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Research article

Does supply chain finance business model innovation improve capital allocation efficiency? Evidence from the cost of capital

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Abstract: Based on the sample of China's A-share listed companies from 2008 to 2021 and the text analysis data of supply chain finance, this study examines whether the supply chain finance business model innovation can improve the efficiency of capital allocation. Results showed that: 1) Firms with a supply chain finance business model have a low cost of capital, particularly the cost of equity capital; 2) The supply chain finance business model reduces the cost of capital in firms with low strategic commitment and a high degree of information asymmetry; 3) The supply chain finance business model innovation can reduce the cost of capital when the degree of competition in the external product market is low and the internal enterprise scale is large. The above findings can greatly inform the optimization of equity finance market supply, the promotion of innovation, and the provision of investment and financing and business decisions that are consistent with sustainable development goals.

Keywords: supply chain finance; capital allocation efficiency; cost of capital; strategic commitment; Information Asymmetry

1. Introduction

In recent years, under the support the of digital economy and financial technology, supply chain finance, a new type of business, came into being. As a financial solution, supply chain finance gathers upstream and downstream enterprises in the supply chain to form a complete blockchain. In addition, supply chain finance connects manufacturers, customers, suppliers, consumers, logistics parties, and financial institutions through the medium of financial technology. This event built a strong supply chain mechanism, innovated the traditional loan financing model, and formed a financing entity with

the core enterprises of the supply chain as the center of the value chain. Hence, the comprehensive competitiveness of the supply chain fundamentally improved, achieving a win–win situation for all parties. In September 2020, multiple departments jointly issued the *Opinions on Regulating the Development of Supply Chain Finance to Support the Stable Cycle and Optimization and Upgrading of the Supply Chain Industry Chain*. The objective is to cultivate and expand new financing models, encourage enterprises to transform and upgrade, and improve the quality of financial services. In 2023, the No.1 document of the Central Committee announced the *Opinions of the Central Committee of the Communist Party of China and the State Council on Promoting the Key Work of Rural Revitalization in 2023*. Moreover, the agricultural supply chain finance ushered in a new growth point. Supply chain finance will become the main service direction. In this context, firms also actively responded to national policies and greatly adapted to the new situation. For example, the financial products launched by Suning.com have satisfied the trade interoperability of its upstream and downstream enterprises; Giant Network has created a highly intelligent industrial chain structure by relying on financial technology; JD Finance, Ant Financial and other companies have increased supply chain finance, making external financing easier for enterprises. With the joint efforts of national policies, we will vigorously boost firms to carry out financial innovation by bailing out enterprises and precise blood transfusion, to greatly better help firms get out of financing distress.

The cost of capital occupies a central position in the study of corporate financial management and is also regarded as crucial by investors. Scholars globally are also very concerned about the cost of capital and regard the cost of capital as the necessary rate of return required by external stakeholders, including the opportunity cost of corporate investment, the cost of debt, and the cost of capital. The goal pursued by modern firms is to maximize the wealth of shareholders. Therefore, the cost of capital is a comprehensive evaluation index for assessing the return on investment of listed companies, the interest of various financing methods, and the value of the enterprise. In addition, as an important criterion for judging the competitiveness of a firm, the cost of capital can fully reflect the operation process of capital, connect investment, financing, dividend distribution and strategic layout. Furthermore, the cost of capital can not only provide investors with the necessary rate of return but also highlight the comprehensive competitiveness of firms.

What is the impact of supply chain finance business model innovation on the capital allocation efficiency of Chinese listed companies? To answer this question, this study explores the competitive advantages of firms from the perspective of supply chain finance business models. The study also verifies the internal mechanism of enterprises implementing supply chain finance business models and the cost of capital based on the theory of strategic commitment and information asymmetry. In addition, this study explores the heterogeneity relationship between supply chain finance and the cost of capital based on the firm's internal and external environment—product market competition and company size. The marginal contribution of this study is: 1) At the theoretical level, the study enriches and expands the research framework of the economic consequences of supply chain finance, and systematically analyzes the mechanism and consequences of supply chain finance on the cost of capital of enterprises; 2) At the methodological level, based on the annual reports of listed companies and text python technology, we constructed the degree indicators of supply chain finance in Chinese listed companies, and laid a good foundation for the subsequent assessment of supply chain finance of enterprises and its economic effects; 3) At the practical level, exploring the impact of supply chain finance on the cost of capital of enterprises is conducive to improving the circulation of China's capital market, which is of great significance to the establishment of a smooth national economic cycle, and providing decision-

making references for enterprises on how to utilize supply chain finance to promote digital change.

2. Literature review and research hypothesis

2.1. Literature review

2.1.1. Supply chain finance model

Supply chain and finance are a combination of two interdisciplinary subjects [1]. On the one hand, supply chain finance focuses on its financial attributes, developed from reverse factoring [2], and is a set of financial solutions provided by financial institutions [3]. On the other hand, supply chain finance emphasizes the collaborative relationship between supply chain companies, particularly the optimization of inventory and operating capital through the synergistic effect of upstream and downstream companies in the supply chain. This perspective also extends the boundary of supply chain finance beyond financing solutions, including collaborative solutions for supply chain processes and fixed asset financing [1,4].

Supply chain finance has very rich application scenarios. Lekkakos and Serrano [5] explored its business advantages and mechanism from the perspective of virtual industrial clusters (virtual clusters) under the virtual supply chain network. Invoking and distributing information to achieve complementary advantages and rational allocation of resources under the supply chain have created a benign interaction among enterprises. Firms rely on the influence of each other's location and industrial clusters to create financing efficiency greater than that of a single enterprise. Risk is also greatly reduced, whereas relying on each other's credit scores brings great risk-taking ability to the industry cluster as a whole [6]. Chod et al. [7] discussed that the integration of blockchain technology and supply chain finance can enhance the authenticity and transparency of the verification of inventory, logistics, capital flow and other information on the supply chain. Such integration can also send signals about the company's operating ability to investors, thereby helping high-quality enterprises obtain financing preferences at a low signal cost. Based on two specific supply chain financial businesses, reverse factoring and dynamic discounting, Omran et al. [8] discussed how blockchain technology can enhance the transparency, automation, and trust level of supply chain finance, thereby improving traditional supply chain finance tool inefficiencies. Goldfarb and Tucke [9] believed that one of its important features is "enterprise data on the chain," that is, enterprises on the supply chain register and confirm transaction information on the blockchain, which is a different way of enterprise digitalization from the Internet. We have built a financial service platform using the Internet of Things, blockchain, big data analysis and other technologies through the promotion of the digital economy. We also established a stable supply chain financial trust network [10].

2.2.2. Economic consequences of Supply Chain Finance

As mentioned earlier, the relevant literature on supply chain finance is more normative than empirical research on the economic consequences of supply chain finance. In addition, research on the economic consequences of supply chain finance is limited, and no literature research exists on the direct relationship between supply chain finance and cost of capital in the academic community. Information on the structure of core supply chain finance enterprises and enterprises enjoying their

services is lacking, including the registration of debt financing and equity financing over the years. Hence, most of the existing research has been carried out from the aspects of enterprise value and risks.

From the firm value perspective, Pfohl and Gomm [4] concluded that supply chain financial services provided by upstream and downstream companies for financing can increase the value of the entire supply chain during the implementation process. Hofmann and Zumsteg [11] also believed that supply chain finance can create value for enterprises. They believed that this model provides a certain space for manufacturers, suppliers and consumers, and can bring additional profit growth and value added. Gelsomino et al. [12] found that supply chain finance can improve operational performance by reducing supply chain capital costs, create financial value, and ultimately improve corporate performance. Pan et al. [13] also studied the value-creation function of supply chain finance. The process by which supply chain finance contributes to the low-carbon development of supply chains and the functions played by financial service providers [14,15]. The increase in research and development (R&D) costs and the decrease in economic returns brought about by carbon emission reduction in the short term can exacerbate the cash flow shortages faced by firms [16], which can reduce firms' incentives to reduce carbon [17,18]. On the contrary, green energy economies such as solar energy are regarded as an effective source for achieving sustainable development with great potential for development. In addition, green energy economics have great emphasis on the protection of economic resources, economic growth, and environmental friendliness [19], along with the addition of government support, which improves socioeconomic conditions [20]. Combining carbon reduction with financial activities is an important way to promote low-carbon sustainable development of supply chains [21].

From the perspective of the risks faced by supply chain finance, He and Tang [22] found that supply chain finance links multiple interest groups, showing the complexity of business and the uncertainty of transactions. This model exposes many potential risks, which can also be called systemic risks. Systemic risk and supply chain integration risk affect the stability of the supply chain through the relationship between supply and demand, thereby affecting the performance of the supply chain. In particular, the systemic risk from the external environment of the supply chain will be transmitted and diffused among upstream and downstream enterprises along the supply chain and ultimately expressed through supply and demand risks. Trkman and McCormack [23] noted that in chain financial risks faced by enterprises, core enterprises should shape the supply chain structure based on the characteristics of different partners. Zhao et al. [24] believed that external large data sets can be used to help financial institutions improve the predictability of business failures of supply chain financial customers. Chen et al. [25] also confirmed that supply chain finance links financial institutions and enterprises to achieve mutual penetration between the bank's internet technology and the enterprise's industrial chain. This case leads to the link between the lending business and the enterprise operation on the chain, an increase in the credit of participating enterprises, and a reduction in the information asymmetry between enterprises and financial institutions. This case also protects against for the lack of collateral and also helps financial institutions control the monitoring costs, effectively solving the financing risk problem in supply chain finance. From the perspective of transaction uncertainty, Ali et al. [26] noted that supply chain finance alleviates the financial pressure of upstream and downstream enterprises, optimizes the overall liquidity of the supply chain, and reduces the risk of supply chain interruption. Muganyi et al. [27] take the balanced growth of China's FinTech industry as a research perspective. They found that the use of advanced technologies, such as big data, artificial intelligence, biometrics, and blockchain, can support the development of the financial sector through the access

(lending), depth (deposits), and savings of China's financial institutions. The emergence of FinTech in the area of financial regulation can significantly improve financial development outcomes and reduce associated risks.

2.1.3. Influencing factors of the cost of capital

The cost of capital is the core of modern financial issues. It runs through the performance evaluation of macroeconomics and micro enterprises. The fluctuation of the cost of capital affects the changes in internal and external investment and financing policies of enterprises. Some scholars explored agency cost [28], company characteristics [29], internal control [30], and the quality of information disclosure [31]. Meanwhile, others studied the factors affecting the cost of capital, and achieved fruitful research results. Some scholars explored the relationship with corporate financing from the perspective of major customers. For example, factors such as the concentration of enterprise customer groups, customers' behavior in selecting suppliers, and the operating and financial conditions of major customers can significantly affect the risks faced by enterprises [32−34]. In addition, from the perspective of supplier risk, Dhaliwal et al. [35] studied that the concentration of large customers will bring additional capital costs for those who are more likely to lose major customers or are more likely to suffer if they lose such customers This relationship is pronounced for suppliers with great losses. Truong et al. [36] found that companies with high customer satisfaction scores enjoy low capital costs, and the impact of customer satisfaction on capital costs increases with the increase of information asymmetry, consistent with the mitigation of customer satisfaction on information asymmetry. In recent years, scholars have also carried out research on the rapid development of internet communication technologies such as the digital economy and big data [37].

In summary, existing studies have explored the concept of supply chain finance, business process reengineering and its economic consequences. However, the following shortcomings still exist: 1) Previous studies have explored the single attribute of supply chain finance (financial attribute or supply chain attribute) in depth, which to a certain extent separates the organic unity of the two attributes [12]; 2) Most of the literature on supply chain finance focused on the perspective of its institutional context, supply chain finance business models, technical characteristics, and other aspects, with most qualitative studies [4,6,38,39], and fewer empirical analyses [40]; 3) Although existing studies have achieved rich results on the value creation and risk prevention and control issues of supply chain finance, they have not been able to provide a comprehensive analysis of supply chain finance. Most focused on the business structure of supply chain finance itself. Supply chain finance not only affects the internal behavior of enterprises [41] but also deepens the collaborative relationship between core enterprises and their suppliers and customers [42] and even affects the financing performance of enterprises [43]. The level of financing efficiency is an important symbol for evaluating the competitiveness of enterprises [44], which plays a decisive role in the sustainable development of enterprises, and this indicator better reflects the capital allocation efficiency [45], which affects the high-quality development of the capital market. Therefore, exploring the impact of supply chain finance on the cost of capital is closer to the essence of corporate finance and can greatly reflect the economic creation value of supply chain finance. Supply chain finance provides financial support to the weak links in the supply chain and improves the stability of the supply chain [46]. In addition, supply chain finance opens up financing blockages in the supply chain and fundamentally coordinates conflicts of interest in the supply chain [11]. This case is conducive to the better mobilization of

synergies between core enterprises and their upstream and downstream enterprises and may provide a positive driver for the reduction of the cost of capital. Then, does supply chain finance help to guide enterprises to allocate their limited capital to areas with the highest returns, thereby promoting the improvement of the efficiency of enterprise capital allocation? Studying the above question has important theoretical value. From this perspective, this study takes A-share listed companies in Shanghai and Shenzhen from 2008 to 2021 as samples, and theoretically analyzes and empirically tests the effect of supply chain finance on the cost of capital. On this basis, from the perspective of strategic alliance and information asymmetry, the financing effect and mechanism of supply chain finance are discussed in depth, to provide empirical supplementation for a series of important initiatives of the state to actively promote the development of supply chain finance.

2.2. Theoretical analysis and research hypothesis

The supply chain management approach is regarded as a model of trust, commitment and profitability across the chain [47]. Then the benefits of supply chain solutions mainly come from exploiting the cost of capital differences among different participants in the supply chain [48]. Therefore, the company's development of supply chain finance may help realize the synergy between upstream and downstream enterprises in the supply chain, revitalize the vitality of the entire supply chain, and particularly win new opportunities for financing for weak enterprises in the chain. This study summarizes how supply chain finance helps companies improve capital allocation efficiency in the following two aspects, namely reaching strategic commitments and improving information sharing.

From the strategic commitment perspective, enterprises that develop supply chain financial business models innovatively reach strategic commitments with each other. This event is conducive to the formation of strategic alliances between core enterprises and upstream and downstream enterprises, thereby becoming a community in the operation of enterprises and major interest decisions [49]. Optimizing capital allocation efficiency and realizing technological innovation and development are conductive to enterprises, thereby optimizing the operating efficiency of upstream and downstream enterprises in the supply chain. According to the strategic commitment hypothesis, implementing strategic commitment management among enterprises can enhance the market advantage of the entire supply chain, improve the quality of the supply chain, and improve the transformation of various functional departments [50]. The core enterprise in the supply chain reaches a strategic commitment with all participating enterprises in the chain, which stabilizes the market position of each enterprise [51]. The core enterprise can also help companies circulate working capital chains and improve the operating efficiency of supply chain companies. In addition, strategic alliances have certain advantages in resource exchange and information sharing, which can strengthen the cooperation among enterprises in the alliance and help enterprises identify their own value, to increase the value of the community of interests. Poitevin [52] found that companies with a lower degree of financing constraints prefer to issue corporate bonds to realize the strategic commitment of supply chain companies. Enterprises also tend to reach strategic commitments with upstream and downstream enterprises in the supply chain to help the company's products gain a place in the market to obtain additional loan funds from financial institutions. Therefore, strategic commitments can improve the capital allocation efficiency of enterprises in the supply chain, playing a vital role in improving the operating efficiency of enterprises.

According to the theory of information asymmetry, the supply chain finance business model developed by digital technology can reduce the degree of information asymmetry between enterprises

and the outside world as a whole. This model focuses on improving investors' trust in listed companies [53,54].

First, supply chain finance is conducive to improving the equity financing environment of enterprises. Yang et al. [55], Yan et al. [56], and other scholars studied the supply chain equity financing model in which enterprises with sufficient capital invest in capital demand enterprises and obtain part of the equity. Considering the initial investment level [57], moral hazard [58], risk aversion [59,60], and the degree of effort of supply chain enterprises[61], supply chain finance trades with investors in the form of shares, thereby reducing the financing cost between core supply chain enterprises. The reason is that venture capital is one of the main ways of enterprise equity financing. The venture capital investor does not require the enterprise to repay the principal and interest at the end of the period and instead gets the equity dividend at the end of the period. In this case, the venture capital investor should use the equity financing funds as the expenditure of the supply chain enterprise's effort cost. As the enterprise's effort level increases, the return to investors will also increase. Therefore, the supply chain enterprise and the venture capital investor will jointly act as the owner of the enterprise and will try their best to maximize the wealth of shareholders.

Second, supply chain finance may be detrimental to the optimization of the cost of debt. The supply chain financial business model is an alliance relationship formed among different stakeholders. Among them, external lending and internal guarantees are very core relationships in the entire chain, and they rely on trust and strategic commitment to reach an agreement. However, traditional financial institutions, such as banks, are relatively conservative in the application of new business models or technologies. Fraudulent loans in the market have also led to a lack of trust in financial institutions for borrowers. Corporate risk ratings or a "one size fits all" approach to suspending high-risk businesses and interrupting lending to such firms has led to a crisis of trust [10]. From another aspect, in the supply chain financial business model, the debt default of chain enterprises is related when financing, and default contagion exists [62]. The relationship maintained by close credit lacks a contractual guarantee, the risk of default is very high, and the bank has a very high risk of uncontrollable repayment. Verifying the complex pledges of enterprises under the supply chain relationship network one by one is difficult for the bank. The breach of contract is brought about by the link.

Furthermore, from the capital structure perspective, Chinese listed companies have a long-term preference for equity financing [63,64], and equity financing accounts for a relatively high proportion. In addition, China's interest rate liberalization reform is still in progress, the credit pricing mechanism is still in the process of improvement, and the change in debt cost is relatively stable. The cost of debt is less sensitive than the cost of capital. On the whole, the development of the supply chain finance business model will reduce the weighted average cost of capital of the enterprise as a whole. To sum up, supply chain finance builds a smart financial model between enterprises and investors by reaching strategic commitments between core enterprises and their upstream and downstream and improving information sharing, which forms the competitiveness of enterprises and improves their profitability. The external financing environment stimulates the capital allocation efficiency of enterprises, speeds up the liquidity of funds in the supply chain, and increases the availability of funds. This model emphasizes the collaborative relationship among supply chain members, particularly emphasizing the optimization of resource allocation through the collaboration of the supply chain members, thereby reducing the cost of supply chain. The cost of capital of the enterprise increases the wealth of shareholders and realizes the goal of sustainable development of the enterprise. Based on this, the hypothesis of this study is put forward:

H1: Firms carrying out the supply chain finance business model will reduce the cost of capital level.

3. Research design

3.1. Data source and sample selection

The selected sample of this paper is A-share listed companies in Shanghai and Shenzhen Stock Exchange in China from 2008 to 2021. The financial data of this paper is from the China Stock Market & Accounting Research database (CSMAR), the word frequency data is obtained from the text analysis of the annual report of A-share listed companies, from the China Research Data Service Platform (CNRDS), and the cost of capital data is from the *Capital University of Economics and Business · Miller Salon's Cost of Capital Estimation Database for Chinese Listed Companies in 2022*[1]. After excluding the companies with missing financial data, financial industry, ST companies, and companies with negative cost of capital estimates. The valid cost of capital sample of 26,214 was obtained by screening. Additionally, by removing the top and bottom 1% of values for each variable, the impact of outliers on the analysis is reduced, further improving the reliability of the results.

3.2. Variable definition

3.2.1. Dependent variables

1. The cost of debt (R_d)

Referring to the practice of Pittman and Fortin [66], we use the ratio of financial costs to the average total liabilities.

2. The cost of equity capital (R_e)

The use of *Specification Guidance on Cost of Capital Estimation for Listed Companies in China 2022*[2] helps to ensure that the cost of equity capital estimates is reliable and accurate for Chinese listed companies. The use of implied cost of capital estimation metrics and the modified RI data for each period, as recommended by Li and Mohanram [67]. Zou et al. [68], further improves the accuracy of the estimates[3]. The use of multiple models, including the Gordon model [69], CT model [70], OJ model [71], GLS model [72], PEG model and MPEG model [73], helps to ensure that the cost of equity capital estimates is robust and not overly influenced by any one model. Taking the arithmetic average of the estimates from these six models, further enhances the reliability and accuracy of the cost of equity capital estimates for the companies in the sample.

1) In the Gordon model, P_0 uses the stock price in the previous period, dsp_1 uses the dividend per share in the current period, and g represents the sustainable growth rate.

$$R_e = \frac{dps_1}{P_0} + g \tag{1}$$

2) In the CT model, P_0 uses the prior-year closing price, $bps0\_tz$ is the adjusted net asset per share, eps_t is the first to five-year surplus per share from the cross-sectional regression forecast model, bps_{t-1} is the calculated "clean surplus" relationship, dps_{t-1} is the calculated prior-period dividend per share, and g is the rate of maturity for ten-year bonds.

$$p_{0=bps_0\_tz} + \sum_{t=1}^{5} \frac{eps_t - r_e \times bps_{t-1}}{(1+r_e)^t} + \frac{\frac{(eps_5 - r_e \times bps_4) \times (1+g)}{r_e - g}}{(1+r_e)^5} \tag{2}$$

3) In the OJ model, the predicted earnings per share in the first and second year, represented by eps_1 and eps_2, respectively, are estimated using a cross-sectional regression forecasting model. The long-term growth rate, represented by the parameter $\gamma\text{-}1$, is also an important factor in the model. In addition to these variables, the yield to maturity of the 10-year treasury bond is used as a factor. The closing price at the end of the previous year, is represented by P_0, and dps_1 represents analyst forecast data.

$$R_e = A + \sqrt{A^2 + \frac{esp_1}{P_0} \times \left(\frac{esp_2 - esp_1}{esp_1} - (\gamma - 1)\right)} \tag{3}$$

Among them, $A = \frac{1}{2}(\gamma - 1 + \frac{dps_1}{P_0})$.

4) In the GLS model, bps_0it is the adjusted net assets per share, P_0 represents the closing price at the end of the previous year, and roe represents the forecasted net income per share.

$$P_0 = bps_0 + \sum_{t=1}^{3} \frac{roe_t - R_e}{(1+R_e)^t} bps_{t-1} + \sum_{t=4}^{11} \frac{roe_t - R_e}{(1+R_e)^t} bps_{t-1} + \frac{roe_{12} - R_e}{R_e(1+R_e)^{11}} bps_{11} \tag{4}$$

5)In the PEG model, the predicted earnings per share in the first and second year, represented by eps_1 and eps_2, respectively, are estimated using a cross-sectional regression forecasting model. The closing price at the end of the previous year, represented by P_0 is also an important factor.

$$R_e = \sqrt{\frac{esp_2 - esp_1}{P_0}} \tag{5}$$

6) In the MPEG model, dsp_1 is the predicted earnings per share. Other alphabetical variables are the same as the PEG model.

$$R_e = \sqrt{\frac{esp_2 + R_e \cdot dsp_1 - esp_1}{P_0}} \tag{6}$$

3. Weighted average cost of capital ($WACC$)

The calculation formula is $WACC = R_d \times W_d + R_e \times W_e$, where the weights W_d and W_e are the ratio of the market value of debt and equity to the total market value of the company.

3.2.2. Independent variables

For supply chain finance (SCF), we refer to Pan et al. [13], and Huang et al. [74] for different descriptions of supply chain finance keywords, and we use Python language statistics to analyze supply chain finance business models. Supply chain finance is divided into four categories: "receivable, prepayment, inventory, and comprehensive." Under these four categories, other keywords exist for detailed division. Figure 1 shows the lexicon. Statistical enterprises discuss and analyze the frequency of occurrence of all keywords in the annual report to measure the financial level of the enterprise's supply chain and conduct the logarithmic processing.
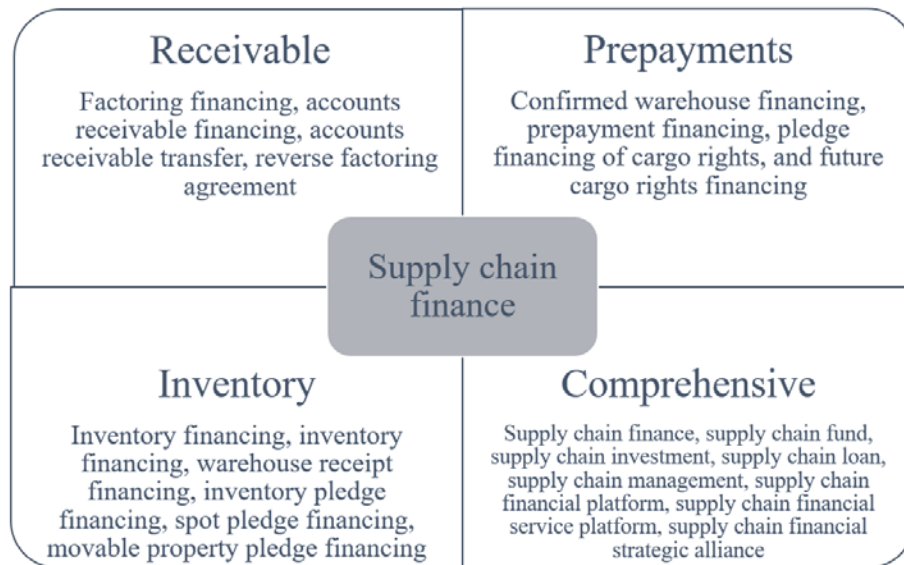
Figure 1. Four classification frequency maps of supply chain finance.

3.2.3. Control variables

This study includes 16 control variables, referring to Fama and French [75], Huang [74] and other scholars, including firm size (*Size*), Firm growth ability (*Growth*), Firm profitability ability (*Roa*), and market risk (*Beta*). Dummy variables are set according to the industry classification guidelines published by the *China Securities Regulatory Commission in the third quarter of 2021*[4] for 21 industries, along with Province and Year dummy variables. Table 1 provides a list of the control variables used in this study.

3.3. Empirical models

In order to explore whether the supply chain financial business model improves the efficiency of capital allocation, this paper uses the following model for regression:

$$R_{d_{it}} = \alpha + \beta_1 SCF_{it} + \beta_2 Controls_{it} + Province_t + Industry_t + Year_t + \varepsilon_{it} \tag{7}$$

$$R_{e_{it}} = \alpha + \beta_1 SCF_{it} + \beta_2 Controls_{it} + Province_t + Industry_t + Year_t + \varepsilon_{it} \tag{8}$$

$$WACC_{it} = \alpha + \beta_1 SCF_{it} + \beta_2 Controls_{it} + Province_t + Industry_t + Year_t + \varepsilon_{it} \tag{9}$$

In the model (7) – (9), the dependent variables in the regression are the company's the cost of debt ($R_{d_{it}}$), the cost of capital ($R_{e_{it}}$) and weighted average cost of capital ($WACC_{it}$), and the independent variable is SCF_{it}, which represents the level of supply chain finance business model carried out by *i* company in *t* year , $Controls_{it}$ represents the control variable, $Province_t$ represents the control of the provincial fixed effect, $Industry_t$, $Year_t$ represents the control of unobservable changes at the industry level and year level, and ε_{it} represents the residual item, and the standard errors are adjusted for firm-level cluster clustering considering the panel data characteristics.

Table 1. Definition and calculation method of main variables.

Variable	Variable name	Variable symbol	Variable measurement method
Dependent variable	Cost of debt	R_d	The ratio of the sum of interest expenses and other financial expenses to the average total liabilities
	Cost of capital	R_e	Arithmetic mean of six models
Independent variables	Weighted average cost of capital	WACC	Weighting the cost of capital and cost of debt using market capitalization weights
	Supply chain finance	SCF	supply chain finance keywords appearing in the annual report, plus 1 natural logarithm
control variable	Company Size	Size	The natural logarithm of the total market capitalization at the end of the period
	Company growth	Growth	The natural logarithm of the price-earnings ratio
	Profitability	Roa	Net interest rate on total assets
	Market risk	Beta	Beta value
	Book-to-market ratio	Bm	Book value of equity/total market value
	Fluidity	Turnover	Turnover rate
	Business risk	Oprisk	The natural logarithm of the standard deviation of return on net assets in the past 3 years
	Tangible assets ratio	Al	Total Tangible Assets/Total Assets
	Cash holdings	Cash	(Cash and cash equivalents + trading financial assets) / asset adjustment
	Concentration of ownership	H1	Shareholding ratio of the largest shareholder
	Board size	Board	The natural logarithm of the board size
	Proportion of independent directors	Indep	Number of Independent Directors/Number of Board of Directors
	Institutional investor shareholding ratio	Ins	The sum of the shareholding ratios of major institutional investors
	Province	Province	Province dummy variable
	Industry	Industry	Industry dummy variable
	Year	year	Year dummy variable

4. Empirical results and analysis

4.1. Descriptive statistics

Table 2 reports the descriptive statistics of the main variables, which shows that the mean value of the cost of debt (R_d) is 0.0033, the mean value of the cost of capital (R_e) is 0.0939 , and the weighted average cost of capital (WACC) has an average value of 0.0791 and a median value of 0.0757, which is more in line with the normal distribution, where the weighted average cost of capital is less than the cost of equity capital, greater than the cost of debt capital, and is in the middle of them. The mean value of supply chain finance business model (SCF) is 0.1217, indicating that the frequency of supply chain finance in sample enterprises is about 0.1218. Among the control variables, the mean and median

of company size (*Size*) are 22.2832 and 22.2031 respectively, and variables such as growth (*Growth*) and profitability (*Roa*) also conform to normal distribution.

Table 2. Descriptive statistics of main variables.

Variable	Obs	Mean	Median	SD	Min	Max
R_d	26214	0.0033	0.0040	0.0064	-0.0235	0.0154
R_e	26214	0.0939	0.0897	0.0333	0.0148	0.2190
WACC	26214	0.0791	0.0757	0.0265	0.0190	0.1721
SCF	26214	0.1218	0.0000	0.3377	0.0000	1.6094
Size	26214	22.2832	22.2031	1.1082	19.3223	25.3422
Growth	26214	3.7173	3.5967	1.0127	1.7314	6.8445
Roa	26214	1.4456	1.1185	1.0340	0.6233	7.8950
Beta	26214	1.0403	1.0554	0.2757	0.3214	1.7353
Bm	26214	0.4813	0.3940	0.3319	0.0667	1.7257
Turnover	26214	1.4642	1.1390	1.1494	0.1087	5.7408
Oprisk	26214	0.9224	0.9446	1.1294	-2.1460	3.7125
Al	26214	0.9246	0.9549	0.0892	0.5436	1.0000
Cash	26214	0.2576	0.1788	0.2488	0.0167	1.4278
H1	26214	0.3489	0.3287	0.1494	0.0886	0.7500
Board	26214	2.3858	2.3979	0.2219	1.7918	2.9444
Indep	26214	0.3810	0.3636	0.0723	0.1875	0.6000
Ins	26214	5.3775	2.9522	6.5696	0.0000	32.1168

4.2. Empirical results

Table 3 shows the regression results of supply chain finance business model innovation on capital allocation efficiency. As shown in column (1), the regression coefficient of supply chain finance (*SCF*) and the cost of debt (R_d) is 0.0003 and significantly positive at the 1% level. In column (2), the regression coefficient of supply chain finance (*SCF*) and the cost of equity capital (R_e) is −0.0016 and significantly negative at the 1% level. Column (3) shows that the regression coefficient between supply chain finance (*SCF*) and the weighted average cost of capital (*WACC*) is significantly negative at the 1% level, and the coefficient is −0.0017, which proves the main hypothesis of this study. Thus, enterprises carrying out the supply chain finance business model will indeed reduce their cost of capital, thereby improving their capital allocation efficiency. The reason is that the basic function of supply chain finance is to strengthen the external financing ability of collaborative enterprises through the credit support, flow and transmission of the core enterprises in the chain, providing the necessary financial support for their production and operation, including R&D and innovation development [76], The alleviation of the financing constraints of the enterprises in the chain is also powerfully and positively fed back to the core enterprises, further strengthening their credit qualification and financing ability, providing abundant capital input and relaxed failure risk tolerance for the business activities of enterprises [6,39]. Therefore, the company helps the upstream and downstream enterprises in the supply chain of the synergistic linkage to reach a strategic commitment and the whole supply chain of vitality to carry out supply chain finance [77]. With the continuous penetration of supply chain finance intervention, the access to equity financing for supply chain enterprises can greatly convey to the

outside world the enterprise's long-term core value shaping and maintenance of competitive advantages. It can also improve the sharing of information between enterprises and quality and technological innovation [78].

Table 3. Regression results of supply chain finance business model and the cost of capital.

Variable	(1) R_d	(2) R_e	(3) WACC
SCF	0.0003***	-0.0016***	-0.0017***
	(3.88)	(-3.15)	(-4.12)
size	0.0000	-0.0074***	-0.0072***
	(0.90)	(-32.78)	(-40.45)
Growth	-0.0009***	-0.0111***	-0.0063***
	(-21.60)	(-39.82)	(-28.12)
Roa	0.0021***	0.0036***	0.0006***
	(45.78)	(12.94)	(2.96)
Beta	0.0006***	-0.0044***	-0.0050***
	(4.66)	(-6.11)	(-8.52)
Bm	-0.0013***	0.0044***	-0.0176***
	(-11.98)	(5.39)	(-29.69)
Turnover	-0.0001**	0.0014***	0.0010***
	(-2.29)	(6.69)	(5.88)
Oprisk	0.0002***	0.0062***	0.0037***
	(7.13)	(33.63)	(26.25)
Al	-0.0007*	0.0223***	0.0107***
	(-1.95)	(10.88)	(6.37)
Cash	-0.0115***	-0.0006	0.0064***
	(-50.87)	(-0.74)	(9.61)
H1	-0.0023***	0.0022*	-0.0016*
	(-10.39)	(1.84)	(-1.65)
Board	-0.0002	0.0031***	0.0018***
	(-1.50)	(3.92)	(2.82)
Indep	-0.0001	0.0018	-0.0015
	(-0.33)	(0.74)	(-0.78)
Ins	-0.0000***	0.0001***	0.0000
	(-2.89)	(2.67)	(1.53)
_cons	0.0105***	0.2105***	0.2282***
	(10.61)	(35.81)	(49.55)
Province	Yes	Yes	Yes
Industry	Yes	Yes	Yes
year	Yes	Yes	Yes
N	26214	26214	26214
adj. R2	0.398	0.384	0.355
F -value	118.54***	216.69***	189.89***

t values in this table have been adjusted by the Cluster standard error at the company and year levels, and*, ** and *** represent the significance levels of 10%, 5% and 1% respectively. The same below.

Thus, under the supply chain financial business model, shareholders are biased toward it, but in this case, the cost of debt borrowing from creditors has increased. In addition, the low capital cost and high debt cost offset each other, making the weighted average cost of capital of the enterprise drop. This case also reflects those creditors, such as banks, have low recognition of this emerging business model and a lack of trust in the entire supply chain during the initial stage of supply chain finance. A market-oriented behavior is highly attractive and can provide additional capital, thereby improving the company's overall capital allocation efficiency [37].

In addition, the regression sign of the control variable is consistent with the existing literature and economic intuition. A significant negative correlation exists among firm size (*Size*), book-to-market ratio (*Bm*), and the weighted average cost of capital (*WACC*), which is consistent with Fama and French [75]. The coefficients of the variables of the firm's profitability (*Roa*), turnover ratio (*Turnover*), and operational risk (*Oprisk*) are significantly positive, which is consistent with Botosan and Plumlee [79] and Hong et al. [37]. Therefore, the control variables are properly selected.

5. Impact mechanism test

According to the above empirical test, the results of the main hypothesis have been verified, that is, the innovation of the supply chain finance business model can reduce the weighted average cost of capital of enterprises. In addition, it can further incorporate strategic commitment and information into the analysis framework of the impact mechanism.

5.1. Strategic commitment perspective

Strategic commitment helps supply chain companies to gain additional sustainable competitiveness. It also enables all participating companies in the supply chain to form a strategic alliance and a community of shared future through strategic commitment, making integrating and optimizing financial resources easy. In addition, strategic alliances have comparative advantages in information sharing and resource exchange. Strategic alliances which enhance enterprises' investment in the supply chain–specific assets, drive financing through investment, further improve the overall strategic alliance performance of supply chain enterprises [50,51], and promote the overall development of the supply chain, thereby reducing the capital cost of enterprises.

We refer to the measurement of Fresard [80] of production capacity investment, capital accumulation, and period expenses as the proxy variable of strategic commitment (*Scapdos*) to test whether "strategic commitment" is the mechanism of action of the supply chain financial business model on the weighted average cost of capital. As the value increases, the company's production capacity investment and capital accumulation are likely to be ahead of other companies in the same industry, and the company's strategic commitment is great. *Scapdos* is divided into two groups according to the mean value and brought into the model (10). Columns (1) – (2) of Table 4 show the regression results. In the group with high strategic commitment, the coefficient of *Scapdos* is not significant; in the group with high strategic commitment for the low group, the *Scapdos* coefficient is –0.0025, which is significantly negative. This result indicates that the reduction effect of supply chain finance on the weighted average cost of capital is highly significant when the strategic commitment is low. Moreover, the development of supply chain financial business models has played a significant role in enterprises with insufficient strategic commitment. The effect of supplementing strategic

commitments is highly evident obvious in reducing the cost of capital.

5.2. Information asymmetry perspective

The development of the supply chain finance business model can reduce the degree of information asymmetry inside and outside the enterprise as a whole, thereby improving the trust of investors in listed companies. The attractiveness to shareholders has been improved by improving the equity financing environment of enterprises. In addition, traditional commercial banks may have a negative impact on the debt financing of enterprises and form a mutual offset effect on the whole. The reason is that they are relatively conservative in the supply chain business model and have the problem of contagion of default, thereby improving the overall capital allocation efficiency of the company.

This study uses the measurement of Dechow et al. [81] to test whether "information asymmetry" is the mechanism of the influence of supply chain finance on the weighted average cost of capital of enterprises. We use the discretionary accruals (Da) obtained from the Jones model by industry and year to measure the information asymmetry of the company. The reason is that the discretionary accruals can reflect the degree of information asymmetry of the enterprise to a certain extent. In the case of information superiority, the management may use the accruals for earnings management to influence the judgment of external investors. Therefore, using discretionary accruals to measure information asymmetry is appropriate. After taking the absolute value of Da, the higher the value, the more the company participates in earnings management, and the greater the degree of information asymmetry. Da is divided into two groups according to the median and brought into model (10). Columns (3) – (4) of Table 4 show the results. In the group with large information asymmetry, the Da coefficient is –0.0027, which is significantly negative. Then in the group with small information asymmetry, the coefficient of Da is not significant. This result indicates that the greater the information asymmetry of enterprises, the greater the effect of supply chain finance on reducing the cost of capital. The effect of supply chain finance on reducing the weighted average cost of capital is significant in enterprises with large information asymmetry.

Table 4. Regression results of impact mechanism.

Variables	Strategic commitment		Information asymmetry	
	(1)	(2)	(3)	(4)
	Scapd=1	*Scapd*=0	*Da*=1	*Da*=0
SCF	-0.0006	-0.0025***	-0.0027***	-0.0006
	(-0.85)	(-4.83)	(-4.76)	(-1.01)
_cons	0.2441***	0.2149***	0.2228***	0.2481***
	(35.50)	(35.92)	(34.29)	(37.27)
Controls	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes
N	11205	15006	13030	13030
adj. R2	0.337	0.372	0.366	0.361
F-value	124.34***	189.01***	99.07***	92.61***
Suest	4.95**		6.03**	

6. Further test

6.1. Supply chain finance, product market competition, and cost of capital

Affected by the market competition environment, each enterprise in the industry will be impacted by the market, which drives enterprises to seek new profit growth points. As a financial solution integrating upstream and downstream, supply chain finance gradually becomes an innovative way for enterprises to tap new growth points in the supply chain. Therefore, this study attempts to explore the difference in the impact of enterprises' development of supply chain finance on the cost of capital under the degree of product market competition and thus the impact on the efficiency of enterprise capital allocation. When an enterprise is faced with a fierce product market competition environment, investors tend to reduce investment out of risk aversion considerations, which restricts the financing of the enterprise, thereby reducing the ability of the enterprise to obtain external financing [82]. Another point of view is that fierce product market competition can reduce the degree of information asymmetry and improve the internal management of enterprises. The management will increase the level of effort owing to the fierce external competition environment. Thus, the information asymmetry and supervision between investors and investors' costs reduce, thereby promoting the rapid realization of external debt or equity financing [83].

We refer to the idea of Nickell [84] to test the heterogeneity relationship between supply chain finance and the cost of capital under the product market competition. The *HHI* index is used to define the company's product market competition degree according to the median grouping. Columns (1) – (2) of Table 5 show the results of grouping regression. In a group with fierce product market, the coefficient of *SCF* is not significant. However, in the group with high degree of competition in the product market, the coefficient of *SCF* is significantly negative. This result indicates that when the degree of competition in the product market is low, the effect of supply chain finance on reducing the cost of capital is enhanced.

6.2. Supply chain finance, company size, and cost of capital

Differences exist in the financing demand and financing cost of enterprises of different scales when financing externally. Thus, the scale affects the efficiency of capital allocation. The impact of the supply chain finance business model itself on enterprises of different sizes is also different. For large companies, on the one hand, the production and operation activities of large companies require a large scale of funds. Moreover, the development of supply chain financial business models connects the industrial chains of upstream and downstream enterprises, which can further reduce information asymmetry [29] and enhance the value of the enterprise. Winning the favor of creditors and investors is highly conducive to the enterprise. Therefore, supply chain finance can easily play the role of reducing the cost of capital in large-scale enterprises. However, small and medium-sized enterprises have multiple problems such as poor credit, weak anti-risk ability, and insufficient bank risk management and control capabilities. The traditional credit evaluation model of commercial banks is mainly based on financial information, such as the company's previous profitability and debt level. In other words, the financial data of SMEs are rarely reliable, resulting in a high degree of information asymmetry [10], Therefore, obtaining the attention of creditors and shareholders in the supply chain financial model is difficult. In small and medium-sized enterprises, the financial resources of financial

institutions cannot match the financial needs of industrial enterprises.

Column (3) – (4) in Table 5 divide the whole sample into small- and large-scale company groups according to the median of the natural logarithm of the company's total assets. In the group of large companies, the coefficient of *SCF* is significantly negative. Then, in the group of small companies, the coefficient of *SCF* is not significant, indicating that supply chain finance is effective in improving the resource allocation efficiency of large companies.

Table 5. Regression results of further analysis.

Variables	(1) product market competition high degree	(2) product market competition low level	(3) large company size	(4) small company size
SCF	-0.0009	-0.0024***	-0.0019***	0.0002
	(-1.63)	(-3.69)	(-3.76)	(0.25)
_cons	0.2427***	0.1978***	0.1722***	0.2035***
	(35.93)	(27.13)	(27.25)	(22.83)
Controls	Yes	Yes	Yes	Yes
Province	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
year	Yes	Yes	Yes	Yes
N	15836	10378	13114	13100
adj. R2	0.359	0.347	0.334	0.371
F-value	140.97***	74.92***	82.30***	106.96***
Suest	2.82*		6.17 **	

7. Robustness test

7.1. Endogeneity test

7.1.1. Instrumental variable method

In order to further alleviate the problem of endogeneity, this study constructs a two-stage regression model of instrumental variables. Specifically, the provincial digital financial inclusion index (*Difi*) and the supply chain financial word frequency level (*MSCF*) standardized by the industry's annual mean are selected as instrumental variables, where *Difi* is the natural logarithm of the digital inclusive financial index of the province where the company is located; *MSCF* is equal to the difference between the word frequency level of supply chain finance and the annual average of the industry divided by the standard deviation. These two indicators can reflect the development of digital economy and supply chain finance in a region. The results of two-stage regression are shown in columns (1) – (2) of Table 6.

In the first stage of regression, column (1) shows that both *Difi* and *MSCF* are significant, indicating that the regional inclusive financial index and the industry level of supply chain finance are highly correlated with the independent variable *SCF*. In addition, Hansen J in the overidentification test shows that there is no problem of over-recognition of instrumental variables. In the second stage of regression, SCF and WACC are used for regression. Column (2) shows that the result is significantly

negative at the level of 1%, indicating that it remains stable after the use of instrumental variable second stage regression to alleviate endogenous problems.

7.1.2. Propensity score match (PSM)

The above test shows that the supply chain finance business model can significantly improve the efficiency of capital allocation and has a significant positive impact, but its return may have endogenous problems. This is because the enterprises that carry out supply chain finance may be fundamentally different from those that do not carry out supply chain finance. Therefore, we set up the dummy variable (*DSCF*) of supply chain finance, and use the method of PSM to control the possible endogenous problems. The regression analysis is carried out after 1:4 matching of the above control variables as matching variables. Column (3) in Table 6 is the regression result of the sample after propensity score matching, The regression results are still robust.

7.1.3. Change model settings

In order to further exclude the influence of omitted variables of industry annual events, this paper further controls the fixed effect of industry and year crossover in the model. Columns (4) of Table 6 shows the results of grouping regression. The regression coefficient of *SCF* is still significantly negative at the 1% level, which can prove the conclusion of this study.

7.2. Robustness test

7.2.1. Replace the weighted average cost of capital (*WACC*) metric

In the previous test, the calculation of *WACC* is weighted by market value. In this part of the test, the face value weight is used for weighting, and the weighted average cost of capital is calculated, that is, *WACC1*, which is substituted into model (9). Columns (5) of Table 6 show the results of grouping regression. After inspection, there is no substantial difference between the regression results and the results of column (2) of table 3.

7.2.2. Replace the supply chain finance (*SCF*) measurement method

We replace supply chain finance metrics. For the processing of word frequency data, this study divides the sum of the frequency of supply chain finance keywords by the total number of words in the annual report and multiplies it by 100, as a substitute index (*SCF1*) for measuring supply chain finance. Column (6) in Table 6 presents the regression results, which show that after replacing the measurement indicators, the negative correlation between supply chain finance and weighted average cost of capital is still at the 1% level. This result further confirms that supply chain finance can significantly improve the efficiency of capital allocation.

7.2.3. Eliminate related industries

We excluded the samples of information transmission, software and information technology

service industry (I) and transportation, warehousing and postal industry (G), The reason is that these two types of industries are mainly supply chain financial service providers, including the upstream and the financing operation among the downstream. The upstream and the financing operation is removed in this part to avoid the impact on the regression results. The conclusion still supports our hypothesis.

Table 6. Robust regression results.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	SCF	WACC	WACC	WACC	WACC1	WACC	WACC
Difi	-0.0212**						
	(-2.05)						
MSCF	0.3224***						
	(102.16)						
SCF		-0.0014***	-0.0013***	-0.0017***	-0.0018***		-0.0013***
		(-3.06)	(-2.88)	(-4.15)	(-4.43)		(-2.91)
SCF1						-0.0115**	
						(-2.48)	
_cons	0.4707***	0.2341***	0.2340***	0.2263	0.2067***	0.2265***	0.2267***
	(6.73)	(48.77)	(36.06)	(.)	(48.61)	(49.83)	(47.20)
Controls	YES	YES	YES	YES	YES	YES	YES
Industry* Year	NO	NO	NO	YES	YES	YES	YES
Province	YES	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES	YES
year	YES	YES	YES	YES	YES	YES	YES
N	22003	24532	13159	26214	26111	26096	23713
adj. R2	0.881	0.201	0.345	0.366	0.291	0.357	0.358
F -value	5218.23***	373.82***	94.27***		146.81***	192.70***	180.38***
Hansen J		0.0557					

8. Conclusions, theoretical contributions, and policy implications

8.1. Conclusions

Academic research focused on the supply chain finance business model of listed companies. However, more of them focused on the theoretical research of the supply chain finance business model, and empirical research on the supply chain finance business model is lacking, with even less on whether the innovation of the supply chain finance business model can improve the efficiency of capital allocation. This study uses the data of China's A–share listed companies after 2008 to explore the relationship between supply chain finance and the cost of capital. The main conclusions are as follows:

First, the supply chain finance business model significantly reduces the company's cost of capital, which can effectively improve the capital allocation efficiency of the enterprise. Second, in terms of the impact mechanism, the strategic commitment reached between companies and the mitigation of the degree of information asymmetry will affect the relationship between supply chain finance and the

cost of capital. That is, in companies with low strategic commitment and companies with a great degree of information asymmetry, the business model of supply chain finance can play a role in reducing the cost of capital of companies. Finally, from the internal and external environment of the company, the low level of product market competition and the large scale of the company will strengthen the negative relationship between the supply chain finance business model and the cost of capital.

8.2. Theoretical Contributions

The theoretical contribution of this study is mainly reflected in three aspects:

First, this study has an innovation in the research intention and has actively explored existing empirical studies about the impact of supply chain finance on the financial behavior of enterprises. Earlier studies were mainly about supply chain finance and firms' cash holdings [13], financing efficiency [43], and financial performance [85]. This study is based on the impact of supply chain finance on firms' cost of capital and its impact mechanism. Text analysis using machine learning is utilized to describe the extent of supply chain finance and empirically test the impact of supply chain finance on the cost of capital. The results show that supply chain finance can significantly reduce the weighted average cost of capital. Therefore, this study is a refinement and addition to the research on the economic consequences of supply chain finance;

Second, the study reveals the internal mechanism of supply chain finance driving the cost of capital of enterprises, which helps to enrich and deepen the research related to supply chain finance and the cost of capital. This study provides a new way of thinking for the research on sustainable supply chain management by examining the black box of the path of supply chain finance business model on the cost of capital from the perspectives of different levels of strategic commitment and alleviation of information asymmetry;

Third, this study considers the heterogeneous effects of external product market competition and internal firm size on the relationship between supply chain finance and cost of capital in different internal and external environments. The findings help to enhance the theoretical boundary of supply chain finance–cost of capital and highlight the external competition mechanism and the internal application value of supply chain finance in the digital context.

8.3. Policy implications

In view of this, this study gets the following enlightenment:

First, the implementation of supply chain finance is conducive to reducing the cost of capital. Therefore, listed companies should pay additional attention to the financing effect of supply chain finance, optimize the capital structure, and actively expand the linkage between upstream and downstream enterprises in the supply chain. Listed companies should also respect the differentiated personalized financial design, form the future development layout of supply chain finance, and improve the innovation and creativity of supply chain finance. This case will help realize the win–win development of multiple stakeholders while meeting the needs of suppliers, customers, and financial institutions and find practical plans with common interests for improving the efficiency of capital allocation of enterprises.

Second, in the context of the formation of credit and contractual cooperation among listed companies, strategic commitment guarantees cooperation among enterprises. Supply chain finance can

pool high-quality resources of all participants in the chain and improve the information value of the whole chain. Therefore, observing the good governance effect of supply chain enterprises would be easy for external investors, which can release supply chain enterprises from financing constraints.

Third, the market mechanism promotes the innovation and writing of the supply chain business model, helps to create a harmonious supply chain financial ecosystem, and improves the limit of "cost depression." Then, the market mechanism will promote supply chain finance to build an ecological network with joint operation, value creation, and information sharing and realize the sustainable development of enterprises.

Notes

1. The cost of capital data is obtained from the Capital University of Economics and Business· Miller Salon Cost of Capital Estimation Database for Chinese Listed Companies in 2022, which was estimated on November 16, 2022 by the Miller Salon team consisting of two teachers, Prof. Wang, Prof. Zou, and dozens of graduate students, combining the reality of the data provided by CSMAR database, Wind database, and RESSET database for Chinese listed companies (Wang, 2018) [65].

2. Specification Guidance on Cost of Capital Estimation for Listed Companies in China 2022 is from the Capital University of Economics and Business· Miller Salon. For a detailed description of the estimated the cost of capital of Chinese public companies [65].

3. The modified RI model is developed from the RI model of Li and Mohanram [67], and the RI model is modified by taking aggregate data instead of per-share data for regression model prediction to obtain the MRI model, which is consistent with the approach of Zou et al. [68].

4. The industry classification results of listed companies for the third quarter of 2021 are taken because the industry classification results of listed companies for the fourth quarter of 2021 are not yet announced by the *China Securities Regulatory Commission* at the time of the deadline. Source: http://www.csrc.gov.cn/csrc/c100103/common_list.shtml.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

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Conflict of interest

The authors declare there is no conflict of interest.

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