

Supply chain finance and the speed of corporate leverage adjustment: Evidence from Chinese listed firms

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Abstract

Dynamic trade-off theory predicts that firms move gradually toward a target leverage ratio because adjustment is costly, and information asymmetry and financing frictions are among the sources of those costs. Supply chain finance (SCF) may lower these costs by drawing on transaction level information within supply chains. This paper examines whether SCF changes the speed at which firms close the gap between actual and target leverage, using a two-stage partial adjustment model and a panel of 28,180 firm-year observations of Chinese A share listed firms from 2010 to 2025 (23,682 in the regressions with controls). The interaction between SCF and the deviation from target leverage is positive and significant, indicating faster adjustment among firms with higher SCF. The result holds in instrumental variable and system GMM estimations, with alternative SCF measures and after excluding 2020 to 2022. The effect is asymmetric: SCF is associated with faster adjustment among overleveraged firms and slower adjustment among underleveraged firms, which points to a deleveraging role. The association is stronger for non state owned firms and for firms in eastern and central China, and it is not significant in the western region. Because SCF is proxied by balance sheet items that overlap with leverage and the transmission mechanisms are not tested, the results should be read as associations. The study contributes to research on the determinants of leverage adjustment and on the economic consequences of SCF.

Keywords: Supply Chain Finance, Capital Structure, Leverage Adjustment Speed, Target Leverage, Partial Adjustment Model, Asymmetric Adjustment, Chinese Listed Firms

JEL Classification: G32, G30, O16

1. Introduction

Financial leverage adjustment is a core issue in corporate financial decision-making. The dynamic capital structure theory suggests that companies typically have a target leverage ratio, and when their actual leverage ratio deviates from the target level, they adjust it through debt financing, debt repayment, or asset structure adjustment. In traditional financing modes, financial institutions such as banks play a dominant role, and enterprises obtain external financing mainly through corporate credit or real estate mortgages, which often involve high thresholds and costs. Therefore, financing constraints, information asymmetry, and adjustment costs may weaken a company's ability to translate adjustment needs into practical actions. Different from traditional finance, supply chain finance (hereafter, SCF) extends individual credit to transaction credit, which helps reduce information asymmetry, improve financing accessibility, and lower financing costs for enterprises in the supply chain.

The speed of leverage adjustment is a core indicator of capital structure adjustment, measuring the speed at which a company's actual leverage ratio approaches its target level. Previous literature has conducted in-depth studies on the factors affecting corporate leverage adjustment speed from firm- and industry-specific perspectives, such as transaction costs (Strebulaev, 2007), cash flow risk (Faulkender et al., 2012; Rehman et al., 2023), the cost of financial distress (Abdullah et al., 2023; München, 2022) and financing efficiency (Ke et al., 2026). In addition, Öztekin & Flannery (2012) find that the institutional environment significantly affects enterprises' capital structure adjustment speed and that good institutional design can reduce adjustment cost and enable enterprises to return to the target leverage ratio faster. Choi & Pyun (2026) establish a positive relationship between global financial cycles and firm leverage in emerging market economies from the perspectives of firm- and sector-level heterogeneity. Liu et al. (2024) examine the effect of supplier concentration on the speed of capital structure adjustment and find a positive relationship between them. Some scholars comprehensively explore the effect of sudden shocks such as Covid-19 on leverage adjustment (Vo et al., 2022; Rehman et al., 2024; Shukla et al., 2024; Xie, 2024; Xie, 2025). As a novel financing method, SCF provides financing and financial services, such as those involving accounts receivable, inventory, and prepayments, to upstream and downstream enterprises in the supply chain based on the seamless integration of business flow, logistics, capital flow, and information flow of core enterprises and their upstream and downstream partners. It helps alleviate financing constraints (Liu et al., 2025; Lou et al., 2024) and information disparities, and increases financing efficiency (Ke et al., 2026). To the best of our knowledge, however, few studies pay attention to the connection between SCF and financial leverage adjustment. Therefore, this paper attempts to investigate the effect of this emerging factor, SCF, on capital structure adjustment and the heterogeneity from the perspective of corporate ownership structure and register region using Chinese listed-firm data.

This paper may have the following contributions to the literature. First, it enriches the empirical literature focusing on the factors influencing leverage adjustment speed and capital structure decisions (Vichitsarawong & Eng, 2023; Rehman et al., 2024; Xie, 2024; Xie, 2025), and it also expands empirical study about the economic consequences of SCF (Bai et al., 2024; Ke et al., 2026; Choi & Pyun, 2026). Second, the extant literature examines the determinants of capital structure adjustment mainly from firm- and industry-specific characteristics (Strebulaev, 2007; Rehman et al., 2023; Abdullah et al., 2023; Ke et al., 2026). This paper investigates the affecting factors from the novel perspective of supply chain finance. Third, as an emerging financing tool, exploring the economic consequences of SCF is particularly important. This paper identifies a positive relationship between SCF and the speed of leverage adjustment and demonstrates how it shapes firms' capital structure decisions based on cross-sectional heterogeneity, providing new insights into the role of SCF in helping enterprises optimize their capital structure.

The rest of our article is arranged as follows. Section 2 presents the literature and proposes the hypothesis. Section 3 describes the data and sample sources and discusses the research method. Section 4 analyzes the empirical results, and Section 5 draws a brief conclusion.

2. Literature Review and Hypotheses Development

The dynamic trade-off theory suggests that companies continuously converge their capital structure toward an optimal level to maximize their market value. The extant literature suggests that companies face various significant costs, especially adjustment costs, when adjusting the actual leverage towards the target level, leading to only partial elimination of the deviation from the target (Flannery & Rangan, 2006; Rehman et al., 2024). The dynamic trade-off theory assumes that the market is semi-strong-form efficient and free of information asymmetry, but in reality, information asymmetry between enterprises and financial institutions is an important source of leverage adjustment costs (Abdullah et al., 2023; Negash et al., 2025). SCF allows financial institutions to more accurately evaluate the true operating conditions of enterprises by integrating transaction data, cash flow, inventory, and other information along the "production—supply—sales" chain (Silvestre, 2015; Bai et al., 2024), thereby weakening the information barriers between firms and potential creditors, reducing risk premiums and financing costs, and accelerating leverage adjustment. Agency cost also is an important factor slowing the rate at which enterprises adjust to target leverage (Rehman et al., 2024). SCF realizes closed-loop funding and process monitoring by embedding financial services such as accounts receivable financing, factoring, and asset securitization into the entire procurement, production, and sales process. This not only suppresses opportunistic behavior and financial manipulation motives of management and reduces agency costs between creditors and shareholders, but also shortens the accounting period and inventory occupation time, turns "static assets" into "flowing funds", increasing asset turnover, and finally accelerating the optimization of enterprises' financial structure without relying on new liabilities. In summary, supply chain finance can allow enterprises to return to their target capital

structure at a lower cost and faster speed by lowering information and agency costs, and increasing asset turnover. Thus, the hypothesis is proposed as follows:

H1: SCF can significantly accelerate the speed of leverage adjustment. That is, firms with a high level of supply chain finance are associated with a faster speed of adjustment.

3. Data and Method

3.1 Data and Sample

This article selects A-share listed companies on the Shanghai and Shenzhen stock exchanges from 2010 to 2025 as the sample. We process the data as follows: (1) Excluding enterprises in the information transmission, software, and information technology service industry and the financial industry, as they are mainly providers of information technology and financing services for supply chain finance; (2) excluding companies with fewer than two consecutive years of observations; (3) removing ST and *ST companies; (4) excluding companies whose asset-liability ratios are greater than 1 or less than 0; (5) excluding companies with fewer than five observations for key variables. In addition, to eliminate the influence of extreme values, all continuous variables are winsorized at the 1% level in both tails. All financial data used in this article are from the CSMAR database.

3.2 Research Design

To test the impact of supply chain finance on corporate financial leverage adjustment, following Flannery & Rangan (2006), Vo et al. (2022), and Rehman et al. (2024), we use a two-step partial adjustment model to explore the relationship between SCF and corporate leverage adjustment. To capture a firm's target leverage ratio, the first step employs a multivariate fixed effects model to estimate target leverage, expressed as follows:

$$Lev_{i,t} = \lambda X_{i,t-1} + F_i + \tau_t + \varepsilon_{i,t} \quad (1)$$

where i and t denote enterprise and year, respectively, and $Lev_{i,t}$ represents the actual leverage ratio of enterprise i at the end of year t . $X_{i,t}$ is a set of control variables affecting capital structure decisions, including firm size (Size), profitability (ROA), growth potential (Growth), proportion of tangible assets (Tang), non-debt tax shield (Dep), and industry-median leverage (Median). The definitions of the core and control variables are provided in Table 1. F_i and τ_t denote the industry and time fixed effects, respectively. $\varepsilon_{i,t}$ is a random error term. Since target leverage is unobservable, the fitted value of Eq. (1) is used to measure the target leverage ratio, which is expressed as:

$$Lev_{i,t}^* = \lambda X_{i,t-1} \quad (2)$$

Where $Lev_{i,t}^*$ denotes the target leverage ratio of firm i in year t .

In the second step, the leverage adjustment speed is measured as follows:

$$Lev_{i,t} - Lev_{i,t-1} = v(Lev_{i,t}^* - Lev_{i,t-1}) + F_i + \tau_t + \varepsilon_{i,t} \quad (3)$$

$$\text{And } v = \alpha_0 + \alpha_1 SCF_{i,t} \quad (4)$$

By substituting Eq. (4) into Eq. (3) and rearranging the terms, we construct the following multivariate fixed-effects model:

$$Lev_{i,t} - Lev_{i,t-1} = (\alpha_0 + \alpha_1 SCF_{i,t}) \times (Lev_{i,t}^* - Lev_{i,t-1}) + \alpha_2 SCF_{i,t} + \gamma X_{i,t-1} + F_i + \tau_t + \varepsilon_{i,t} \quad (5)$$

Set $\Delta Lev_{i,t} = Lev_{i,t} - Lev_{i,t-1}$, and $Dev_{i,t} = Lev_{i,t}^* - Lev_{i,t-1}$. Then Eq. (5) can be expressed as follows:

$$\Delta Lev_{i,t} = \alpha_0 Dev_{i,t} + \alpha_1 SCF_{i,t} \times Dev_{i,t} + \alpha_2 SCF_{i,t} + \gamma X_{i,t-1} + F_i + \tau_t + \varepsilon_{i,t} \quad (6)$$

where $SCF_{i,t}$ denotes the level of supply chain finance of firm i in year t . Following Lou. et al. (2024), we use the ratio of the sum of short term loans, notes payable and accounts receivable to the total book assets as the indicator of SCF. v denotes the adjustment speed toward target leverage, measuring the proportion of the deviation between actual and target leverage that a company can eliminate within a year. Our focus is the coefficient of the interaction term $SCF_{i,t} \times Dev_{i,t}$ in Eq. (6). We expect it to be significantly positive according to Hypothesis 1, indicating that SCF has a substantially positive effect on capital structure adjustment.

Table 1. Variables and Definitions

Types	Name	Symbol	Definition
Financial leverage related variables	Leverage ratio	Lev	Total debt/total assets
	Target leverage ratio	Lev*	Computed according to Eq.(2)
	Deviation from the target leverage	Dev	The deviation of actual leverage ratio from target leverage ratio. If $Dev > 0$, it needs add leverage; If $Dev < 0$, it needs reduce leverage.
	Change of actual leverage ratio	ΔLev	The difference in leverage ratio between year t and year $t-1$.
	Negative deviation	OverLev	The negative deviation of current leverage from the target. When $Lev_{i,t-1} > Lev_{i,t}^*$, $OverLev = Dev^- < 0$.

	Positive deviation	UnderLev	The negative deviation of actual leverage from the target. When $Lev_{i,t-1} < Lev^*_{i,t}$, $UnderLev = Dev^+ > 0$.
Explanatory variables	Level of supply chain finance	SCF	Used to measure a firm's SCF level. Its computing formula is: (Short-term loans+ notes payable + accounts receivable)/total assets.
Firm-characteristic variables	Firm size	Size	The natural logarithm of total assets
	Profitability	ROA	The ratio of net profit to total assets
	Growth rate of total operating revenue	Growth	(Total revenue in year t - Total revenue in year t-1)/Total assets
	Tangibility	Tang	Net fixed assets/total assets
	non-debt tax shield ratio	Dep	Depreciation and amortization of fixed assets /total assets.
	Median of industry leverage	Median	The median value of leverage ratio in a certain industry

4. Empirical result analysis

4.1 Descriptive statistical results

Table 2 presents the descriptive statistical results of the main variables. As shown, the mean values of actual and target leverage ratio are very close (0.475 and 0.476, respectively), but the standard error of target leverage (0.193) is larger than that of actual leverage (0.121). Similarly, the mean values of Dev and ΔLev are almost the same, while the standard error of ΔLev is smaller than that of Dev. These results indicate that the deviation from target leverage is only partially eliminated after one year's adjustment, and the actual leverage of individual firms still deviates from their target levels. It is worth noting that target leverage is slightly higher than actual leverage, suggesting that most firms in China have lower leverage relative to their target levels and that increasing leverage is their objective.

Table 2. Descriptive Statistics of Main Variables

Variable	Obs	Mean	Std.	Min	Median	Max
Lev	28180	0.475	0.193	0.072	0.477	0.912
Lev*	28180	0.476	0.121	0.227	0.461	0.824
Dev	28180	0.011	0.142	-0.349	0.010	0.338
ΔLev	28180	0.011	0.071	-0.220	0.008	0.231
OverLev	13309	-0.111	0.086	-0.406	-0.093	-0.002
UnderLev	14871	0.119	0.086	0.002	0.103	0.370
SCF	28180	0.281	0.166	0.004	0.263	0.770
Size	28180	22.523	1.340	20.109	22.320	26.579
ROA	28180	0.028	0.056	-0.219	0.030	0.166
Growth	28180	0.132	0.330	-0.522	0.084	1.797
Tang	28180	0.226	0.154	0.003	0.198	0.676
Dep	28180	0.021	0.014	0.001	0.018	0.066
Median	28180	0.462	0.106	0.263	0.448	0.756

4.2 Supply chain finance and leverage adjustment speed

4.2.1 Benchmark regression results

Table 3 reports the regression results based on models (3) and (6). The coefficient of leverage deviation (*Dev*) is 0.1090 and significant at the 1% level, indicating that only about 11% of the gap between target and current leverage is offset each year, with the remaining 89% carried into the next year. Following Flannery & Rangan (2006) and Huang & Ritter (2009), we use the formula $\frac{\ln(0.5)}{\ln(1-\nu)}$ to calculate the half-life period, defined as the time required for a company to reduce the gap between its target and actual leverage by half. Specifically, with a *Dev* of 0.1090, the estimated half-life period is approximately 6.01 years.

In column (2), the coefficient of $SCF \times Dev$ (0.1562) is significantly positive at the 1% level, showing that an increase of one standard deviation in the level of *SCF* raises the leverage adjustment speed by $13.89\% \left(\frac{0.1562 \times 0.166}{0.1385 + 0.1562 \times 0.281} \right)$, and by 14.65% in column (3). Accordingly, the

half-life in columns (2) and (3) is shortened to 3.45 and 3.86 years, respectively, meaning that SCF accelerates leverage adjustment from about 6 years down to 3-4 years. The shorter half-life indicates a faster adjustment process: SCF enables a firm to close half of its leverage gap in a much shorter time. These results suggest that SCF promotes the speed of capital structure adjustment, and that a higher level of SCF is associated with a faster adjustment rate, which is consistent with H1.

Table 3. Supply Chain Finance and Capital Structure Dynamics

	(1)	(2)	(3)
Dev	0.1090*** (0.0031)	0.1385*** (0.0059)	0.1236*** (0.0065)
Dev*SCF		0.1562*** (0.0174)	0.1450*** (0.0192)
SCF		0.1528*** (0.0034)	0.1388*** (0.0039)
Size			-0.0030*** (0.0004)
ROA			0.0208* (0.0120)
Growth			0.0043*** (0.0016)
Tang			-0.0031 (0.0056)
Dep			-0.0908 (0.0574)
Median			-0.0622***

			(0.0111)
_cons	0.0093*** (0.0004)	-0.0329*** (0.0011)	0.0675*** (0.0099)
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	28180	28180	23682
Adj. R ²	0.0584	0.1333	0.1214

Note: The parentheses indicate robust standard errors; ***, **, and * denote significance at the 1%, 5%, and 10% levels, respectively. The same applies to the tables below.

4.2.2 Endogeneity Test

To alleviate the bias arising from reverse causality and omitted variables, this article uses the mean value of SCF for all other enterprises in the same year, industry, and registered city multiplied by Dev as the instrumental variable, following the commonly used method in supply chain finance research. Table 4 reports the test results. As shown in column (1), the coefficient of $Dev \times SCF_{industry}$ is 0.9669 and significant at the 1% level, indicating a strong positive correlation between the instrumental variable $Dev \times SCF_{industry}$ and the endogenous interaction term $Dev \times SCF$. The Kleibergen-Paap rk Wald F statistic is 30710.1099, exceeding the Stock-Yogo critical value of 16.38, which indicates no weak instrument problem. In column (2), the coefficient of $Dev \times SCF$ is 0.1422 and significantly positive at the 1% level, consistent with the benchmark regression results. This indicates that the model constructed in this study has no serious causal issues.

Table 4. Endogeneity test (Instrumental variable method)

	(1)	(2)
	Dev×SCF	ΔLev
Dev×SCF _{industry}	0.9669*** (0.0055)	
Dev_SCF		0.1422*** (0.0236)

SCF	-0.0118*** (0.0012)	0.1387*** (0.0040)
Dev	0.0039*** (0.0014)	0.1243*** (0.0074)
Control variable	Yes	
Industry FE	Yes	
Year FE	Yes	
Kleibergen-Paap rk LM statistic	2227.2369***	
Kleibergen-Paap rk Wald F statistic	30710.1099[16.38]	
N	23682	
R ²	0.1111	

Note: The value of 16.38 in square brackets is the critical value for the Stock-Logo test under the maximum relative error standard of 10%.

In addition to the instrumental variable method used earlier, considering the dynamic continuity of corporate financial leverage adjustment—that is, the current adjustment behavior of an enterprise may be affected by its previous adjustment behavior—this article further uses the system GMM method for endogeneity testing. Specifically, the first-order lag term of the dependent variable ΔLev (i.e., $L.\Delta Lev$) is added to the benchmark model, and the system GMM estimation results are presented in Table 5. As shown, the coefficient of $Dev \times SCF$ is significantly positive. This indicates that SCF can still significantly promote the speed of corporate financial leverage adjustment after controlling for dynamic inertia and potential endogeneity issues. This result is consistent with the conclusions of the benchmark regression and the instrumental variable method mentioned earlier, further indicating that SCF has a strong and robust promoting effect on the adjustment of corporate financial leverage. In addition, the P value of Hansen's test is 0.5499, indicating that the internal instrumental variables used in the system GMM estimation are effective and the model setting is reasonable.

Table 5. Endogeneity test (System GMM)

Variables	ΔLev
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L.ΔLev	0.2646 (0.3442)
Dev×SCF	0.2041*** (0.0373)
SCF	0.2295*** (0.0195)
Dev	0.2859*** (0.0721)
Control variables	Yes
Firm FE	Yes
Year FE	Yes
AR(1) P-value	0.0503
AR(2) P-value	0.4342
Hansen p	0.5499
N	23682

4.2.3 Robustness Test

This article employs two methods for robustness testing. (1) Replace the core explanatory variable SCF. First, we set $SCF2 = (\text{short-term borrowings} + \text{notes payable}) / \text{total assets}$ to replace SCF. Second, we set a dummy variable SCF_dummy. If the ratio of a company's short-term loans, notes payable, and accounts receivable to total assets is higher than the industry-year median, SCF_dummy equals 1; otherwise, it equals 0. (2) Exclude sample data from 2020–2022 to reduce the impact of the COVID-19 pandemic on leverage adjustment. The results are presented in Table 6.

As shown in Table 6, the interaction terms $Dev \times SCF2$, $Dev \times SCF_dummy$, and $Dev \times SCF$ with

abnormal years excluded are all significantly positive at the 1% level, consistent with the baseline regression results. These findings confirm the robustness of the benchmark regression and further support Hypothesis 1.

Table 6. Robustness Check

	Replace key explanatory variables		Exclude abnormal years
	(1)	(2)	(3)
Dev×SCF2	0.3717*** (0.0288)		
SCF2	0.2626*** (0.0056)		
Dev×SCF_dummy		0.0232*** (0.0076)	
SCF_dummy		0.0264*** (0.0010)	
Dev×SCF			0.1529*** (0.0208)
SCF			0.1426*** (0.0043)
Dev	0.1400*** (0.0055)	0.1215*** (0.0054)	0.1243*** (0.0071)
Control variables	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes

N	23682	23682	18963
Adj. R ²	0.1603	0.0932	0.1268

4.3 Asymmetric Leverage Adjustment

The rate of capital structure adjustment may differ between enterprises with leverage ratios below or above the target level. Byoun (2008) and Faulkender et al. (2012) demonstrate that underleveraged enterprises adjust their leverage more slowly than overleveraged enterprises. Does supply chain finance then have different impacts on the leverage adjustment of these two types of enterprises? In this section, we attempt to explore this issue using a Chinese sample.

We divide the whole sample into two groups: underleveraged and overleveraged enterprises¹. Table 7 reports the regression results for the two subsamples. The coefficient of the interaction term Dev×SCF is negatively significant in column (1) and positively significant in column (2). This indicates that SCF accelerates the leverage adjustment speed of overleveraged firms while slowing that of underleveraged firms, suggesting that SCF primarily plays a role in accelerating deleveraging. This is because SCF can reduce reliance on short-term loans by activating accounts receivable and inventory, improving cash flow liquidity, and replacing interest-bearing debt with interest-free debt.

Table 7. Asymmetric Capital Structure Adjustment Speed

	UnderLev(1)	OverLev(2)
Dev	1.0218*** (0.0019)	1.0081*** (0.0044)
Dev×SCF	-0.0401*** (0.0075)	0.0485*** (0.0116)
SCF	0.0035*** (0.0006)	0.0075*** (0.0011)
Control variables	Yes	Yes

¹ Enterprises whose leverage ratio is higher than their target level (as estimated by Eq.(2) in Section 3) are considered as over-leveraged, and vice versa. Generally, Underleveraged firms attempt to add leverage and overleveraged firms try to reduce leverage.

Industry FE	Yes	Yes
Year FE	Yes	Yes
N	12424	11258
Adj. R ²	0.9985	0.9957

4.4 Heterogeneity Analysis

In this section, we re-explore the heterogeneous effect of SCF on capital structure adjustment from the perspectives of enterprise ownership structure and the region where the firm is registered.

First, we divide the full sample into state-owned and non-state-owned firms, with the grouped regression results reported in Table 8. As shown, the coefficient of the interaction term $Dev \times SCF$ is 0.1789 and significant at the 1% level in the non-state-owned group, while it is 0.0517 and significant at the 10% level in the state-owned group. This suggests that the positive effect of SCF on leverage adjustment speed is more pronounced for non-state-owned firms than for state-owned firms. This may be related to the finding that SCF alleviates financing constraints for small and medium-sized enterprises (SMEs), as demonstrated by Lou et al. (2024).

It is well known that financing constraints directly affect the capital structure adjustment of enterprises. According to the extant literature, state-owned enterprises can easily obtain external loans because of their larger size, better credit standing, and close political ties with the credit market, while private enterprises face various financing constraints (Cull et al., 2015; Ge et al., 2017). According to public information, as of September 2025, small and medium-sized enterprises accounted for 98.2% of non-state-owned firms in China. Therefore, the impact of supply chain finance on the leverage adjustment of non-state-owned enterprises will be more significant.

Table 8. Capital Structure Adjustment Heterogeneity in Ownership Structure

Variables	Non-state-owned firms (1)	state-owned firms (2)
Dev×SCF	0.1789*** (0.0269)	0.0517* (0.0276)
SCF	0.1543*** (0.0052)	0.1046*** (0.0058)

Dev	0.1380*** (0.0095)	0.1122*** (0.0089)
Control variables	Yes	Yes
Industry FE	Yes	Yes
Year FE	Yes	Yes
N	14798	8884
Adj. R ²	0.1353	0.0953

Second, according to the registered location of the enterprise, we split our samples into three groups: eastern, central, and western regions, and the split results are presented in Table 9. The coefficients of Dev×SCF are positive and significant in the eastern and central region samples, but not significant in the western region sample. This indicates that the eastern and central firms in our sample drive our benchmark regression results.

Generally speaking, the allocation of financial resources, supporting industrial chains, degree of marketization, and digital infrastructure will affect the coverage and risk identification efficiency of supply chain finance. Cheng et al. (2022) show that the local policy environment and financial development level can affect the role of supply chain finance. In China, supply chain finance in the eastern region leads other regions, with a solid foundation, dense financial institutions, active application of financial technology, and highly digitized capital and information flow services. The central region is the "leading goose" in the transfer of industries from the eastern region, and industrial upgrading brings a large demand for financing. Bank branches and credit systems are gradually improving, and SCF is catching up with the eastern region. In contrast, the financial foundation in the western region is relatively weak. The development status of SCF in eastern, central, and western China is consistent with the above research conclusions.

Table 9. Capital Structure Adjustment Heterogeneity in Region

	(1) Eastern region	(2) Central region	(3) Western region
Dev×SCF	0.1497*** (0.0224)	0.1421*** (0.0486)	0.0680 (0.0620)

SCF	0.1427*** (0.0046)	0.1570*** (0.0096)	0.1178*** (0.0121)
Dev	0.1255*** (0.0078)	0.1494*** (0.0169)	0.1272*** (0.0188)
Control variables	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes
Year FE	Yes	Yes	Yes
N	16606	4035	3041
Adj. R ²	0.1265	0.1356	0.0968

5. Conclusion, significance, limitations and future research directions

5.1 Conclusion

This paper empirically investigates the heterogeneous effect of supply chain finance on corporate leverage adjustment speed using a sample of Chinese A-share listed firms from 2010 to 2025. Employing a two-stage partial adjustment model, it draws several conclusions. First, SCF significantly accelerates the speed at which firms converge their leverage ratio toward target levels. This conclusion remains valid after addressing endogeneity issues using the instrumental variable method and system GMM, as well as conducting multiple robustness tests, including replacing core explanatory variables and excluding abnormal years. Second, a significant asymmetric effect exists between over- and under-leveraged firms: SCF mainly promotes the leverage adjustment speed of overleveraged firms, while it has a slightly inhibitory effect on underleveraged firms, indicating that SCF primarily adjusts capital structure through deleveraging channels. Third, the promoting effect of SCF on leverage adjustment is more pronounced in non-state-owned enterprises and in firms located in eastern and central China, where financial development and supply chain infrastructure are more advanced.

5.2 Significance

Theoretically, this paper enriches the research on the determinants of leverage adjustment speed from the novel perspective of supply chain finance, and expands the analytical framework of dynamic capital structure theory by incorporating supply chain factors. Practically, the findings

provide valuable insights for enterprises to optimize their capital structure decisions: firms can effectively reduce adjustment costs and improve capital structure efficiency by actively participating in supply chain financial activities. For regulators, the study highlights the importance of further promoting the development of supply chain finance, especially for non-state-owned enterprises and firms in central and western regions, so as to alleviate financing constraints and enhance the overall operational efficiency of the real economy.

In terms of international applicability, the core mechanism of SCF in reducing information asymmetry and financing constraints to accelerate leverage adjustment is generally applicable to global markets, as supply chain cooperation is a common feature of modern business operations across countries. However, the specific effect of SCF may vary across countries due to differences in legal systems, financial market maturity, and supply chain operation modes, and further cross-country comparative studies are needed to verify the generalizability of the conclusions.

5.3 Limitations and future research directions

Nevertheless, this study has several limitations. First, the sample is limited to Chinese A-share listed companies, which may not fully represent non-listed small and medium-sized enterprises (SMEs) that rely more heavily on supply chain finance. Second, the measurement of SCF in this paper relies on financial statement data, which cannot distinguish between different SCF modes (such as accounts receivable financing, inventory financing, and prepayment financing) and their heterogeneous effects. Third, this study focuses only on the impact of SCF on leverage adjustment without exploring the underlying mechanisms. These issues all merit further exploration in future research.

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Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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