of Supply Chain Finance (SCF) is significantly negative at 1% level (-0.035***), indicating that Supply Chain Finance is able to reduce the financing cost of firms. Further, the coefficient of financing cost (FER) on the cost of debt default in column (3) is positive and significant at the 1% level, indicating that the effective reduction of financing cost contributes to the reduction of firms' debt default risk.

Table 7: Intermediary Test Result (Financing Cost)

	(1)	(2)	(3)
	EDF	FER	EDF
SCF	-0.048***	-0.035***	-0.045***
	(-6.226)	(-13.793)	(-5.873)
FER			0.081***
			(3.157)
_cons	-0.009	-0.015***	-0.007
	(-1.208)	(-5.528)	(-1.041)
N	34455	34455	34455
F	48.099	504.278	45.504
r2	0.137	0.412	0.138
r2_a	0.134	0.410	0.135

6.1.2. Reducing Agency Costs

The regression results in Table 8 show that the coefficient of Supply Chain Finance (SCF) is significantly positive (0.665***) at 1% level, indicating that it can effectively reduce the agency cost of shareholders-management; the coefficient of Agency Costs (Turn) is significantly negative (-0.017***) at 1% level, which proves that Supply Chain Finance will alleviate the agency conflict between shareholders and management, and thus reduce the risk of debt default.

Table 8: Intermediary Test Result (Agency Cost)

	(1)	(2)	(3)
	EDF	Turn	EDF
SCF	-0.048***	0.665***	-0.036***
	(-6.226)	(29.004)	(-4.787)
Turn			-0.017***
			(-9.974)
_cons	-0.009	0.536***	0.000
	(-1.208)	(19.291)	(0.055)
N	34455	34455	34455
F	48.099	470.038	45.821
r2	0.137	0.440	0.140
r2_a	0.134	0.438	0.137

6.2. Moderating Effect

The results in Table 9 show that the coefficient of the cross-multiplier term (SCF_DT) is negative (-0.001***) at 1% significance level, indicating that the digital transformation of enterprises can effectively strengthen the inhibiting effect of supply chain finance on corporate debt default risk.

Table 9: Moderating Effect Result

	(1)	(2)
	EDF	EDF
SCF	-0.048***	-0.049***
	(-6.226)	(-6.396)
DT		-0.000***
		(-8.438)
SCF_DT		-0.001***
		(-6.789)
_cons	-0.009	-0.008
	(-1.208)	(-1.113)
N	34455	34454
indFE	YES	YES
YearFE	YES	YES
r2	0.137	0.138
r2_a	0.134	0.135

7. Conclusions and Implications

This paper conducts research on the impact of supply chain finance on debt default risk with the help of the data of Chinese A-share listed enterprises from 2011 to 2023. The main findings are as follows. Firstly, the development of supply chain finance can significantly inhibit corporate default risk. This conclusion remains robust after endogeneity treatment and multiple robustness tests. Secondly, supply chain finance is more effective in reducing the debt default risk of enterprises and non-state-owned enterprises in the eastern region. Intermediation effect finds that scaling down financing cost and agency cost is an effective way for supply chain finance to curb debt default risk. Meanwhile, the digital transformation of enterprises demonstrates a positive moderating effect in the relationship between supply chain finance and debt default risk.

Based on the above findings, this paper gives the following policy insights from three perspectives of the government, enterprises and financial institutions. Firstly, the government can increase the policy inclination to the central and western regions and state-owned enterprises, and guide financial institutions to develop supply chain finance products that fit the characteristics of central and western enterprises through financial subsidies, tax exemptions, or regional supply chain finance pilots; and at the same time, promote the optimization of the governance structure of state-owned enterprises to enhance the effectiveness of the application of supply chain finance, and reduce the risk of debt default due to the digital transformation of enterprises. Secondly, enterprises should accelerate the process of digital transformation, and embed Internet of Things, blockchain and other technologies into supply chain management to reduce the agency costs caused by information asymmetry. Meanwhile, they should take the initiative to build digital supply chain platforms with core enterprises and financial institutions to enhance financing efficiency through data transparency, and further amplify the inhibiting effect of supply chain finance on the risk of debt

default. In addition, financial institutions can optimize their risk assessment models and incorporate the “chain credit” of supply chain finance into their credit-granting systems. They can also jointly develop intelligent risk-control tools with science and technology companies, and consolidate the sustainability of their risk-suppressing effect through real-time monitoring of the supply chain data and dynamic early warning of risks.

References

[1] Altman, E. I. Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. Journal of Finance, 1968, 23(04): 589-609.
[2] Merton, R. C. On the Pricing of Corporate Debt: The Risk Structure of Interest Rates. Journal of Finance, 1974, 29(2): 449-470.
[3] Salaniė, B. The Economics of Contracts: a Primer. Cambridge: MIT Press, 2005, 134-135.
[4] Srinivasa Raghavan, N. R., & Mishra, V. K. Short-term Financing in A Cash-constrained Supply Chain. International Journal of Production Economics, 2011, 134(2): 407-412.
[5] Wuttke, D. A., Blome, C., & Henke, M. Focusing the Financial Flow of Supply Chains: An Empirical Investigation of Financial Supply Chain Management. International Journal of Production Economics, 2013, 145(2): 773-789.
[6] Bu J, Zhu Y. Can Supply Chain Finance Improve the Total Factor Productivity of Enterprises? Research on Financial and Economic Issues, 2016, 5: 89-104.
[7] Chen DQ, Liu JW, Dong ZY. Social Bankruptcy Cost, Debt Default, and Credit Fund Allocation, 2013, 11: 68-81.
[8] Guo JX, Gong WJ. The Impact of Corporate ESG Performance on Debt Default Risk——Based on the Perspective of Enterprise Life Cycle Theory. Finance and Economy, 2023, 11: 21-30+45.
[9] Ling RZ, Pan AL, Li B. Can Supply Chain Finance Improve the Innovation Level of Enterprises? Journal of Finance and Economics, 2021, 47(02): 64-78.
[10] Liu D, Liu GQ. The Impact of ESG Performance on Corporate Debt Default Risk. Statistics & Decision, 2024, 40(13): 177-182.
[11] Liu YFS, Yi ZG. Common Institutional Investors and Corporate Debt Default Risk. Journal of Zhongnan University of Economics and Law, 2025, 1: 28-41.
[12] Luo CY, Li XS. Financial Cycle, Total Factor Productivity, and Corporate Bond Default. Business and Management Journal, 2020, 42(02): 5-12.
[13] Pan WH, Luo YH. Supply Chain Finance and Enterprise Resilience: Based on the Perspective of Collaborative Innovation and Risk-Taking. The Theory and Practice of Finance and Economics, 2024, 45(05): 10-17.
[14] Pan AL, Wang H, Ling RZ. Can Supply Chain Finance Promote the Cultivation of Chain Owner Enterprises? ——Based on the Empirical Evidence of Enterprise M&A. Accounting Research, 2023, 1: 120-134.
[15] Tang S, Xie XY. How Do Firms Holding Financial Institutions Serve the Real Economy——From the Perspective of Supply Chain Spillover Effect. China Industrial Economics, 2021, 11: 116-134.
[16] Wang B, Li L, Hao DP. Monetary Policy Uncertainty, Default Risks and Macroeconomic Fluctuations. Economic Research Journal, 2019, 54(03): 119-134.
[17] Wu F, Hu HZ, Lin HY, Ren XY. Enterprise Digital Transformation and Capital Market Performance: Empirical Evidence from Stock Liquidity. Journal of Management World, 2021, 37(07): 130-144.
[18] Wu SN, Lu XY. A Study of Models for Predicting Financial Distress in China's Listed Companies. Economic Research Journal, 2001, 6: 46-55+96.
[19] Xu HR, Jing X. Social Network and Corporate Debt Default——Evidence from Chinese A-share Listed Companies. Finance & Trade Economics, 2016, (09): 36-52.
[20] Yu ZJ, Zhao YZ. How Does Supply Chain Finance Affect Green Technology Innovation in Enterprises? ——Heterogeneity Characteristics, Mechanisms, and the Assessment of the Synergistic Effect with Environmental Information Disclosure Policies. The Journal of Humanities, 2024, 12: 72-83.
[21] Zhai SP, Han X, Zhang XL, Chen X. Can Digital Finance Reduce the Risk of Corporate Debt Default? Accounting Research, 2022, 2: 117-131.
[22] Zhang LN, Su XS, Yuan L. Supply Chain Finance and Digital Transformation of Enterprises: Heterogeneous Features, Channel Mechanisms, and Effect Differences in an Untrustworthy Environment. Financial Economics Research, 2021, 36(06): 51-67.
[23] Zhang WB, Liu K. Can Supply Chain Finance Development Reduce SME Financing Constraints? Based ——On the Empirical Analysis of Small and Medium-sized Listed Companies. Economic Science, 2012, 3: 108-118.
[24] Zhou L, Wu HJ. Supply Chain Finance and Product Market Performance. Financial Economics Research, 2022, 37(06): 99-112.