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Research on Financing Constraints of Technology-Based SMEs Based on Supply Chain Finance

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ABSTRACT

The high financing thresholds have hindered the growth of technology-based small and medium-sized enterprises (SMEs). However, supply chain finance, as an innovative financing approach in the field of technology-based SME financing, has effectively alleviated their financing pressure and successfully reduced financing costs, opening up new financing channels for the development of technology-based SMEs. This paper conducts an empirical study using cross-sectional data from SME board-listed companies between 2013 and 2022 as samples. The research suggests that implementing this innovative supply chain finance model can effectively address the financing challenges encountered by technology-based SME, providing them with an alternative approach to overcome funding shortages. Through the collaborative efforts of governments banks enterprises, and third-party logistics companies, the unique potential of supply chain finance can be fully harnessed thereby fostering the steady growth of technology-driven SMEs.

Keywords: supply chain finance; technology-based small and medium-sized enterprises (SMEs); financing constraints

INTRODUCTION

The economic development practices in China clearly illustrate that technology-driven small and medium-sized enterprises(SMEs)are crucial to the national economy. They are indispensable in maintaining sustained economic growth, creating extensive employment opportunities, expanding international trade, and enhancing local fiscal revenue. As per the"Classification Standards for Small and Medium-sized Enterprises" currently in effect, by the end of 2022, the total number of SMEs registered with the Administration for Industry and Commerce in China surpassed 52 million, marking a 51%increase from the end of 2018. SMEs account for over 95% of all enterprises in China, contributing more than 60% of GDP, with their import and export scale accounting for 50.9% of the total, exceeding half for the first time annually and contributing 80.8% to China's foreign trade growth. They also contribute over 50% of taxes and provide more than 80% of urban job opportunities. They are playing an increasingly important role in various areas, including promoting national economic growth, easing employment pressure, and optimizing the economic structure. Despite occupying a central position in China's economic development, technology-based SMEs face financing difficulties due to their relatively small size, lack of collateralizable assets, and low credit ratings, leading commercial banks to generally hesitate to provide loans to them. Therefore, financing problems have become an important reason restricting the sustainable and healthy development of technology-based SMEs in China.

THEORETICAL AND LITERATURE REVIEW

As the national macro-environment evolves, financial demands are increasing, prompting commercial banks to undergo corresponding changes in response to intensifying competitive pressures. Against this background, various domestic commercial banks and other financial institutions have turned their attention to the application of supplychain finance in the field of technology-based small and medium-sized enterprises(SMEs) considering it as an important part of their competitive strategies to strengthen their market positions. To this end, commercial banks have conducted in-depth analyses of various aspects of supply chain finance and established a scientific and reasonable financing system. In recent years, the integration of SME financing with

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supply chain finance has also become a focal point of academic attention. Currently, a substantial body of literature has examined the supply chain financing models for technology-based SMEs.

The characteristics of technology-based SMEs, which possess abundant current assets but relatively few fixed assets [1]. Drawing on the development background of supply chain finance, they categorized it into three models accounts receivable financing, confirmed warehouse financing, and financing warehouse financing, and performed a comparative analysis of the similarities and differences among these models. Researchers believe that when selecting a financing model, technology-based SMEs should not only fully consider their actual needs but also choose a suitable financing model according to their position in different supply chain nodes. Jia Zhuopeng provided a detailed analysis of supply chain financing models from the three key links of procurement, production, and sales within the supply chain, and compared the characteristics of supply chain financing models with traditional financing models [2]. He proposed that the diversification of supply chain financing models not only fills the gaps in traditional models but also demonstrates their vigorous vitality and dynamism in the market. The academic community has also paid considerable attention to the positive role of supply chain finance in alleviating financing constraints for SMEs. The advantages of supply chain finance to financing platforms for technology-based SMEs dominated by third-party logistics enterprises, which theoretically enable all participants in the supply chain to achieve a win-win situation [3]. They also believed that under the guidance of an induced financing system, supply chain finance has unique advantages in solving financing difficulties for technology-based SMEs, alleviating information asymmetry between banks and enterprises, and reducing transaction costs. Elaborated in more detail from a game theory perspective that supply chain finance can effectively reduce information asymmetry between banks and enterprises [4]. Starting from the complexity and diversity of risk sources, he classified these complex risks from both systematic and non-systematic perspectives. The research found that the brand maintenance status, solvency, continuous financing ability of core enterprises, and the risk control system of commercial banks are all important sources of risk [5]. In particular, default risks in supply chain financing mainly originate from credit risks among enterprises within the chain. Based on the above literature, it can be observed that most scholars have focused their research on supply chain financing for technology-based SMEs on financing models, financing advantages, and risk sources. However, relatively few scholars have conducted in-depth analyses from the perspective of the effect of supply chain finance in alleviating financing constraints. This paper seeks to empirically examine how supply chain finance influences financing for technology-based SMEs through the lens of investment-cash flow sensitivity, with the goal of assessing the effectiveness of supply chain finance in reducing financing constraints for these firms.

Research Hypotheses and Model Establishment

Research Hypotheses

Almeida, Campell, & Weisbach introduced a new model to measure corporate financing constraints using cash-cash flow sensitivity [6]. They emphasized that the investment opportunity information and potential agency cost issues embedded in cash flows do not weaken the explanatory power of cash flows for corporate cash holding strategies, thus avoiding (or mitigating) potential issues when using cash-cash flow sensitivity to measure corporate financing constraints. Based on this, the cash-cash flow sensitivity model has gradually gained attention in academic circles, and numerous scholars have conducted new explorations and research on this basis. Khurana, Martin, and Pereira used the cash-cash flow model to explore the financing constraints faced by enterprises in various countries with different levels of financial market development, based on annual data from 48,400 corporate reports provided by 12,782 enterprises from 35 countries between 1994 and 2002 [7]. The research results showed that as financial markets mature, corporate financing constraints gradually ease. In regions with lagging financial market development and severe external financing environments for enterprises, corporate cash holdings exhibit high sensitivity to changes in their cash flows. In contrast, in regions with highly developed financial markets, corporate cash is not sensitive to cash flows, and there is no significant correlation between them. Similar conclusions have been drawn by Sufi [9]. Li Jin, Li Shiming, & Yan Zheng, as well as Lian Yujun, Su Zhi, & Ding Zhiguo, also obtained consistent conclusions that cash-cash flow sensitivity can be used to measure corporate financing constraints, using domestic listed companies as samples [10][11]. Therefore, this paper proposes the following two basic hypotheses:

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H1: Technology-based small and medium-sized enterprises (SMEs) exhibit significant cash-cash flow sensitivity, indicating the presence of financing constraints.

H2: With the development of supply chain finance, the cash-cash flow sensitivity of technology-based SMEs decreases, indicating that financing constraints are alleviated to a certain extent.

Model Selection

To empirically test the hypotheses, this paper draws on the cash-cash flow sensitivity model proposed by Almeida et al. and follows the research of Khurana et al. to construct the following two models [6][7]:

Baseline Model:

$$\Delta CHAS_{i,t} = \alpha_0 + \alpha_1 CF_{i,t} + \alpha_2 SCF_t * CF_{i,t} + \alpha_3 SCF_t + \alpha_4 GROWTH_{i,t} + \alpha_5 SIZE_{i,t} + \eta_i + \xi_{i,t} \quad (1)$$

Expanded Model:

$$\Delta CHAS_{i,t} = \alpha_0 + \alpha_1 CF_{i,t} + \alpha_2 SCF_t * CF_{i,t} + \alpha_3 SCF_t + \alpha_4 GROWTH_{i,t} + \alpha_5 SIZE_{i,t} + \alpha_6 EXPEN_{i,t} + \alpha_7 \Delta NWC_{i,t} + \alpha_8 \Delta SD_{i,t} + \eta_i + \xi_{i,t} \quad (2)$$

Where, ΔCHASi,t represents the change in cash and cash equivalents of enterprise i in period t; CFi,t represents the cash flow of enterprise i in period t; SCFi,t represents the development of supply chain finance nationwide; CFi,t*SCFi,t represents the interaction term between the development of supply chain finance nationwide and the cash flow of enterprise i in period t, which is used to investigate the impact of supply chain finance development on financing constraints; represents the individual effect of the enterprise. The definitions of other variables are provided in Table 1 and explained below. Based on the hypotheses above, it can be predicted that >0, <0.

Empirical Research

Sample Selection and Data Sources

The data in this paper include annual financial data of listed companies on the Small and Medium Enterprise Board from 2013 to 2022, as well as data on China's monetary market and policy tools. The data sources are from the Guotai'an Database. To reduce the impact of "noise," this paper excludes ST stocks and financial stocks, and applies a 1% winsorize treatment to continuous variables, ultimately obtaining 2,725 observation values.

Variable Definitions

Table 1: Variable Names, Symbols, and Definitions

Variable	Expected Symbol	Description of the Variable
Dependent Variable		
CHASi,t		Cash and cash equivalents, equal to monetary funds / total assets for the current period.

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ΔCHASi,t		Change in cash and cash equivalents
Explanatory Variable		
CFi,t	+	Cash flow = net cash flow from operating activities for the current period / total assets for the current period.
SCFi,t	+	(Annual short-term borrowings + notes payable) / total assets at the end of the period
CFi,t*SCFi,t	-	Interaction term between cash flow and supply chain finance development indicator
Control Variable		
GROWTHi,t	+	(Main business revenue of the current year - main business revenue of the previous year) / main business revenue of the previous year
SIZEi,t	+	Natural logarithm of total assets at the end of the current year
EXPENi,t	-	Capital expenditure = (Cash paid for the acquisition and construction of fixed assets, intangible assets, and other long-term assets - net cash received from the disposal of fixed assets, intangible assets, and other long-term assets) / total assets for the current period.
NWCi,t		Non-cash working capital = (Current assets - current liabilities - monetary funds) / total assets for the current period.
ΔNWCi,t	-	Change in non-cash working capital
SDi,t		Short-term borrowings = current liabilities for the current period / total assets for the current period.
ΔSDi,t	+	Change in short-term borrowings

Supply Chain Finance. Adopting the product of supply chain finance indicators and cash flow as a measurement standard can significantly reflect the cash-cash flow sensitivity of supply chain finance. In the supply chain finance system, based on the close ties between upstream and downstream enterprises in the supply chain, core enterprises will provide guarantees for technology-based SMEs (small and medium-sized enterprises). If the number of guarantees obtained by an enterprise from related core enterprises exceeds the median, it indicates that the enterprise is more inclined to leverage the credit advantages of core enterprises, thereby maintaining and strengthening transaction interactions with core enterprises, making transaction activities more stable and frequent. Therefore, this indicator can effectively assess the development status of enterprises in the field of supply chain finance.

Financing Constraints. This paper selects cash flow as a benchmark for assessing financing constraints because, compared to other indicators, cash flow generated from operating activities is more continuous and stable. It more accurately reflects the capital flow situation of technology-based SMEs during production and operation, thus serving as a more appropriate measurement tool.

Control Variables. Based on a comprehensive review of the research results of other scholars, this paper screens and optimizes the key variables required for this study, while systematically organizing and improving them.

Descriptive Statistical Analysis

Table 2 reports the descriptive statistics of the main variables.

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Table 2: Descriptive Statistics of Main Variables

Variable	Minimum value	Q25	Q50	Q75	Maximum value	Mean value	Standard deviation	Skewness	Kurtosis
csah	0.002	0.068	0.121	0.197	0.551	0.146	0.110	1.331	4.964
cflow	-0.236	0.006	0.049	0.097	0.291	0.050	0.086	-0.212	4.459
SCF1t	2.161	2.168	2.438	2.685	2.811	2.461	0.234	0.123	1.638
SCF2t	1.229	1.492	1.769	1.957	2.329	1.769	0.346	0.157	2.214
SCF3t	1.549	1.910	2.314	2.603	3.142	2.312	0.507	0.247	2.154
salegr	-4.387	-0.025	0.123	0.249	0.865	0.014	0.619	-4.777	31.570
tagr	-1.175	-0.021	0.073	0.181	0.726	0.063	0.249	-1.577	10.200
tobinq	0.878	1.152	1.534	2.245	10.190	2.020	1.483	3.072	14.610
size	18.320	20.700	21.400	22.130	24.450	21.430	1.143	0.063	3.281
expend	-0.089	0.009	0.031	0.071	0.264	0.048	0.058	1.319	5.424
nwc	-2.465	-0.215	-0.076	0.057	0.0452	-0.118	0.353	-3.578	23.000
sd	0.000	0.111	0.280	0.445	0.786	0.291	0.211	0.317	2.188

Note: The values are rounded to three decimal places.

In the sample, there are significant differences in the holdings of cash and cash equivalents: the lowest level accounts for only 0.2% of the total assets for the same period, while the highest level reaches as high as 55.1%, with the maximum being nearly 270 times the minimum. This reveals a great variability in cash holding ratios among technology-based SMEs, providing flexible operating space for cash management strategies. On the other hand, the average level of cash flow is 5.0%, but the minimum value drops to -23.6%, indicating that about one-fifth of the enterprises face the dilemma of negative cash flow; at the same time, the standard deviation of cash flow is 8.6%, which is 1.7 times the average value. Although this suggests that the fluctuation range of cash flow among technology-based SMEs in China is not extremely large compared to its average value, attention still needs to be paid to the proportion of enterprises with negative cash flow and their potential impacts. Compared with other variables describing the characteristics of technology-based SMEs, the sales growth rate and asset growth rate of enterprises show more significant differences. Specifically, the ratios of the standard deviations to the means of these two indicators (0.619/0.014 for sales growth rate and 0.248/0.063 for asset growth rate) both exceed 30, indicating a relatively high degree of numerical dispersion. In contrast, the relative difference in Tobin's Q, which is also a measure of investment opportunities, is not obvious, with its standard deviation being only about 70% of its mean. It seems more reasonable to use the sales growth rate and asset growth rate as measures of investment opportunities. This sample exhibits similar characteristics to those in the studies by Lian Yujun, Su Zhi, and Ding Zhiguo [11].

Empirical Testing

Regression Analysis

Given the characteristics of panel data, in order to enhance the accuracy of estimation results, a random effects model is selected. Meanwhile, to address potential challenges of non-independence and non-identical distribution of error terms, a robust Huber-White estimation method is employed for adjustment. During the

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model-building process, we gradually introduce the sales growth rate, total asset growth rate, and Tobin's Q value, as well as their interaction terms with cash flow, to estimate both the benchmark model and the extended model, resulting in regressions (1) to (18). The results are summarized in Tables 3 and 4.

Table 3: Regression Results of the Benchmark Model

	（1）	（2）	（3）	（4）	（5）	（6）	（7）	（8）	（9）
	salegr	**tagr**	**tobinq**	**salegr**	**tagr**	**tobinq**	**salegr**	**tagr**	**tobinq**
cflow	0.059***	0.269***	0.252***	0.231***	0.251***	0.233***	0.232***	0.251***	0.233***
	8.525	9.006	6.121	6.909	7.767	4.839	6.929	7.790	4.845
SCF1t*CFi,t	-0.003***	-0.003***	-0.002***						
	-4.668	-4.712	-4.636						
SCF2t*CFi,t				-0.004***	-0.005***	-0.003***			
				-6.258	-6.171	-3.478			
SCF3t*CFi,t							-0.003***	-0.004***	-0.002***
							-6.005	-5.928	-3.426
SCF1t	0.041***	0.042***	0.033***						
	4.548	4.641	4.636						
SCF2t				0.034***	0.033***	0.044***			
				4.452	4.369	3.846			
SCF3t							0.022***	0.021***	0.029***
							4.372	4.299	3.756
size	-0.010***	-0.015***	-0.011***	-0.006***	-0.011***	-0.007***	-0.006***	-0.011***	-0.007***
	-3.858	-6.016	-2.709	-2.476	-3.986	-1.651	-2.460	-3.976	-1.599
salegr	0.002			0.004			0.004		
	0.705			1.284			1.288		
tagr		0.039***			0.035***			0.035***	
		3.118			2.990			2.993	
Tobinq			0.005***			0.007***			0.007***
			1.872			2.535			2.652

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常数项	0.095***	0.203***	0.138***	0.061***	0.156***	0.051***	0.070***	0.165***	0.058***
	2.006	4.172	1.746	1.258	2.884	0.548	1.439	3.052	0.622
样本	1869	1892	1069	1560	1579	870	1560	1579	870
r2_w	0.095	0.112	0.107	0.099	0.110	0.118	0.098	0.110	0.119

Note: The values are rounded to three decimal places; the values in parentheses are the t-values adjusted by Huber-White; r2_w represents the between-group R2; ***, **, and * indicate statistical significance of the test statistic at the 1%, 5%, and 10% levels, respectively.

In Table 3, from regression (1) to regression (9), the cash flow coefficients remain positive and significant at the 1% level, with values stabilizing between 0.23 and 0.26. This indicates that technology-based SMEs exhibit significant cash-cash flow sensitivity, confirming Hypothesis H1. This suggests that technology-based SMEs tend to withdraw and hold cash from the cash flow generated by their operating activities, reflecting to some extent the relatively severe financing constraints faced by these enterprises under current financing conditions in China.

The coefficients of the interaction terms between cash flow and national supply chain finance development indicators, namely the interaction terms between cash flow and national short-term loans (amounts issued) SCF1t, national commercial bills (amounts issued) SCF2t, and national discounts (amounts issued) SCF3t, are all negative and significant at the 1% level, supporting Hypothesis H2. This indicates that with the development of supply chain finance, the financing constraints faced by technology-based SMEs are alleviated. This result aligns with the findings of Khurana, Martin, and Pereira and Li Bin and Jiang Wei that the level of financial development in various regions can mitigate corporate financing constraints [7][12]. The regression results for the extended model in Table 4 are generally consistent with those in Table 3, but the coefficients of the variables have increased, with cash flow coefficients ranging from 0.31 to 0.36 and being significantly positive. The coefficients of the interaction terms between cash flow and supply chain finance development are also significantly negative, supporting both Hypotheses H1 and H2. Unfortunately, in both Table 3 and Table 4, the ratio of the absolute values of the interaction term coefficients to the cash flow coefficients is only around 1%-2%. From an economic analysis perspective, the effectiveness of supply chain finance in alleviating the financing difficulties of SMEs is relatively limited. The study reveals that there may be two reasons for the low coefficients of the interaction terms: on the one hand, using national data on short-term loans, commercial bills, and discounts to assess the development of supply chain finance introduces measurement errors, as these data are mixed with non-supply chain finance components. The current lack of precise data to measure the development of supply chain finance, especially the specific use of supply chain finance financing by enterprises, is a limitation of this study. On the other hand, it is more likely that supply chain finance in China is still in its early stages of development, and many enterprises and banks lack sufficient awareness of its potential to alleviate financing difficulties for SMEs, as well as insufficient investment and attention, which hinders the progress of supply chain finance development to some extent.

Table 4: Regression Results of the Extended Model

	（10）	**（11）**	**（12）**	**（13）**	**（14）**	**（15）**	**（16）**	**（17）**	**（18）**
	salegr	**tagr**	**tobinq**	**salegr**	**tagr**	**tobinq**	**salegr**	**tagr**	**tobinq**
cflow	0.331***	0.344***	0.364***	0.314***	0.338***	0.361***	0.315***	0.339***	0.362***
	11.639	11.819	8.897	10.665	11.556	7.877	10.697	11.595	7.893
SCF1t*CFi,t	-0.004***	-0.005***	-0.003***						

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	-7.093	-6.594	-6.533						
SCF2t*CFi,t				-0.006***	-0.007***	-0.004***			
				-7.665	-7.699	-4.971			
SCF3t*CFi,t							-0.005***	-0.005***	-0.003***
							-7.469	-7.542	-4.845
SCF1t	0.036***	0.036***	0.026***						
	3.894	3.939	2.142						
SCF2t				0.030***	0.028***	0.034***			
				4.356	4.142	3.096			
SCF3t							0.020***	0.018***	0.022***
							4.277	4.060	3.009
size	-0.000	-0.008***	-0.000	-0.005***	-0.003	0.004	0.005***	-0.0002	0.004
	-0.025	-3.094	-0.062	1.892	-0.604	0.913	1.898	-0.598	0.967
expend	-0.416***	-0.468***	-0.431***	-0.427***	-0.470***	-0.439***	-0.427***	-0.470***	-0.441***
	-9.141	-9.815	-6.561	-8.928	-9.625	-6.092	-8.944	-9.640	-6.122
D.nwc	-0.045***	-0.060***	-0.034***	-0.028***	-0.041***	-0.019	-0.028***	-0.041***	-0.018
	-2.782	-3.645	-2.101	-1.968	-2.683	-1.452	-1.972	-2.687	-1.445
D.sd	0.335***	0.029	0.061***	0047***	0.044***	0.058***	0.047***	0.044***	0.058***
	1.753	1.471	2.450	2.403	2.213	2.158	2.397	2.208	2.149
salegr	0.009***			0.011			0.011***		
	2.668			3.273			(3.280)		
tagr		0.071***			0.060***			0.060***	
		5.461			4.600			4.601	
Tobinq			0.004***			0.006***			0.006***
			1.737			2.246			2.323

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常数项	-0.07 8***	0.087***	-0.063	-0.13 9***	-0.005	-0.152	-0.1 31***	0.002	-0.148
	-1.721	1.672	-0.768	-2.811	-0.083	-1.605	-2.662	0.035	-1.557
样本	1719	1731	967	1417	1426	772	1417	1426	772
r2_w	0.181	0.215	0.200	0.200	0.217	0.229	0.200	0.217	0.229

Note: Same as Table 3.

Additionally, the conclusions drawn from this study are highly consistent with the cash flow coefficients estimated by Lian Yujun, Su Zhi, and Ding Zhiguo based on the benchmark model and the extended model, which are 0.56 and 0.43 respectively [11]. This validates the effectiveness of the above conclusions to some extent. In terms of control variables, sales growth rate (SALEGRi,t), total asset growth rate (TAGRi,t), and Tobin's Q ratio (TOBINQi,t) are positive in most cases at a significance level of at least 10%. Meanwhile, capital expenditures and changes in non-cash working capital are typically negative at a significance level of 1%, while changes in short-term borrowings are negative in most cases at a significance level of 10%, but positive in some cases at a significance level of 5%. These results indicate that the cash holdings of technology-based SMEs are positively correlated with investment opportunities and changes in short-term borrowings, while negatively correlated with capital expenditures and changes in non-cash working capital.

Robustness Study

To further verify the robustness of the results, the author conducted a series of robustness tests on the results presented in Tables 3 and 4. Firstly, we re-estimated the benchmark model and the extended model using a fixed effects model. The results showed that, except for the regression model measuring investment opportunities using Tobin's Q ratio, where the interaction term between cash flow and the national supply chain finance development indicator was not significant at the 10% significance level, the other results remained unchanged. Secondly, considering that the sample covers different years and industries, to control for the potential impact of year effects and industry effects, we introduced annual dummy variables (referencing Lian Yujun et al.), industry dummy variables, and simultaneously included both annual and industry dummy variables in the benchmark model and the extended model [11]. Thirdly, following the method of Ning Yanjun, we deflated cash and cash equivalents and cash flow using the previous year's total assets [13]. Finally, we applied 3%, 5%, and 7% winsorize tail treatments to the main continuous variables. Upon examination, the main research conclusions in Tables 3 and 4 did not undergo substantial changes, indicating that the aforementioned empirical results are robust.

RESEARCH CONCLUSIONS AND POLICY RECOMMENDATIONS

This paper, from the perspective of cash-cash flow sensitivity, investigates the role of supply chain finance development in addressing financing constraints faced by technology-based small and medium-sized enterprises (SMEs) using cross-sectional data from SME board listed companies from 2013 to 2022 as a sample. Through the establishment of a benchmark model and an extended model, empirical analysis reveals that supply chain finance has a significant effect on the financing constraints of technology-based SMEs. Therefore, this paper proposes policy recommendations to promote the development of supply chain finance and drive the healthy development of technology-based SMEs:

1. To ensure the sustained and healthy development of supply chain finance, the government should strive to build a solid policy platform and effectively play a leading role in the supply chain financing of technology-based SMEs. This includes conducting rigorous qualification reviews and confirmations of all participating parties, clearly defining the rights, responsibilities, and obligations of credit subjects. At the same time, the government needs to continuously improve relevant laws, regulations, and rules and regulations systems to fully protect the legitimate rights and interests of all participants in supply chain finance, thereby fully leveraging the positive role of supply chain finance in promoting the financing of technology-based SMEs.

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2. Commercial banks play a pivotal role in the supply chain finance system. To optimize the development of supply chain financial products, it is necessary to proceed from the perspective of strategic transformation and long-term planning for fund utilization and deeply recognize the core value of supply chain finance in promoting the growth of technology-based SMEs. Supply chain finance is not only an innovation in the financing model of SMEs but also a key path to enhancing their competitiveness and profitability. Therefore, to adapt to the new requirements of supply chain finance development, financial institutions need to comprehensively reshape their business process systems.

3. Third-party logistics enterprises serve as a bridge between technology-based SMEs and financial institutions, and their smooth operation is crucial for ensuring the efficient circulation of capital flows, logistics, and information flows across various links, thereby maintaining the stable operation of the entire supply chain model. To this end, third-party logistics enterprises need to continuously improve their informatization level and resource integration capabilities, strengthen the warehousing management and supervision of pledged goods. By providing value-added services such as asset assessment and movable property auctions, they can not only effectively address the comprehensive logistics needs of technology-based SMEs but also further expand into the field of financing services and deepen cooperation with SMEs.

4. While supply chain finance provides strong support for the financing of technology-based SMEs, these enterprises also need to strengthen their cooperation with core enterprises in the supply chain to enhance their creditworthiness. Additionally, by broadening the scope of cooperation with core enterprises and attracting them to make resource investments, the mutually beneficial and win-win relationship between the two parties can be further deepened.

REFERENCES

1. Yan, J. H., & Xu, Q. X. (2007). Analysis of financing models for small and medium-sized enterprises based on supply chain finance. Shanghai Finance, (02), 14-16.
2. Jia, Z. P. (2010). Supply chain financing: An effective breakthrough for collateral constraints and credit rationing of small and medium-sized enterprises. Research on Financial Development, (09), 28-32.
3. Ma, J., Wan, J. Q., & Shen, X. Y. (2013). Innovation in financing for small and medium-sized enterprises relying on supply chain finance. Commercial Research, (04), 131-137.
4. Chen, P., Zheng, Y., & Kong, L. L. (2015). Analysis of the impact of supply chain finance on the financing of small and medium-sized enterprises: From the perspective of game theory. China Business Review, (10), 75-77.
5. Tang, M. Q., & Zhu, H. F. (2015). Supply chain financing models and risks from the perspective of supply chain systems: A case study of Standard Chartered Bank's supply chain financing. Credit Reference, (02), 67-72.
6. Almeida, H., Campello, M., & Weisbach, M. S. (2004). The cash flow sensitivity of cash. The Journal of Finance, 59(4), 1777-1804.
7. Khurana, I. K., Martin, X., & Pereira, R. (2006). Financial development and the cash flow sensitivity of cash. Journal of Financial and Quantitative Analysis, 41(4), 787-808.
8. Hadlock, C. J., & Pierce, J. R. (2010). New evidence on measuring financial constraints: Moving beyond the KZ index. The Review of Financial Studies, 23(5), 1909-1940.
9. Sufi, A. (2009). Bank lines of credit in corporate finance: An empirical analysis. The Review of Financial Studies, 22(3), 1057-1088.
10. Li, J., Li, S. M., & Yan, Z. (2007). Financial constraints and cash-cash flow sensitivity: Empirical evidence from domestic A-share listed companies. Management Review, (03), 53-57+64.
11. Lian, Y. J., Su, Z., & Ding, Z. G. (2008). Can cash-cash flow sensitivity test the financing constraint hypothesis?. Statistical Research, (10), 92-99.
12. Li, B., & Jiang, W. (2006). Financial development, financing constraints, and firm growth. Nankai Economic Studies, (03), 68-78.
13. Ning, Y. J. (2011). Financial development and corporate financing constraints (Master's thesis, Jinan University). Master's degree.