Supply Chain Finance and Enterprise Labor Employment

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Abstract: As an important support for enterprise capital operation and business expansion, the relationship between supply chain finance and enterprise labor employment has attracted much attention from academia and industry. Based on this, this paper, based on the relevant data of Shanghai and Shenzhen A-share listed companies from 2005 to 2023, deeply explores the impact of supply chain finance on enterprise labor employment and its mechanism of action. The results show that supply chain finance can significantly expand the scale of enterprise labor employment. This conclusion still holds after robustness tests such as changing explanatory variables, adding control variables, and excluding some samples. The mechanism test found that easing financing constraints and expanding production scale are the paths for supply chain finance to increase enterprise labor employment. Further heterogeneity analysis shows that the employment effect of supply chain finance is greater in private enterprises, enterprises with a high degree of digital transformation, and enterprises with a low degree of industry competition. The above conclusions not only enrich the theoretical connotation of the logical relationship between supply chain finance and enterprise labor employment, but also provide key empirical basis and decision-making reference for promoting the development of related fields and formulating targeted policies.

Keywords: Supply Chain Finance; Financing Constraints; Labor Employment

1. Introduction

As the greatest livelihood welfare, employment is the key cornerstone for consolidating the fundamental interests of the people, maintaining social harmony and stability, and promoting sustained economic growth. At present, my country's employment faces multiple pressures: in terms of total employment, the number of college graduates in 2025 will reach 12.22 million. Together with the unemployed group in previous years, the labor supply far exceeds the new jobs, and the competition is fierce. In terms of industrial structure, industrial upgrading and the development of emerging industries have caused the coexistence of "difficulty in recruiting workers" and "difficulty in finding employment". In the economic environment, the global economic slowdown, geopolitical conflicts and domestic real estate adjustments have reduced the demand for corporate recruitment. The weak recovery of consumption has also suppressed the ability of the service industry to absorb employment, seriously restricting employment growth. As the main body of employment creation, the scale of labor employment of enterprises is not only the key to stabilizing employment, but also affected by operational volatility (Yu Minggui et al., 2022)[1]. Faced with the complex employment situation, on July 30, 2024, the Political Bureau of the CPC Central Committee emphasized that "we must increase efforts to protect and improve people's livelihood and strengthen employment priority policies." Therefore, it has become an important and practical issue to be solved at present to explore the driving factors of expanding the scale of enterprise labor employment and help enterprises effectively alleviate operating risks, so as to achieve stable development of the employment market[2].

Supply chain finance is an effective financial tool to dredge the capital chain and activate the vitality of market entities. It has positive significance for expanding the labor absorption capacity of enterprises and promoting the upgrading of employment quality. As a cutting-edge financial paradigm that deeply integrates the capital flow and information flow of the supply chain, supply chain finance relies on financial technology empowerment to build a new financial service ecology with the credit of core enterprises as the anchor and the real transaction data on the chain as the cornerstone

(Zhao Chunming et al., 2023)[5]. Although academia has conducted a lot of research on supply chain finance and enterprise labor employment, the interactive relationship between the two still lacks a systematic explanation. Existing research has not yet clearly answered: How does supply chain finance affect the labor employment decision of enterprises? What are the differences in this impact among enterprises with different property rights, degree of digitization and industry competition intensity? What is its internal transmission mechanism? In-depth discussion of these issues will not only help to improve the theory of factor allocation, but also open up the connection path between supply chain finance and employment stability from a micro level, and provide theoretical basis and practical guidance for accurately guiding financial resources to support the real economy and optimize the employment structure.

To answer these questions, this paper conducts an empirical analysis of supply chain finance and corporate labor employment based on the data of Shanghai and Shenzhen A-share listed companies from 2005 to 2023. The study found that supply chain finance has a significant positive impact on the scale of corporate labor employment. After rigorous tests such as replacing core explanatory variables, adding control variables, and eliminating interference samples, the conclusion is still reliable. Heterogeneity analysis shows that the impact is different under different corporate characteristics and industry characteristics. Due to the difficulty of traditional financing for private enterprises, supply chain finance alleviates their financing constraints and plays a more prominent role in expanding the scale of employment; enterprises with a high degree of digital transformation use digital technology to integrate resources and strengthen cooperation, making the promotion of supply chain finance more significant. In enterprises with low industry competition, supply chain finance can provide additional support for enterprises, and the effect of expanding the scale of employment is obvious, while enterprises in highly competitive industries have actively responded to competition, and supply chain finance has a small marginal impact on the expansion of their employment scale.

Compared with existing research, the marginal contribution of this paper is mainly in the following three aspects: First, it expands the research perspective of the economic consequences of supply chain finance. Previous research on the economic consequences of supply chain finance has focused on corporate finance and organizational performance (Yang Yalin and Wu Qiang, 2025; Wu Yongmin and Li Qinlin, 2025)[25,26], ignoring its impact on employment. This paper explores the relevant economic consequences from the perspective of the scale of corporate labor employment, expands the research boundaries to the field of social employment, and improves the understanding of the economic impact of supply chain finance. At the same time, this paper integrates labor economics and finance, and explores its relationship with corporate labor employment from the perspective of supply chain finance, providing new ideas for the interdisciplinary research of "labor and finance" and promoting the development of this interdisciplinary subject. Second, it enriches the theoretical research on the influencing factors of corporate labor employment at the micro level. From the perspective of supply chain finance, the study found that it is a new factor affecting the scale of labor employment in enterprises, and found that it can promote enterprises to expand their employment scale by easing financing constraints, enriching relevant theoretical research and improving the micro-theoretical framework; at the same time, it also refined the analysis of the impact mechanism, deeply analyzed the heterogeneous impact under different enterprise characteristics and industry characteristics, and clarified that its role in promoting labor employment is more prominent in private enterprises, enterprises with high degree of digital transformation and low degree of industry competition, providing a more detailed and comprehensive theoretical basis for understanding the labor employment decision-making of micro-enterprises. Third, it provides more targeted suggestions for enterprise management practice. In terms of strategic planning, it guides enterprises to integrate supply chain finance into the business system, play a leading role in the industrial chain, build a service platform, carry out customized services, explore emerging fields, achieve coordinated development of financing and labor employment, and point out the direction for the long-term strategic planning of enterprises; in terms of internal management, it is recommended that enterprises incorporate credit

construction into long-term planning, improve financial auditing, risk assessment and information disclosure mechanisms to obtain financing convenience, and formulate talent training and introduction plans around the needs of supply chain financial business, improve employee capabilities, attract high-end talents, provide intellectual support for expanding the scale of labor employment, and thus optimize the internal management of enterprises.

2. Literature Review and Research Hypothesis

2.1 Literature Review

The literature related to this study mainly includes two categories. One category is the study of the economic consequences of supply chain finance. Supply chain finance plays a significant role in promoting corporate investment and financing, innovation and production by deeply integrating financial characteristics and organizational effectiveness. At the level of financial characteristics, it has strategic value for both small and medium-sized enterprises and core enterprises. Studies have shown that supply chain finance can significantly improve the investment efficiency of small and medium-sized enterprises, and financing constraints play an intermediary role in it. The three financing models of prepaid accounts, accounts receivable and inventory pledge (Hu Yuefei et al., 2009)[7] effectively solve the problem of "difficult and expensive financing" for small and medium-sized enterprises, and improve financing performance by filling the credit gap and reducing information asymmetry. For core enterprises, supply chain finance can not only improve information communication with financial institutions and reduce financing costs, but also optimize capital turnover and alleviate liquidity pressure through account financing (Ling Runze et al., 2023)[11]; at the same time, it provides support for the digital transformation of enterprises (Zhang Lina et al., 2021)[10] and the improvement of the innovation capabilities of core enterprises (Ling Runze et al., 2021)[9] by unblocking financing bottlenecks. At the organizational effectiveness level, supply chain finance achieves efficient resource integration by building a "production-sales" network (Cheng Cheng et al., 2023)[12], and optimizes the overall performance of the supply chain with the help of signal transmission effects (Song Hua and Lu Qiang, 2017)[13]. As corporate competition shifts to the supply chain level (Song Hua et al., 2024)[14], it promotes information sharing, reduces costs, stabilizes expectations, and enhances the overall value of the supply chain by strengthening the collaboration of companies on the chain. Studies have confirmed that companies' participation in supply chain finance can significantly improve total factor productivity, and have a positive impact on corporate performance (Liu et al., 2021)[21], organizational performance (Bi et al., 2022), and profits of upstream and downstream of the industrial chain (Jena et al., 2023).

The second type of literature related to this article is the study of factors affecting corporate labor employment. As the core entity for solving employment problems, enterprises' motivations for hiring labor mainly include financial burden, technology application and institutional factors. Financially, the "short-term loan and long-term investment" model (Han Xun et al., 2025)[15] can alleviate short-term capital pressure, but it inhibits employment expansion due to increased operating risks. Financing constraints and cash flow fluctuations also directly restrict the scale of corporate employment (Zhang Sanfeng et al., 2016; Caggese et al., 2019)[16,30]. When funds are tight, companies tend to hire short-term employees and are prone to layoffs under external shocks (Alnahedh et al., 2019)[31]. Technically, artificial intelligence has helped to create new business models, reduce costs and increase efficiency (Acemoglu and Restrepo, 2018), the digital transformation of enterprises optimizes production with the help of technological innovation and data elements, both of which can effectively expand labor demand; in terms of system, policies such as tax cuts and fee reductions can directly stabilize employment and improve efficiency (Wang Beibei et al., 2022)[17], while tightening financing supervision will aggravate the financial pressure of enterprises and thus inhibit employment (Ye Yongwei et al., 2023)[18], and the protection of small and medium-sized enterprise rights and interests policies and the reduction of social security contribution rates will directly or indirectly promote enterprises to expand their employment scale by ensuring enterprise development and reducing burdens (Liu Guanchun et al., 2021)[21].

Based on the above analysis, the discussion on

the economic consequences of supply chain finance is mostly concentrated in the fields of enterprise investment and financing, innovation and production, and its role in enhancing the value of enterprises and supply chains is demonstrated from the dual dimensions of financial characteristics and organizational effectiveness, but it rarely involves the level of enterprise labor employment decision-making. Although the research on the factors affecting enterprise labor employment has systematically sorted out the mechanisms of finance, technology, and system, it has not yet included supply chain finance in the analysis framework. Given that supply chain finance is deeply related to corporate capital allocation and production organization, this paper focuses on examining the impact and mechanism of supply chain finance on corporate labor employment, and attempts to supplement existing research.

2.2 Theoretical Analysis and Research Hypothesis

In theory, the improvement of the level of supply chain finance can effectively alleviate corporate financing constraints by broadening financing channels and obtaining credit funds. At the same time, supply chain finance can also promote enterprises to expand investment and production scale by reducing corporate costs and improving market competitiveness, thereby promoting the expansion of corporate employment scale. Based on this, this paper will deeply analyze the impact mechanism of supply chain finance on corporate employment decisions from two dimensions: the effect of easing financing constraints and the effect of expanding production scale[6].

2.2.1 Effect of easing financing constraints

Supply chain finance helps enterprises break through capital bottlenecks by building a flexible financing model and provides solid financial guarantees for expanding the scale of labor employment. Specifically, the cost structure of enterprise employment of labor as a quasi-fixed production factor presents a complex feature. In terms of variable costs, wages and social security are directly linked to the scale of employment, while investment in recruitment advertising, site rental, and new employee induction training constitutes fixed costs that are difficult to adjust immediately with the number of employees in the short term. At the same time, the complex time chain and capital flow characteristics of the enterprise operation process further amplify this employment decision risk. In the enterprise operation cycle, the time misalignment of production, sales, and collection leads to a natural lag between labor cost input and capital recovery. In addition, the inability of labor to obtain financing as collateral further increases the reliance of employment activities on continuous cash flow. In addition, employment costs also cover hidden expenses such as employee personalized development plans and professional qualification certification. Although sufficient internal funds are the basis for maintaining employment activities, most companies still need to rely on external financing to make up for the funding gap. Existing studies have also confirmed this view. Liu Guanchun et al. (2021)[21] believe that liquidity constraints will significantly inhibit the scale of employment of enterprises. Ye Yongwei et al. (2023) found that the restriction of loan renewals has aggravated the liquidity pressure of enterprises and forced them to reduce the scale of employment.

Supply chain finance mainly alleviates corporate financing constraints through two paths, thereby expanding the scale of labor employment: first, enterprises use financial instruments such as accounts receivable financing and inventory pledge to effectively solve the term mismatch problem between sales proceeds and capital expenditures, accelerate capital recovery, and enrich internal disposable funds; second, relying on the integration advantages of the supply chain financial ecosystem in logistics, business flow, information flow and capital flow (Hu Yuefei et al., 2009)[7], reduce the degree of information asymmetry between banks and enterprises, optimize the financing environment, enhance the external financing capabilities of enterprises, and provide solid financial guarantees for expanding the scale of employment.

2.2.2 Production scale expansion effect

Relying on the resource integration and financing support of supply chain finance, enterprises can achieve full-chain growth in labor employment by expanding production scale. Based on the cost-profit theory (Ge Yangqin et al., 2019)[23], when corporate costs are reduced, they will actively expand production scale in pursuit of profit maximization, which will directly drive the expansion of employment scale. The expansion of production scale has led to multi-dimensional growth in labor demand. On the production front

line, the newly put into production production line urgently needs to supplement the positions of operators, quality inspectors, etc.; in the indirect production link, with the increase of management complexity and the increase of technology optimization demand, enterprises need to increase the staffing of production management, equipment maintenance, technology research and development, etc.; non-production departments also need to expand the sales, logistics, warehousing and other departments due to the increase in production capacity, in order to ensure product circulation and market coverage, including sales personnel, transportation drivers, warehouse management personnel, etc., thus forming a full-chain labor employment growth effect. In addition, capital and labor are complementary. In the process of increasing capital investment such as purchasing new equipment and building production bases, enterprises must simultaneously recruit more production workers, technicians and managers to ensure the smooth operation of new investment projects and ultimately achieve a significant expansion of the scale of enterprise labor employment[8].

Based on the above analysis, this paper proposes the following research hypothesis to be tested:

Hypothesis 1: Supply chain finance can expand the scale of enterprise labor employment.

Hypothesis 2: Supply chain finance can achieve the improvement of enterprise labor employment through the effect of easing financing constraints and the effect of expanding production scale.

3. Research Design

3.1 Sample Selection and Data Source

Shanghai and Shenzhen A-share listed companies from 2005 to 2023 were selected as samples. Supply chain finance data were counted by text analysis for word frequency statistics of news announcements and annual reports of listed companies. Other data were mainly from the CSMAR database. At the same time, the following samples were excluded: one is financial companies, two are ST and *ST companies during the sample period, three are samples with serious missing values, and four are companies that withdrew after carrying out supply chain finance. In addition, all continuous variables were shrinked at the upper and lower 1% quantiles, and finally 42,203 sample data were obtained.

3.2 Selection of Research Variables

1. Explained variable: enterprise labor employment (Lnlab): measured using the logarithm of the total number of employees in the enterprise that year.

2. Explanatory variable: supply chain finance (LnSCF): Drawing on the methods of Zhou Lan and Wu Huijun (2022) and Zhang Lina et al. (2021), using a combination of Python crawler technology and text analysis, based on the supply chain finance keyword thesaurus, text recognition and statistics were performed to characterize the intensity of supply chain finance. The frequency of key words in supply chain finance is summed up and then added to 1 to take the logarithm as a proxy indicator of the development level of supply chain finance.

3. Control variables

This paper refers to existing literature and selects factors that may affect the scale of enterprise labor employment as control variables to reduce the impact of sample selection bias on regression results (Yu Xiaoyue et al., 2023; Tao Feng et al., 2023)[2,3]. Enterprise size (Size) is measured by the natural logarithm of total assets; enterprise age (Age) is measured by the logarithm of the current year minus the year of listing plus 1; profitability (Roa) is measured by the ratio of net profit to total assets; debt repayment ability (Lev) is measured by the ratio of total debt to total assets; growth potential (Growth) is measured by the operating income growth rate; Tobin's Q value (Tobinq) is measured by the ratio of the sum of the stock market value and the book value of debt to the book value of total assets; equity concentration (Top1) is expressed by the shareholding ratio of the largest shareholder; dual-position (Dual) refers to the situation where the chairman and general manager are concurrently appointed. When the chairman and general manager are not the same person, the value is assigned to 0, otherwise it is 1; employee salary level (Wage) is measured by the logarithm of the ratio of employee salary payable to the total number of employees; operating cash flow (Cfo) is expressed by the ratio of net cash flow generated by operating activities to total assets.

3.3 Model Construction

Benchmark regression model

In order to test the effect of supply chain finance on enterprise labor employment, this paper

constructs a model:

$$Lnlab_{i,t}=\alpha_0+\alpha_1 LnSCF_{i,t}+\alpha_2 Controls_{i,t}+Year+Firm+\varepsilon_{i,t} \quad (1)$$

Among them, Lnlabi, trepresents the scale of labor employment of company i in the tth year; LnSCFi,t represents the development of supply chain finance in the tth year of company i; Controlsi,t is a variety of control variables that may affect the scale of labor employment of enterprises; Year and Firm represent the fixed effects of the research period and the fixed effects of the research enterprise respectively, and εi,t represents the random error term. This paper mainly observes the regression coefficient α1, which measures the causal effect between supply chain finance and enterprise labor employment. Based on the theoretical analysis in the previous article, we have the following expectations: α1 is significantly positive, and supply chain finance can expand the scale of enterprise labor employment.

Mechanism test model

According to the theoretical analysis in the previous article, supply chain finance will affect the labor employment of enterprises through two mechanisms: the effect of easing financing constraints and the effect of expanding production scale. This paper constructs the following model to test the mechanism:

$$M_{i,t}=\alpha_0+\alpha_1 LnSCF+\alpha_2 Controls_{i,t}+Year+Firm+\varepsilon_{i,t} \quad (2)$$

Among them, Mi,t represents the mechanism variable. This paper uses the KZ index to measure financing constraints. The larger the value of this index, the greater the financing constraints faced by the enterprise. At the same time, drawing on the practice of Wang Feng and Ge Xing (2022), the logarithm of operating income is used to measure the production scale to verify the effect of production scale expansion. The remaining variables are the same as the benchmark regression model.

4. Empirical Results and Analysis

4.1 Descriptive Statistics

According to the descriptive statistics presented in Table 1, the labor employment scale of listed companies (Lnlab) shows significant discrete characteristics, with a maximum value of 10.995 and a minimum value of 4.554. The standard deviation of 1.253 further confirms that there are large differences in employment scale among enterprises. The supply chain finance development level index (LnSCF) has a mean of 0.318 and a standard deviation of 0.608, indicating that the overall development of supply chain finance of sample listed companies is limited, and there is a significant development gap between different enterprises. The statistical characteristics of the remaining control variables are basically consistent with the existing research conclusions. The indicators show obvious heterogeneity among enterprises. Incorporating them into the regression model will help improve the robustness and explanatory power of the empirical analysis.

Table 1. Descriptive Statistical Results

Variable	Observed Value	Mean	Standard Deviation	Minimum	P25	P50	P75	Maximum
Lnlab	42203	7.601	1.253	4.554	6.746	7.533	8.388	10.995
LnSCF	42203	0.318	0.608	0.000	0.000	0.000	0.693	2.773
Size	42203	22.098	1.278	19.779	21.181	21.905	22.812	26.120
Age	42203	2.818	0.561	1.386	2.398	2.890	3.332	3.526
Roa	42203	0.038	0.059	-0.217	0.014	0.038	0.068	0.196
Lev	42203	0.427	0.206	0.054	0.261	0.422	0.582	0.894
Growth	42203	0.323	0.956	-0.693	-0.047	0.107	0.351	6.858
Tobinq	42203	1.938	1.185	0.857	1.218	1.552	2.187	7.892
Cfo	42203	0.049	0.070	-0.162	0.009	0.048	0.090	0.248
Dual	42203	0.284	0.451	0.000	0.000	0.000	1.000	1.000
Top1	42203	24.778	14.905	8.820	23.140	32.630	44.930	74.660
Wage	42203	9.502	1.107	5.677	8.924	9.621	10.211	11.958

4.2 Analysis of Benchmark Regression Results

To enhance the reliability of the test, this paper uses the method of gradually adding control variables and fixed effects to test the correlation between supply chain finance and the scale of enterprise labor employment. The regression results are shown in Table 2.

Table 2. Benchmark Regression Results

	(1)	(2)	(3)
	Lnlab	Lnlab	Lnlab
LnSCF	0.2852***	0.0734***	0.0711***

	(27.019)	(10.921)	(11.571)
Size		0.7167***	0.7596***
		(175.746)	(192.278)
Age		0.0243***	0.0183**
		(2.910)	(2.039)
Roa		0.7366***	0.5358***
		(9.100)	(7.339)
Lev		0.2582***	0.4607***
		(10.111)	(20.159)
Growth		-0.1778***	-0.0919***
		(-32.099)	(-23.788)
Tobinq		0.0055*	-0.0072**
		(1.672)	(-2.087)
Cfo		2.1626***	1.9596***
		(30.718)	(35.160)
Dual		-0.0120	-0.0295***
		(-1.416)	(-3.660)
Top1		0.0021***	0.0028***
		(7.391)	(11.336)
Wage		-0.2983***	-0.2416***
		(-62.032)	(-67.423)
_cons	7.5099***	-5.7605***	-6.8158***
	(1104.300)	(-68.763)	(-81.300)
Year	No	No	Yes
Firm	No	No	Yes
N	42203	42203	42203
r2_a	0.0191	0.6137	0.6818

Note: ***, ** and * indicate significance at the 1%, 5% and 10% levels respectively. The values in brackets are t values, the same below.

It can be found that in the results of column (1) without any control variables, the estimated coefficient of LnSCF is positive and passes the significance test at the 1% level, which preliminarily shows that supply chain finance can increase the scale of enterprise labor employment. Considering that the heterogeneous characteristics of enterprises may interfere with the research conclusions, columns (2)-(3) successively include control variables and fixed effects. It is not difficult to find that the estimated coefficient of LnSCF is still significantly positive, indicating that supply chain finance still has a positive effect on enterprise labor employment. From the perspective of economic effects, the full model regression results of column (3) show that the estimated coefficient of LnSCF is 0.0711. Based on the calculation of the standard deviation of the variables, when the level of supply chain finance increases by one standard deviation (0.608), the scale of enterprise labor employment will increase significantly by 3.45% (0.0711×0.608/1.253). This result is not only highly statistically significant, but also shows a strong practical explanatory power. The above findings are completely consistent with the hypothesis 1 of this article that "the development of supply chain finance can promote enterprises to expand the scale of labor employment", which strongly supports theoretical expectations.

4.3 Robustness Test

Replacing explanatory variables

To ensure the robustness of the research conclusions, the test is conducted from the perspective of replacing the core explanatory variables. This paper uses the proportion of the sum of short-term loans, notes payable, and accounts payable to total assets as the alternative core explanatory variables to characterize the strength of corporate supply chain finance. The regression results are shown in column (1) of Table 3. After replacing the explanatory variables, the hypothesis of this paper is still verified[11].

Adding control variables

In the context of supply chain finance, as a rational subject of labor employment decision-making, enterprises need to plan employment strategies based on future cost and benefit expectations. Production capacity and R&D innovation will have an impact on the company's employment cost estimation and profit calculation, and their dynamic fluctuations will bring challenges to the company's labor employment. Based on this, this paper includes fixed asset ratio and R&D expense ratio as control variables to consider the company's asset structure and innovation input characteristics, and conducts a robustness test on the impact of supply chain finance on corporate labor employment. The results are shown in column (2) of Table 3, and the results still show a significant correlation[12].

Eliminate some samples

Considering the impact of the 2015 Chinese stock market crash on the entire financial market, the sample observations in 2015 were excluded for regression analysis; at the same time, in view of the impact of the 2020 COVID-19 pandemic on China's economic development, the sample data in 2020 were deleted and re-estimated. The results of the sample regression are shown in column (3) of Table 3, and the research conclusions are consistent with the previous article[13].

Table 3. Robustness Test: Changing the Variable Measurement Method

	(1)	(2)	(3)
	Changing explanatory variables	Adding control variables	Eliminate some samples
	Lnlab	Lnlab	Lnlab
SCF	0.7470***		
	(15.517)		
LnSCF		0.0625***	0.0737***
		(9.002)	(11.102)
Size	0.7873***	0.7492***	0.7584***
	(169.162)	(146.580)	(172.936)
Age	0.0565***	0.0491***	0.0206**
	(5.217)	(4.779)	(2.104)
Roa	0.3324***	0.7474***	0.5728***
	(3.661)	(7.818)	(6.826)
Lev	-0.1242***	0.6454***	0.4616***
	(-2.980)	(20.487)	(17.742)
Growth	-0.0828***	-0.0566***	-0.0920***
	(-14.725)	(-7.180)	(-17.362)
Tobinq	0.0087**	-0.0065	-0.0080**
	(2.013)	(-1.633)	(-2.117)
Cfo	2.0456***	1.6258***	1.9014***
	(28.200)	(18.645)	(27.610)
Dual	-0.0141	-0.0011	-0.0276***
	(-1.566)	(-0.119)	(-3.289)
Top1	0.0021***	0.0035***	0.0026***
	(7.207)	(10.491)	(9.385)
Wage	-0.2177***	-0.2384***	-0.2451***
	(-42.257)	(-31.572)	(-49.238)
Rfa		0.4208***	
		(10.031)	
Rd		-0.0001***	
		(-4.573)	
_cons	-7.6485***	-7.5202***	-6.7608***
	(-76.556)	(-25.198)	(-71.387)
Year	Yes	Yes	Yes
Firm	Yes	Yes	Yes
N	32072	19481	36996
r2_a	0.6935	0.7475	0.6791

4.4 Mechanism Test

Previous studies have confirmed that supply chain finance has a significant promoting effect on enterprise labor employment. However, its mechanism of action needs to be further explored. Based on theoretical deduction, easing financing constraints and expanding production scale are potential paths for supply chain finance to expand enterprise labor employment[14]. This section will conduct empirical tests on the above-mentioned impact mechanisms.

First, we test the impact of supply chain finance on easing financing constraints. In the era of deep integration of digital economy and industry, supply chain finance mainly alleviates corporate financing constraints through three major paths: first, relying on digital platforms to integrate industrial chain information, reduce the degree of information asymmetry between banks and enterprises, and enhance the willingness of financial institutions to grant credit; second, using the credit of core enterprises as a link, credit resources are transmitted to the upstream and downstream of the industrial chain to solve the financing difficulties of small and medium-sized enterprises with insufficient collateral; third, through models such as

accounts receivable pledge and inventory financing, the current assets of enterprises are activated to alleviate liquidity pressure. To verify this mechanism, this paper uses the KZ index to measure the level of corporate financing constraints (the larger the index value, the higher the degree of financing constraints). The results of the mechanism analysis are shown in Table 4 (1).

Table 4. Mechanism Test

	(1)	(2)
	KZ	Lnincome
LnSCF	-0.0373***	0.1014***
	(-3.626)	(19.110)
Size	-0.0874***	0.9665***
	(-13.011)	(262.210)
Age	0.8431***	0.0563***
	(48.910)	(6.819)
Roa	-7.4300***	3.0125***
	(-51.477)	(36.727)
Lev	6.9045***	1.0076***
	(155.590)	(44.700)
Growth	-0.0395***	-0.0784***
	(-5.230)	(-19.366)
Tobinq	0.5736***	-0.0380***
	(77.275)	(-12.049)
Cfo	-14.0090***	1.2889***
	(-134.598)	(24.246)
Dual	-0.0794***	-0.0345***
	(-5.136)	(-5.538)
Top1	-0.0028***	0.0043***
	(-6.407)	(21.596)
Wage	-0.0871***	-0.0187***
	(-13.611)	(-5.838)
_cons	2.4013***	-0.6393***
	(16.538)	(-8.713)
Year	Yes	Yes
Firm	Yes	Yes
N	41382	42203
r2_a	0.7808	0.8548

The regression coefficient of the supply chain finance level (LnSCF) is significantly negative, indicating that the development of supply chain finance can significantly ease the financing constraints of enterprises, thereby promoting the expansion of labor employment[15].

Secondly, we test the impact of supply chain finance on the expansion of production scale. In the process of accelerating the transformation and upgrading of industrial structure, the role of supply chain finance in promoting the expansion of enterprise production scale is becoming increasingly prominent. On the one hand, it optimizes the supply chain coordination mechanism, deepens strategic cooperation with suppliers, and significantly improves the overall operation efficiency of the supply chain[16]; on the other hand, by enhancing the credit ability of enterprises, expanding diversified financing channels, and attracting strategic investment, it provides solid financial and resource guarantees for enterprises to expand their production scale. This paper uses the natural logarithm of the enterprise's operating income to represent the production scale. The regression results are shown in Table 4 (2). The coefficient of the core explanatory variable is positive and passes the test at the significance level of 1%, which fully confirms that supply chain finance has a significant effect on the expansion of production scale, thereby driving the growth of enterprise labor employment demand[17].

5. Heterogeneity Analysis

5.1 Property Rights

As the core feature of an enterprise, the property rights have a significant impact on the difficulty of financing and labor investment strategies of the enterprise. Due to the lack of government endorsement and resource tilt, private enterprises face high financing thresholds in the traditional financial system and find it difficult to obtain low-cost bank loans. Supply chain finance, with the help of the core enterprise credit transmission mechanism, has opened up a new financing path for upstream and downstream private enterprises, effectively alleviating their financing difficulties[18]. Therefore, the financing relief effect of supply chain finance on private enterprises is more prominent. In contrast, in state-owned enterprises, the promotion of management is often closely linked to operating performance and social responsibility fulfillment, which prompts their operating decisions to show a short-term tendency. In addition, the problem of "absence of owners" and the imperfection of the internal supervision and checks and balances mechanism have further aggravated the agency contradiction that the management ignores the long-term development of the enterprise in pursuit of personal interests, resulting in insufficient enthusiasm of state-owned enterprises to actively carry out supply chain finance business, and it is difficult to give full play to the role of supply chain finance in

promoting enterprise operations and labor investmen[19]t.

This paper divides the sample into two groups, state-owned enterprises and private enterprises, for regression testing. The results are shown in Table 5.

Table 5. Heterogeneity Analysis: Property Rights

	(1)	(2)
	State-owned	Private
	Lnlab	Lnlab
LnSCF	0.0309***	0.0842***
	(2.719)	(11.300)
Size	0.7513***	0.7646***
	(118.057)	(135.518)
Age	0.1230***	-0.0571***
	(6.368)	(-4.694)
Roa	0.1293	0.6295***
	(0.933)	(6.633)
Lev	0.1341***	0.6180***
	(3.279)	(20.130)
Growth	-0.0917***	-0.0855***
	(-12.283)	(-13.484)
Tobinq	-0.0078	-0.0018
	(-1.200)	(-0.449)
Cfo	1.5320***	2.1521***
	(14.203)	(26.707)
Dual	-0.0537***	-0.0145*
	(-2.791)	(-1.660)
Top1	0.0006	0.0031***
	(1.444)	(9.673)
Wage	-0.2451***	-0.2433***
	(-36.476)	(-37.675)
_cons	-6.6322***	-6.8569***
	(-44.996)	(-52.204)
Year	Yes	Yes
Firm	Yes	Yes
N	15424	26080
r2_a	0.7006	0.6449

Column (1) shows that the estimated coefficient of supply chain finance on the scale of labor employment in state-owned enterprises is 0.0309, and it has passed the statistical test at the significance level of 1%, indicating that supply chain finance has a significant positive impact on the scale of labor employment in state-owned enterprises. Column (2) shows that the estimated coefficient of supply chain finance on the scale of labor employment in private enterprises is 0.0842, and it has also passed the statistical test at the significance level of 1%, confirming that it has a positive impact on the labor employment in private enterprises. However, it is worth noting that the supply chain finance coefficient of state-owned enterprises is significantly smaller than that of private enterprises, highlighting the significant differentiation of the impact of supply chain finance on enterprise labor employment under the differences in property rights[20].

5.2 Degree of Digital Transformation

In the digital age, digital technologies such as big data and blockchain have brought all-round empowerment to corporate supply chain finance, profoundly affecting the scale of corporate labor employment. From the perspective of supply chain collaboration and risk response, digital information technology has greatly strengthened the collaborative communication between various entities in the supply chain network[21]. With the help of digital technology, banks can conduct in-depth analysis of various transaction entities in the supply chain, accurately reveal financial risks, and achieve effective risk control. Through digital platforms, upstream and downstream enterprises in the supply chain can share information and collaborate more closely, so that enterprises can instantly grasp the dynamics of upstream and downstream, more calmly deal with the risks brought by market changes, and ensure business continuity. Stable business development has enhanced the confidence of enterprises and made them more motivated to expand the scale of labor employment. From the perspective of financing and corporate development, digital technology has effectively alleviated the financing difficulties faced by enterprises, such as long R&D cycles, difficult collateral definition, and complex value assessment. Supply chain finance replaces traditional financial statements with real-time data, significantly alleviating the information asymmetry problem between enterprises and financial institutions and improving the financing availability of enterprises[22]. Especially for enterprises with a high degree of digitalization, they can give full play to the advantages of digitalization, use data elements as the basis for financing, and achieve efficient docking with financial institutions. This not only improves the business credit of the enterprise and stabilizes the customer scale, but also promotes the efficient transformation of the enterprise's innovative achievements and ensures sufficient internal funds. High-tech enterprises

with sufficient funds have a stronger demand for technical talents, thereby expanding the scale of employment of enterprises[23].

Table 6. Heterogeneity Analysis: Degree of Digital Transformation

	(1)	(2)
	High degree of digital transformation	Low digital transformation
	Lnlab	Lnlab
LnSCF	0.0501***	0.0205
	(7.362)	(1.388)
Size	0.7632***	0.7310***
	(152.870)	(107.474)
Age	0.0017	0.0805***
	(0.156)	(4.779)
Roa	0.7258***	0.2124*
	(7.267)	(1.717)
Lev	0.6091***	0.2935***
	(19.382)	(7.909)
Growth	-0.0904***	-0.0901***
	(-13.572)	(-13.042)
Tobinq	-0.0070*	-0.0143**
	(-1.746)	(-2.517)
Cfo	2.1714***	1.6687***
	(25.310)	(17.651)
Dual	-0.0101	-0.0770***
	(-1.043)	(-5.956)
Top1	0.0036***	0.0020***
	(11.055)	(4.966)
Wage	-0.2544***	-0.2240***
	(-38.940)	(-34.424)
_cons	-7.0136***	-6.3719***
	(-50.058)	(-44.595)
Year	Yes	Yes
Firm	Yes	Yes
N	24517	17686
r2_a	0.7080	0.6588

Therefore, this paper refers to the research of (Wu Fei et al., 2021)[4] and selects four keyword dimensions of artificial intelligence, blockchain, cloud computing, and big data for text analysis. The natural logarithm of the statistical word frequency plus 1 is taken as the measurement indicator of the degree of digital transformation of the enterprise, and the full sample is divided into a low digital transformation degree group and a high digital transformation degree group according to the annual industry median of the degree of digital transformation. The regression results are shown in columns (1) and (2) of Table 6. In the samples with a high degree of digital transformation, the estimated coefficient of LnSCF is significantly positive, but the samples with a low degree of digital transformation did not pass the significance test, and the coefficient of the former is much larger than the latter, which means that the role of supply chain finance in the employment of corporate labor is more significant in enterprises with a high degree of digital transformation[24].

5.3 Industry Competition Level

In the process of building a modern economic system, inter-industry competition is becoming increasingly fierce, and the level of industry competition, as one of the important external environmental factors of enterprises, plays an important role in the internal production and operation of enterprises[25]. The level of industry competition can affect the employment of enterprise labor through multiple transmission paths. Compared with industries with lower competition, the market game in highly competitive industries is more intense. This fierce competition environment can effectively alleviate the information asymmetry between enterprises and external entities. In a highly competitive market structure, in order to gain the favor of investors and resource support, enterprises often take the initiative to improve the quality and transparency of information disclosure to enhance market trust[26]. At the same time, enterprises in highly competitive industries often have a stronger sense of crisis and will comprehensively improve the comprehensive competitiveness and risk resistance of enterprises by improving internal governance structures, increasing R&D and innovation investment, and optimizing operation and management models[27]. These positive measures have prompted enterprises to expand the scale of labor employment to meet the needs of business expansion and innovative development. It is precisely because enterprises in highly competitive industries have achieved remarkable results in expanding labor employment through their own proactive changes and positive actions that the role of supply chain finance in promoting the expansion of their employment scale is relatively limited. In industries with low competition, enterprises lack sufficient external pressure, and their motivation and resource investment in labor employment are relatively insufficient. Therefore, supply chain finance can play a more significant

role in promoting enterprises to expand the scale of labor employment[28].

Table 7. Heterogeneity Analysis: Industry Competition Level

	(1)	(2)
	Low industry competition	High industry competition
	Lnlab	Lnlab
LnSCF	0.1181***	0.0161*
	(14.970)	(1.701)
Size	0.7286***	0.8001***
	(128.598)	(136.245)
Age	0.0671***	-0.0480***
	(5.815)	(-3.168)
Roa	0.4700***	0.7012***
	(4.445)	(6.053)
Lev	0.5116***	0.4215***
	(15.386)	(11.862)
Growth	-0.0850***	-0.0940***
	(-12.897)	(-13.186)
Tobinq	-0.0089**	0.0040
	(-2.167)	(0.702)
Cfo	1.8863***	2.0036***
	(20.077)	(22.871)
Dual	-0.0464***	-0.0081
	(-4.385)	(-0.712)
Top1	0.0027***	0.0023***
	(7.436)	(6.463)
Wage	-0.2458***	-0.2341***
	(-34.703)	(-38.511)
_cons	-6.1658***	-7.4826***
	(-37.791)	(-64.226)
Year	Yes	Yes
Firm	Yes	Yes
N	21159	21044
r2_a	0.6869	0.6854

For this reason, this paper uses the Lerner Index to calculate the level of industry competition. The smaller the Lerner Index, the smaller the industry monopoly and the greater the market competition; the larger the Lerner Index, the opposite is true. Therefore, the full sample is divided into a low industry competition group and a high industry competition group according to the median of the Lerner Index. It can be seen from columns (1) and (2) of Table 7 that the coefficient of LnSCF in the group with low industry competition is significantly positive at the 1% level, and the low industry competition level is more significant than the high industry competition level. The empirical results show that the effect of supply chain finance on enterprise labor employment is more significant in enterprises with low industry competition levels, which is consistent with the expectations in the previous article[29].

6. Research Conclusions and Policy Recommendations

In the critical stage of high-quality development of the real economy, the labor employment decision of enterprises is directly related to production and operation efficiency and market competitiveness, and supply chain finance, as an innovative financing model, is becoming an important factor affecting the scale and structure of enterprise employment. This paper uses Shanghai and Shenzhen A-share listed companies from 2005 to 2023 as samples to test the impact of supply chain finance on the scale of enterprise labor employment from both theoretical and empirical aspects[30]. The study found that supply chain finance can expand the scale of enterprise labor employment. This conclusion has passed a series of robustness tests such as changing explanatory variables, adding control variables, and eliminating samples. Further heterogeneity analysis found that the effect of supply chain finance on expanding the scale of labor employment is more prominent in private enterprises with high degree of digital transformation and low degree of industry competition. Based on the above research results, this paper proposes an optimization path from the level of government guidance and enterprise practice:

The government should build a governance system that emphasizes both policy support and supervision based on its macro-control function to create a favorable environment for supply chain finance to drive labor employment. In terms of policy guidance, a special development fund for green supply chain finance can be established, requiring them to bind their business with green projects, and giving subsidies and approval preferences to enterprises that drive upstream and downstream green transformation and create technical jobs; for enterprises with slow digital transformation, through the "government + enterprise + university" cooperation model, targeted training of compound talents in supply chain finance and digital technology, and building a public digital service platform to improve the efficiency of supply chain financial services, indirectly promote the expansion of employment scale. For

enterprises in highly competitive industries, an innovation incubation center should be established, and technical consultation and training should be provided in conjunction with universities to support enterprises in model innovation, encourage leading enterprises to take the lead in establishing a supply chain financial alliance, and drive the expansion of positions in the entire industrial chain[31]. At the level of regulatory innovation, a cross-departmental joint regulatory mechanism can be established, integrating data resources from departments such as finance, industry and information technology, and market supervision, building a supply chain financial risk monitoring and early warning platform, using artificial intelligence algorithms to conduct real-time analysis of transaction data and capital flows, and identify potential risks; at the same time, differentiated regulatory standards should be formulated, hierarchical management should be implemented for enterprises of different sizes and industries, appropriate regulatory tolerance should be given to innovative businesses with controllable risks, and financial institutions should be encouraged to develop supply chain financial products that meet the needs of small and medium-sized enterprises, so as to release the potential for job creation while ensuring market stability. In addition, the government should also promote the standardization of supply chain finance, unify business operation specifications and information disclosure requirements, lower the threshold for enterprise participation, promote fair competition in the market, and create a sustainable policy environment for labor employment[32].

Enterprises need to start with strategic planning and internal management, deeply integrate supply chain finance into the business system, and achieve the coordinated development of financing capacity improvement and labor employment. In terms of business innovation, core enterprises can play a leading role in the industrial chain, jointly with financial institutions to build a supply chain financial service platform, and use blockchain technology to realize the chain storage of transaction information and enhance the efficiency of credit transmission; at the same time, based on platform data, provide customized services such as order financing and inventory pledge for upstream and downstream small and medium-sized enterprises, stabilize the cooperative relationship of the industrial chain, drive supporting enterprises to expand production, and create more positions in technology research and development, production operations, logistics management, etc. In addition, enterprises should also actively explore emerging fields such as green supply chain finance and cross-border supply chain finance, expand business boundaries, and stimulate the demand for professional positions such as green technology talents and cross-border trade specialists. In terms of credit management and talent strategy, enterprises need to incorporate credit construction into long-term development plans, conduct regular financial audits and risk assessments, and enhance credit strength by optimizing capital structure and improving profitability. At the same time, they should establish a sound information disclosure mechanism, actively show financial institutions their operating conditions and development potential, and obtain higher credit lines and financing facilities. In terms of talent management, enterprises should formulate targeted talent training and introduction plans based on the needs of supply chain finance business. On the one hand, they should strengthen internal employee training to improve their financial knowledge and digital operation capabilities; on the other hand, they should attract high-end talents in financial technology, supply chain management and other fields through generous remuneration and career development space, and provide intellectual support for enterprises to expand the scale of labor employment with the help of supply chain finance. By building a virtuous cycle of "financing-development-employment", the two-way empowerment of enterprise scale expansion and the labor market can be achieved.

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