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Supply Chain Finance and New Quality Productive Forces: Evidence from Chinese A-Share Listed Firms

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Abstract: The upgrading of productivity driven by innovation, green transformation, and digitalisation has become a central concern in the pursuit of high-quality economic development. Against this background, this study investigates whether and how supply chain finance promotes firms' new quality productive forces. The results show that supply chain finance significantly enhances firms' new quality productive forces, and this finding remains robust across multiple specifications. Mechanism analysis indicates that alleviating financing constraints, improving operational efficiency are key channels through which supply chain finance promotes productivity upgrading. Further analysis reveals that the positive effect of supply chain finance is more pronounced for small and medium-sized enterprises, private firms, and firms located in central and western regions.

Keywords: Supply chain finance; New quality productive forces.

1. Introduction

In recent years, the transition toward high-quality economic development has intensified academic and policy interest in productivity upgrading driven by innovation, digitalisation, and green transformation. Against this backdrop, the concept of new quality productive forces has emerged as an analytical framework capturing productivity growth rooted not in factor accumulation, but in technological progress, organisational upgrading, and the restructuring of production processes. Existing studies generally associate new quality productive forces with innovation-driven growth, digital transformation, and green production modes, emphasising their role in sustaining long-term economic development [1].

Finance plays a critical role in shaping firms' innovation capacity and productivity trajectories. A large body of research shows that access to external finance significantly affects firms' investment behaviour, innovation outcomes, and productivity growth, particularly in environments characterised by information asymmetry and credit constraints. In this context, supply chain finance has attracted growing attention as an innovative financial arrangement that embeds financial services into real transaction networks. By leveraging trade relationships, core firm credit, and transaction-level data, supply chain finance enables financial institutions to provide liquidity support to upstream and downstream firms that are often excluded from traditional credit markets.

Existing empirical studies document that supply chain finance effectively alleviates financing constraints, improves cash flow stability, and enhances firm performance, especially for small and medium-sized enterprises [2]. The adoption of digital technologies such as big data analytics and platform-based risk control has further strengthened the scalability and risk management capacity of supply chain finance, reducing transaction costs and improving credit allocation efficiency [3]. Beyond financial outcomes, recent research suggests that supply chain finance may also influence firms' real economic activities by supporting long-term investment, innovation, and operational upgrading [4].

Against this background, this study investigates whether and how supply chain finance promotes firms' new quality productive forces. Using a panel dataset of Chinese A-share listed companies from 2011 to 2022, we construct a firm-level composite index of new quality productive forces based on an entropy-weighted multi-dimensional framework capturing innovation capability, operational efficiency, digitalisation, and green transformation. Supply chain finance is measured using a textual analysis approach based on firms' annual reports. Employing two-way fixed effects models, mediation analysis, we systematically examine the overall effect, underlying transmission mechanisms, and heterogeneous impacts across firms.

2. Theoretical Analysis and Research Hypothesis

2.1. Direct Effect

The development of supply chain finance directly impacts enterprises' new quality productive forces primarily by reducing information asymmetry. Within supply chain finance scenarios, on one hand, the credit rating and operational capabilities of the supply chain anchor enterprise can be transmitted to upstream and downstream businesses. This provides financial institutions with additional risk identification signals, thereby reducing risk assessment costs for SMEs. On the other hand, supply chain finance utilizes authentic transaction data to construct enterprise credit systems. By leveraging objective information such as orders, accounts receivable, and logistics trajectories to enhance information transparency—rather than relying solely on financial statements—it enables "data-driven credit" to replace traditional collateral. This data-driven transparency effectively mitigates adverse selection risks for financial institutions while enabling enterprises to secure financing aligned with their actual operational performance. Furthermore, digital supply chain finance leverages big data risk management and AI models to further reduce information asymmetry and enhance the accuracy of credit assessments.

2.2. The Mediating Effect

Financing constraints represent one of the most significant barriers to enterprise development, particularly during

technological innovation and structural transformation. As a financing model embedded within authentic transaction scenarios, supply chain finance provides SMEs with access to credit channels based on transactional credit rather than physical collateral. This is achieved through mechanisms such as credit enhancement by core enterprises, accounts receivable pledging, pre-payment financing, and inventory pledging [5].

Supply chain finance alleviates financing constraints primarily through three mechanisms: First, leveraging the credit of core enterprises to partially substitute for the credit of individual SMEs, thereby lowering financial institutions' credit approval thresholds for SMEs. Second, utilizing authentic trade backgrounds and multidimensional transaction data to reduce information asymmetry and due diligence costs, enhancing financial institutions' accuracy in assessing enterprise quality. Third, it enhances the liquidity and financeability of corporate assets through structured operations involving receivables, orders, and inventory [6]. These mechanisms collectively enable enterprises previously excluded from traditional credit systems due to weak creditworthiness and information opacity to access capital support commensurate with their actual operational capabilities.

For new quality productive forces, high-quality development activities such as R&D, digital transformation, green production, and smart manufacturing heavily dependon long-term, stable financial backing [7]. If enterprises remain chronically constrained in financing, they can only sustain daily operations and struggle to undertake forward-looking technological planning and organizational upgrades. By alleviating financing constraints, supply chain finance releases enterprises' capital bottlenecks, empowering them to increase investments in R&D innovation, digital infrastructure, smart equipment, and highly skilled human capital. This, in turn, drives technological efficiency gains and the reorganization of production factors, forming new quality productive forces characterized by digitalization, intelligence, and green development.

3. Research and Design

3.1. Data Sources

This study selected A-share listed companies from 2011 to 2022 as research samples and processed the samples according to the following principles: (1) Deleted ST and *ST samples with abnormal financial conditions; (2) Financial sector companies were excluded; (3) Firms with excessive data gaps were removed. Enterprise-level variables draw from the Guotai An (CSMAR) database, China National Research Data Service (CNRDS), annual reports of listed companies, and corporate websites.

3.2. Variable Selection

The core explanatory variable is Supply Chain Finance (SCF). Following the methodology of Zhou Lan and Wu Huijun (2022) [8], SCF keywords are categorized into receivables-based, prepayment-based, inventory-based, and comprehensive types. The level of SCF adoption by enterprises is measured by counting the frequency of these keywords in disclosed information such as annual reports and official websites of listed companies. This frequency count is then log-transformed to yield lnSCF. Text data extracted from corporate annual reports and websites provides a more accurate and direct reflection of supply chain finance operations compared to financial data.

The dependent variable is enterprise new quality productive forces (lnNQPF). Following the methodology of Zhang Xiu'e et al. (2024) [9], this paper constructs an evaluation index system for enterprise new quality productive forces based on its fundamental characteristics. This system identifies three key factors: new quality laborers, new quality labor objects, and new quality labor resources. The entropy method is employed to determine the weights of indicators at each level. Since the new quality productive forces index (NQPF) is constructed using the entropy method, it exhibits strict positive characteristics and a right-skewed overall distribution [10]. To mitigate heteroskedasticity and prevent extreme values from distorting regression results, this study takes the natural logarithm of NQPF to obtain lnNQPF as the dependent variable.

The following control variables were selected: average age of management (averageage), financial background of executives (financialback), firm age (firmage), proportion of independent directors (indirect), proportion of intangible assets (intangible), and ownership structure (soe).

3.3. Model Establishment

To examine the overall impact of supply chain finance on enterprises' new quality productive forces, the following baseline regression model is established:

$$lnNQPF_{it}=a_0+a_1lnSCF_{it}+bX_{it}+u_i+v_t+w_{it}$$

Where $NQPF_{it}$ denotes the level of enterprises' new quality productive forces, SCF_{it} represents the level of supply chain finance, X_{it} is the control variable, u_i and v_t denote industry and year fixed effects, respectively. wit is the random disturbance term, with subscripts i and t representing enterprises and years, respectively.

4. Empirical Results and Analysis

4.1. Analysis of Benchmark Regression Results

The benchmark regression results are presented in Table 1. Column (1) reports the OLS estimation results of the model, demonstrating the impact of supply chain finance (SCF) development on new quality productive forces (NQPF). The coefficient in column (2) indicates that, after controlling for other factors, a 1% increase in SCF leads to a 0.1048% increase in NQPF. Comparing the regression results in columns (1) and (2), we find that regardless of whether control variables are included, the regression coefficient for supply chain finance (lnSCF) remains positive and is statistically significant at the 1% level. This indicates that supply chain finance generally exerts a significant positive effect on enterprises' new quality productive forces. This validates that supply chain finance can promote the development of enterprises' new quality productive forces.

Table 1. Benchmark Regression Results

	(1) lnNQPF	(2) lnNQPF
lnSCF	0.1035***	0.1048***
	(0.0192)	(0.0191)
averageage		0.0060**
		(0.0029)
financialback		0.0413***
		(0.0140)
firmage		-0.0080***
		(0.0014)
inddirect		0.0020
		(0.0015)
intangible		-0.1483
		(0.1143)
soe		0.0589***
		(0.0223)
Constant	-2.4863***	-2.8055***
	(0.0095)	(0.1569)
Observations	20,722	20,722
R-squared	0.4144	0.4200

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

4.2. Robustness Test

To mitigate potential measurement errors in core explanatory variables, this paper proposes constructing a financial proxy variable for supply chain finance based on the company's own financial condition. Drawing on Song et al. (2021) [11], the Cash Conversion Cycle (CCC) indicator is adopted, where days sales outstanding (DSO) − days payable outstanding (DPO) + days inventory outstanding (DIO). This metric fundamentally measures the duration of capital occupation. Higher values indicate longer cash conversion cycles, more severe capital occupation, and lower levels of supply chain finance.

After substituting this indicator for supply chain finance (SCF) in the benchmark regression, the results show that cash conversion cycle (CCC) exerts a significant negative impact on a firm's new quality productive forces. This indicates that firms with longer cash occupation periods face greater financing constraints and weaker supply chain finance support, thereby curtailing their R&D investment and innovation activities, which in turn reduces their new quality productive forces levels. Thus, the robustness of the findings is further validated.

Table 2. Robustness Test

	lnNQPF
lnCCC	-0.0172**
	(0.0079)
Constant	-2.3857***
	(0.0380)
Observations	18,168
R-squared	0.4213

5. Mechanism Test and Heterogeneity Analysis

5.1. Mechanism testing

To ensure the rigor of the mechanism test, this paper adopts the fixed-effects model specification used in the benchmark regression, incorporating financing constraints (FC) and operational efficiency (ATO) as mediating variables. Additionally, the control variables remain consistent with the benchmark regression, while continuing to include two-way fixed effects for industry and year, with standard errors clustered at the firm level. The specific form of the regression model used is as follows:

$$M_{it}=a_0+a_1 lnSCF_{it}+a_2 X_{it}+u_i+v_t+w_{it}$$

$$lnNQPF_{it}=b_0+b_1 lnSCF_{it}+b_2 M_{it}+b_3 X_{it}+u_i+v_t+w_{it}$$

Financing constraints represent one of the key channels through which supply chain finance influences the enhancement of enterprises' new quality productive forces. Empirical results from the first stage indicate that supply chain finance exerts a significant negative effect on financing constraints (FC), demonstrating that it effectively alleviates corporate financing pressures and substantially improves capital accessibility. In the second stage, after incorporating financing constraints, supply chain finance continues to significantly boost new quality productive forces, while the financing constraint coefficient remains negatively significant. This suggests that the alleviation of financing constraints facilitates the improvement of enterprises' new quality productive forces [12].

Supply chain finance reduces information asymmetry across the supply chain through mechanisms such as credit endorsements from core enterprises and access to authentic upstream/downstream transaction data [13]. This enhances financial institutions' assessment of corporate creditworthiness—including improved accounts receivable management, elevated credit ratings, and reduced collateral requirements—effectively easing external financing constraints. The reduction in financing constraints enables enterprises to expand investment scope, enhance innovation and production capacity, and allocate more funds to high-value activities such as R&D, technological upgrades, and digital investments, thereby boosting new quality productive forces.

Operational Efficiency (ATO) reflects a firm's asset turnover capability and resource utilization efficiency, serving as a crucial driver for technological upgrading and production efficiency enhancement. Phase I results indicate a significantly positive coefficient for supply chain finance, demonstrating its substantial improvement in operational efficiency. Phase II reveals a significantly positive coefficient for operational efficiency itself, confirming that enhanced operational efficiency effectively elevates the level of new quality productive forces.

Table 3. Mechanism Analysis

	FC	lnNQPF	ATO	lnNQPF
lnSCF	-0.0623***	0.0796***	0.1355***	0.0937***
	(0.0086)	(0.0189)	(0.0265)	(0.0192)
FC		-0.3510***		
		(0.0348)		
ATO				0.0432**
				(0.0213)
Constant	1.2838***	-2.3772***	0.4102***	-2.8326***
	(0.0675)	(0.1597)	(0.1217)	(0.1573)
Observations	19,892	19,892	20,192	20,192
R-squared	0.3679	0.4364	0.2551	0.4259

5.2. Heterogeneity Analysis

To examine whether the actual effects of supply chain finance vary across different levels of economic development, this study divides the sample into three regions—Eastern, Central, and Western—and conducts separate regression analyses. As shown in Table 4, supply chain finance significantly promotes new quality productive forces in the Eastern and Central regions, but not in the Western region. This disparity can be attributed to differences in financial infrastructure and the maturity of supply chain ecosystems. Enterprises in the eastern and central regions possess more robust supply chain networks, higher information transparency, and more mature financial markets, enabling supply chain finance to more effectively support corporate output. In contrast, enterprises in the western region face challenges such as a weak financial system and lower supply chain integration, which limit the effective transmission of supply chain finance to new quality productive forces.

This paper estimates the results by dividing the sample into two subgroups based on whether enterprises are state-controlled: "state-owned enterprises (SOEs)" and "non-state-owned enterprises (NSOEs)". Heterogeneity-of-regression results indicate that supply chain finance significantly enhances the new quality productive forces of NSOEs more than that of SOEs. This disparity primarily stems from differing impacts of ownership structures on financing constraints and costs: SOEs typically possess stronger asset collateralization capabilities, more stable government credit endorsements, and easier access to bank loans, resulting in relatively lower financing constraints and reduced reliance on supply chain finance. Consequently, when SOEs utilize supply chain finance services, the marginal effects on improving liquidity and stimulating innovation investment are relatively limited.

In contrast, non-state-owned enterprises—particularly small and medium-sized private businesses—generally face narrow financing channels, high financing costs, and insufficient information transparency. Supply chain finance, through credit transmission from core enterprises and supply chain data-driven risk control mechanisms, can significantly lower financing barriers for private enterprises, enhance their cash flow stability, and thereby drive increased R&D investment, technological upgrades, and digital transformation. Consequently, supply chain finance demonstrates higher effectiveness among non-state-owned enterprises.

Table 4. Heterogeneity Analysis

	West	Mid	East	Soe	Nsoe
lnSCF	0.0515	0.0796***	0.1355***	0.0421	0.0993***
	(0.0439)	(0.0189)	(0.0265)	(0.0338)	(0.0230)
Observations	2,307	3,727	14,056	7,884	12,836
R-squared	0.4466	0.4359	0.4489	0.4318	0.4177

6. Conclusions and Enlightenment

The findings of this study indicate that the development of supply chain finance can enhance enterprises' new quality productive forces. Through an analysis of the mediating mechanism, supply chain finance promotes new quality productive forces by alleviating financing constraints and improving operational efficiency. Its promotional effect is more pronounced in eastern regions, non-state-owned enterprises, larger-scale enterprises, and enterprises with stronger digital foundations. This suggests that the actual impact of supply chain finance depends on the enterprise's environment, resource base, and the level of financial infrastructure development, revealing significant structural differences.

Based on these findings, this paper proposes two policy recommendations:

First, further refine the regulatory framework for supply chain finance to establish secure and efficient collaborative mechanisms. Governments should strengthen oversight structures, guiding core enterprises, financial institutions, and technology platforms to establish risk-sharing and information-sharing mechanisms. Accelerate infrastructure development such as supply chain bills and accounts receivable registration systems to reduce information asymmetry within supply chains. This will enhance financing accessibility and transparency for SMEs, providing a stable institutional environment for new quality productive forces development. Second, provide targeted policy support to address bottlenecks in corporate operational efficiency and financing constraints. For enterprises with low operational efficiency or high financing constraints, government

platforms or financial institutions can offer supply chain operational consulting, credit guarantees, and accounts receivable confirmation services. This would lower financing barriers, enhance capital turnover capacity, alleviate insufficient input of production factors, and lay the groundwork for the formation of new quality productive forces.

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