Digital Transformation, Supplier Concentration, and Trade Credit Financing

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Abstract. With the widespread application of technologies such as big data and artificial intelligence, coupled with increasing policy support, digital transformation has permeated the entire business operation process, emerging as a pivotal force in reshaping the commercial credit ecosystem. This study therefore employs empirical research to explore the relationship between digital transformation and corporate commercial credit financing. The findings indicate that digital transformation does indeed facilitate commercial credit financing, and that reducing supplier concentration is a critical pathway through which digital transformation drives such financing. Heterogeneity analysis reveals that this promotional effect is more pronounced in central and western regions, state-owned enterprises, and high-tech firms. This study offers new insights into corporate financing logic in the digital era and provides valuable implications for governments to optimize digital support policies and for enterprises to advance digital transformation with precision.

Keywords: Digital Transformation; Commercial Credit Financing; ; Supplier Concentration

1 Introduction

As micro-level entities within the real economy, enterprises undergoing digital transformation not only optimize internal operational processes and external transaction models but also exert profound impacts on financing channels. As a vital component of external corporate financing[1], exploring the effects of digital transformation on commercial credit financing and its underlying mechanisms has become a significant unresolved issue in corporate financing research within the digital economy era. Existing research has extensively discussed the influencing factors of corporate commercial credit financing. From an internal governance perspective, characteristics such as integrity levels[2], social responsibility disclosure[3], strategic differentiation, and internal control quality have been shown to impact commercial credit financing outcomes by influencing partners' confidence in the firm's long-term operational stability. Concurrently, research on the economic consequences of digital transformation has primarily focused on areas such as corporate green innovation, supply chain efficiency[4], and sustainable performance[5]. While some studies have suggested that digital transfor-

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mation can indirectly influence financing efficiency by optimizing the information environment and reducing transaction costs, these often provide generalized analyses of commercial credit financing within broader financing frameworks, lacking focused, in-depth exploration.

Based on the above analysis, this study contributes in two key areas: Theoretically, it reveals the transmission channel of reducing supplier concentration and provides an in-depth analysis of heterogeneity across macro, meso, and micro levels, thereby refining the perspective on heterogeneity analysis. From a practical perspective, this paper proposes corresponding strategies to promote commercial credit financing based on empirical findings, providing valuable reference for enterprises in central and western regions, non-state-owned enterprises, and low-tech enterprises seeking to enhance commercial credit financing.

2 Theoretical Analysis and Research Hypotheses

Based on the theory of information asymmetry, since creditors determine the scale of commercial credit extended based on a company's creditworthiness and credit risk, the degree of information asymmetry directly impacts credit decisions and the scale of credit granted. The advancement and application of digitalization can promote the electronic, public, and transparent disclosure of corporate information. This enables credit providers to access corporate disclosure reports at any time, narrowing the digital divide between enterprises and lenders. Consequently, lenders need not adopt overly cautious approaches due to ambiguous or incomplete information, making them more willing to implement more lenient credit policies. Based on this, the following hypothesis is proposed.H1: Digital transformation exerts a significant positive driving effect on commercial credit financing.

From the perspective of supply chain management theory, under the traditional model, companies face high costs for information acquisition and low communication efficiency, which tends to lead to a high concentration of suppliers. While this may reduce costs in the short term, it exacerbates reliance on a single source. Digital platforms, however, break down geographical and information barriers, helping companies expand their supplier base. By screening suppliers to build a talent pool and enabling collaboration among multiple parties, these platforms effectively reduce reliance on a small number of suppliers. Therefore, Hypothesis H2 posits that the key mechanism through which digital transformation facilitates commercial credit financing is the reduction of supplier concentration.

3 Research Design

3.1 Sample Selection and Data Sources

This study employs all A-share listed companies from 2010 to 2024 as empirical samples. To mitigate the impact of outliers on results, the data underwent the following processing: first, exclusion of ST or ST* companies; second, exclusion of finan-

cial institutions; and third, removal of outliers. This yielded a final dataset of 20805 sample observations. All data were sourced from the CSMAR database.

3.2 Variable Definition and Measurement

Dependent variable. Following the methodology of scholar Shu Wei, the ratio of the sum of accounts payable, notes payable, and advance receipts to total assets is selected to measure the scale of a firm's commercial credit financing. This approach has the advantage of encompassing all funds involved in the firm's upstream and downstream supply chain. Dividing by total assets eliminates the influence of firm size. Explanatory variables. Drawing upon the research of scholar Wu Fei[6], we statistically analyze the keyword frequency across five dimensions—artificial intelligence technology, blockchain technology, cloud computing technology, big data technology, and digital technology applications—in corporate annual reports. Given the pronounced right-skewed nature of such data, this study adds one to the aggregated results before taking the logarithm. This process yields a comprehensive metric for measuring corporate digital transformation. Additionally, to eliminate confounding and interfering factors beyond the core explanatory variables and the dependent variable, ensuring the unbiased and precise estimation of the core causal relationship, this study also controlled for the following variables: Lev, ROA, ROE, Growth, Size, Age, Dual, MSR, Board, Indep, Top1 and Big4.

3.3 Model Construction

To test Hypothesis H1, this study constructs a main effects benchmark regression model:

$$TC_{it}=\alpha_0+\alpha_1 Digital_{it}+\alpha_j \sum_{j=1}^{n} control_{it}+\varepsilon_{it} \quad (1)$$

4 Empirical Analysis

4.1 Benchmark Regression Results

Table 1. Regression Results for the Base Model and Moderation Effects.

VARIABLES	TC	
	(1)	(2)
Digital	0.004***(6.410)	0.010***(19.079)
_CONS	0.152***(131.634)	0.313***(20.985)
Control variables	NO	YES
N	20805	20805
R^2	0.02	0.282

Table 1 presents the benchmark regression and moderation effect regression results. Columns (1) and (2) indicate that the empirical results are positively significant re-

gardless of whether control variables are included, confirming that digital transformation can indeed enhance commercial credit financing. Thus, Hypothesis 1 holds.

4.2 Robustness Tests

This paper constructs a new dummy variable (Digital_dum) based on whether enterprises have undergone digital transformation, replacing the explanatory variable. The dependent variable is replaced by net commercial credit financing, measured by calculating total commercial credit financing (TC) minus its mean. The results in Table 2 indicate that, even after changing the method of measuring the core variables, the positive impact of digital transformation on corporate commercial credit financing remains reliable and robust. China's digital development entered an accelerated phase starting in 2015, hence the sample period was adjusted to 2015-2024. However, considering the pandemic's impact on Chinese enterprises during 2020-2022, data from those years were also excluded. As shown in Column (3), changing the sample period does not alter the robustness of the core findings.

Table 2. Robustness Test Results.

VARIABLES	Replace core variables		Change the sample
	TC	TC1	TC
	(1)	(2)	(3)
Digital		0.010***(19.079)	0.010***(13.562)
Digital_dum	0.019***(12.512)		
_CONS	0.297***(19.836)	0.157***(10.491)	0.329***(14.691)
Control variables	YES	YES	YES
N	20805	20805	9709
R^2	0.275	0.282	0.284

4.3 Mechanism Analysis

This paper conducts a mechanism test, measures supplier concentration by the proportion of purchases from the top five suppliers, and constructs the regression model as follows:

$$CR5_{it}=\delta_0+\delta_1 Digital_{it}+\delta_j \sum_{j=1}^{n} control_{it}+\varepsilon_{it} \quad (2)$$

$$TC_{it}=\theta_0+\theta_1 Digital_{it}+\theta_2 CR5_{it}+\theta_j \sum_{j=1}^{n} control_{it}+\varepsilon_{it} \quad (3)$$

As shown in Table 3, the regression results indicate that the coefficient for digital transformation is -0.250. Meanwhile, the proportion of annual procurement spent with the top five suppliers is a positive indicator—a higher value signifies greater supplier concentration. Thus, the negative coefficient for digital transformation here confirms that it effectively reduces supplier concentration, validating the direct relationship between these two variables. When both supplier concentration and digital transformation

are included in the regression model for commercial credit financing, the coefficient for digital transformation decreases from 0.0104 (without supplier concentration) to 0.0102, while the coefficient for supplier concentration becomes negative. This result indicates that supplier concentration partially mediates the effect of digital transformation on commercial credit financing. Digital transformation indirectly promotes commercial credit financing by reducing supplier concentration, consistent with the theoretical expectation of a "digital transformation—supplier concentration—commercial credit financing" transmission mechanism. Hypothesis H2 is thus validated.

Table 3. Mechanism Analysis.

VARIABLES	TC	CR5	TC
	(1)	(2)	(3)
Digital	0.0104***(19.079)	-0.250**(-2.200)	0.0102***(18.951)
CR5			-0.001***(-16.625)
_CONS	0.152***(131.634)	29.668***(9.531)	0.330***(22.182)
Control variables	YES	YES	YES
N	20805	20805	20805
R^2	0.02	0.058	0.291

4.4 Heterogeneity Analysis

Columns (1) and (2) show that the promotional effect of digital transformation on corporate commercial credit financing is more pronounced in central and western regions. This phenomenon is actually not difficult to understand. Due to their inherent resource endowments, the scale of commercial credit financing in eastern regions has approached saturation, making the promotional effect of digital transformation relatively limited. In contrast, central and western regions lag behind in development and urgently need digital transformation to boost corporate credit financing. As shown in columns (3) and (4), the effect of high-tech enterprises remains significant after regression, while that of low-tech enterprises is insignificant. This indicates that the promotional effect varies depending on industry attributes. As evident from Column (5) and Column (6), the regression coefficients are positively significant at the 1% level for both SOEs and NSOEs. This indicates that the positive driving effect of digital transformation on commercial credit financing exhibits property rights universality. As shown in Table 4.

Table 4. Heterogeneity Analysis.

VARIABLES	Eastern	Central and Western	High-Tech	Low-Tech	State-Owned	Non-State-Owned
	(1)	(2)	(3)	(4)	(5)	(6)
Digital	0.009***	0.015***	0.006***	0.014	0.017***	0.006***
	(14.649)	(12.300)	(9.235)	(14.398)	(17.410)	(9.074)
_CONS	0.335***	0.274***	0.235***	0.344	0.430***	0.222***
	(19.223)	(9.370)	(11.031)	(16.439)	(18.768)	(9.869)

Control variables	YES	YES	YES	YES	YES	YES
N	14739	6066	10883	9922	10570	10235
R^2	0.301	0.255	0.388	0.273	0.254	0.345

5 Conclusions and Countermeasures

This paper finds that digital transformation significantly boosts firms' commercial credit financing. Accordingly, two recommendations are put forward: First, the government should optimize the environment supporting digital transformation while balancing regional and sectoral development. For regions in central and western China that lag behind in development, efforts should be intensified to build digital transformation infrastructure; furthermore, the digital development of eastern regions should not be neglected, and efforts should be made to advance digital transformation in these areas toward greater refinement and specialization. Second, lenders should improve digital credit assessment systems and broaden the scope of credit supply. For non-state-owned enterprises and low-tech enterprises, lenders should demonstrate greater patience and trust by slightly relaxing credit conditions; once these enterprises navigate the critical transition period, they will inevitably become stable and reliable partners.

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