

# Enterprise Digital Transformation and Misallocation of Credit Resources

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**Abstract.** Rational allocation of resources is the way to realize the high-quality development of China's economy. This paper empirically examines the impact of enterprise digital transformation on misallocation of credit resources using Chinese A-share listed companies in Shanghai and Shenzhen from 2007 to 2022 as the research samples. Baseline regression results show that there is a significant inhibitory effect of enterprise digital transformation development on misallocation of enterprise credit resources. Through the mediation analysis, it is found that improving the quality of enterprise internal controls, reducing the management of accrued surplus and lowering the cost of debt financing are effective paths for enterprise digital transformation to inhibit misallocation of enterprise credit resources. Further, the heterogeneity analysis based on the perspectives of enterprise micro characteristics and macro market environment shows that the non-state and high-tech attributes of enterprises and high marketization degree will strengthen the inhibitory effect of enterprise digital transformation on misallocation of enterprise credit resources. The findings are of great revelation to further promote the rational allocation of credit resources under the enterprise digital transformation.

**Keywords:** Digital Transformation; Misallocation of Credit Resources; Internal Controls Quality; Accrual Surplus Management; Debt Financing Cost.

## 1. Introduction

At this critical stage of China's economic transformation from rapid growth to high-quality development, especially against the backdrop of the scarcity of economic resources, great importance has been attached to improving the efficiency of resources allocation. The Fourth Plenary Session of the 19th CPC Central Committee put forward the requirement of promoting efficient and fair allocation of factors in the market, and since then the 14th Five-Year Plan and the National People's Congress of 2024 have also emphasized the need to "focus on improving the efficiency of factors allocation", "correcting the imbalance and misallocation of resources" and "deepening the comprehensive reform of market-based allocation of factors", respectively. At the same time, more and more literature shows the importance of resources allocation efficiency for economic growth [1], of which Hsieh and Klenow (2009) point out that if China's resources allocation efficiency is raised to the level of the United States, China's total factors productivity will be raised by 30%-50% [2]; Ting Shao (2010) points out that if financial mismatch is eliminated, China's GDP growth can be increased by 2%-8% [3]; Heng Yin and Shigang Li (2019) estimate that the room for improvement in China's resources allocation efficiency reaches 160% [4]. It is clear that optimizing resources allocation efficiency is the way to achieve high-quality development of China's economy. Enterprises are the most active micro subjects in the market, and Pei Zhang and Hong Ma (2012) argue that the loss of total factors productivity in China stems from credit misallocation at the micro level [5], so it is a necessary and relevant proposition to pay attention to enterprise credit resources allocation and study how to promote the optimal resources allocation of micro enterprises.

Most of the existing literature explores the factors affecting the efficiency of resources allocation from macro perspectives, such as studying market economy development [6-8], government policy [9-12], technological and financial development [13-17] on resources allocation. Some scholars have also explored the micro factors, such as corporate governance [18-21], leverage [22], information

asymmetry [23]. Enterprise digital transformation is a research proposition that has attracted much attention in recent years, and there has been a large body of literature demonstrating that it can have a positive effect on the improvement of corporate performance and governance and business model innovation [24-28], which is an important driving force for enterprises to improve quality and efficiency [29], and also is an important driving force to promote the high-quality development of China's economy [30]. Considering that the digital transformation of enterprises has given rise to new technologies, new business forms and new modes, bringing profound changes to enterprises [31], it is highly likely to affect the efficiency of enterprise credit resources allocation. Kang Xie et al. (2023) realized that the essence of high-quality digital transformation lies in the use of data elements to improve the efficiency of enterprise internal and external resources reallocation [32]. However, few studies have further linked enterprise digital transformation to credit resources misallocation. Therefore, this paper aims to explore the impact of enterprise digital transformation on misallocation of enterprise credit resources from the micro level to fill the gap of relevant research.

This paper takes Chinese A-share listed companies in Shanghai and Shenzhen from 2007 to 2022 as the research samples, explores the impact of enterprise digital transformation on misallocation of credit resources. The study digs deeper into the inner mechanism of the impact in terms of the enterprise internal controls quality, accrued surplus management, and debt financing cost, which also analyzes the heterogeneity of the micro perspective of the nature of enterprise's property rights and technological attributes, as well as the macro perspective of the market environment.

Building on existing research, the possible theoretical and practical contributions to this paper can be listed as follows. Firstly, it enriches the research on the influencing factors of credit resources allocation at the micro level from the perspective of enterprise digital transformation. Existing literature mainly explores the impact of policy changes, marketization process, technological development, etc. on resources allocation from the macro perspectives, while few literature explores the factors affecting enterprise resources allocation at the micro level. This study finds that enterprise digital transformation has an inhibitory effect on misallocation of credit resources, which expands a new way of thinking for exploring the influencing factors of enterprise credit resources allocation efficiency from the micro perspectives. In addition, from the perspective of enterprise credit decision-making, it enriches the related research on the economic consequences of enterprise digital transformation. At present, academics have mainly studied the impact of enterprise digital transformation on enterprise performance, business model, industrial structure upgrading and high-quality economic development, while there are few empirical discussions on how enterprise digital transformation affects enterprise credit resource misallocation. This paper expands the research on the economic consequences of enterprise digital transformation to help academics understand the role of digitalization on enterprise development. Moreover, currently both promoting enterprise digital transformation and improving resources allocation efficiency are important ways to promote the high-quality development of China's economy. This paper explores in depth the intrinsic mechanism of enterprise digital transformation on misallocation of credit resources, and examines the impact under the conditions of different property rights nature, technological attributes and market environment respectively, which finds that the conditions of non-state-owned enterprises, high-tech enterprises, and enterprises with a higher degree of marketization in the region where they are located have a positive moderating effect on the impact, which will provide theoretical basis and empirical support for better promoting the positive effect of enterprise digital transformation on credit resources allocation efficiency.

## **2. Theoretical Analysis and Hypothesis Formulation**

With the new round of technological and industrial revolution in full swing, digitalization with innovative information technology has become an important driving force to promote the high-quality development of China's economy. Xiang Xu and Mofei Zhao (2020) found that data capital provides an innovative expression of data processing capacity in promoting enterprise factors allocation, demonstrating the powerful role played by data factor in high-quality development over traditional

factors [33]. A large number of studies have shown that the development of the digital economy significantly improves resources allocation efficiency and total factors productivity [27,34]. On the contrary, misallocation of credit resources seriously hampers production efficiency and economic growth [2,35]. Then, the enterprise digital transformation, as a micro presentation of the development of the digital economy, will most likely use data elements to bring about comprehensive changes for enterprises, which in turn will have a significant impact on the mismatch of credit resources in enterprises, and ultimately act on the high-quality growth of the macro-economy. Therefore, this paper explores the impact of enterprise digital transformation on misallocation of credit resources and the internal mechanism from the three main paths of enterprise internal controls quality, accrued surplus management and debt financing cost.

Enterprise digital transformation can effectively improve the quality of internal controls, enhance corporate governance, and then inhibit the misallocation of enterprise credit resources. With the deep integration of digital technologies such as artificial intelligence, big data and the Internet of Things with the real economy, digitalization will have a profound impact on the internal and external environment of enterprises [36]. For one thing, digital transformation promotes changes in the internal management mode of enterprises, reduces the burden of hierarchical management and improves management efficiency by optimizing the organizational structure [36], which tends to be networked and flattened [37]. At the same time, digitalization empowers the enterprise information structure to upgrade from hierarchical to network format on the one hand, greatly enhancing the timeliness of information transmission and accuracy of information processing within the enterprise, and reducing interdepartmental information discrepancies; on the other hand, the application of digital technology to realize the intelligence and visualization of operation and management is conducive to the effective supervision of production and management decision-making [38], alleviating the principal-agent problem, and urging the management to standardize their own behavior [39], and enhance internal control capabilities. For another thing, the enterprise digital transformation utilizes digital technologies such as big data to broaden the channels of information acquisition and circulation [40], facilitating the management to accurately identify the relationship between internal and external resources allocation, and providing assistance to the management to make reasonable and effective resource allocation decisions through the support of high-granularity data, supervising the management to reduce inefficient investment and financing, and alleviating the misallocation of credit resources. In addition, the digitization process also strengthens corporate governance by improving the implementation, supervision and feedback mechanisms of the internal control system [26]. Ultimately, the digital transformation of enterprises suppresses the misallocation of enterprise credit resources by improving the internal quality controls and corporate governance [41,42].

The digital transformation of enterprises can effectively reduce the enterprise accrual surplus management and improve the quality of accounting information, so as to inhibit the misallocation of enterprise credit resources. Taking advantage of the flexibility in the application of accounting standards, enterprises may adopt accrual surplus management behavior for the motives of management self-interest, financing and meeting capital market expectations [43], while enterprises that upwardly adjust their profits through surplus management obtain more credit resources [21], they tend to carry out inefficient investments, distorting the efficiency of credit resources allocation [5]. In contrast, enterprise digital transformation can reduce the degree of information asymmetry from both direct and indirect aspects, inhibit accrual surplus management behavior, and thus improve the efficiency of credit resources allocation. At the direct level, digital technology can informatize and visualize the enterprise's business management activities, increase information transparency, and form a natural real-time monitoring mechanism. While the application of cloud platforms, blockchain and other technologies promotes the sharing of data among functional departments and strengthens the enterprise's supervision of various departments and staff. In this case, management's discretion in the selection of accounting policies and accounting estimates has been greatly weakened, and its incentives and maneuverable space for accrual surplus management will be reduced. Indirectly, the information visualization brought about by digital transformation reduces the information asymmetry

in and out the firms, improves the comparability of accounting information [38], and reduces the cost of external supervision such as auditing. And the increased power of external supervision increases the risk of detection of accruals management and reduces the likelihood that management will collaborate with various functionaries in carrying out such instable financial behaviors. Therefore, the digital transformation of firms improves the accounting information quality by reducing accruals management [43,44], which ultimately contributes to the suppression of credit resources misallocation in firms.

Enterprise digital transformation can effectively alleviate information asymmetry, reduce debt financing cost, and further inhibit the misallocation of enterprise credit resources. According to Haoping Xu and Changjiang Lv (2007), enterprise risk is a determinant of enterprise cost of capital [45]. However, in China's financial system dominated by the indirect financing method of bank credit, adverse selection and moral hazard due to information asymmetry make traditional financial institutions such as banks more willing to flow credit resources to enterprises with stable risks, while enterprises with higher production efficiency face harsher financing conditions and more expensive debt financing cost due to the nature of property rights or scale disadvantages [46], resulting in a distorted allocation of credit resources. Under credit discrimination, enterprises facing financing difficulties can only seek informal financial support such as "rent-seeking" [47], further worsening the degree of credit resources misallocation. The enterprise digital transformation can improve the predicament of expensive financing for some enterprises. Firstly, the connectivity, openness, sharing and other characteristics of digital technology [48] can effectively reduce the degree of information asymmetry between banks and other financial institutions and enterprises, and while reducing the cost of identification of financial institutions, it makes them more aware of the actual operation of the enterprises, thus easing the debt financing conditions and reducing the requirements of the risk premium, and further lowering the debt financing cost enterprises [41]. Secondly, digital technology can help enterprises reduce the degree of information asymmetry with the capital market, improve their ability to obtain and process information, so that they can clarify the optimal financing channels and alleviate the mismatch of the enterprise's investment and financing terms [49], thus reducing the debt financing cost borne by the enterprise. Moreover, the enterprise performance improvement brought by enterprise digital transformation can enhance the positive market expectations [41], which is more conducive to enterprise financing, and thus alleviate the misallocation of credit resources. Therefore, enterprise digital transformation can restrain the misallocation of enterprise credit resources [5,50] by reducing debt financing cost [29,51]. Based on the above analysis, this paper proposes the following research hypothesis:

H1: Enterprise digital transformation can significantly inhibit misallocation of enterprise credit resources.

### **3. Research Design**

#### **3.1. Samples Selection and Data Sources**

This paper takes Chinese A-share listed companies in Shanghai and Shenzhen from 2007 to 2022 as the research objects. The basic characteristics of listed companies and financial data are obtained from the CSMAR database. Following the conventions of the existing literature, this paper deletes the samples of financial firms, the samples of ST firms, and the samples with missing main variables. In addition, in order to avoid the impact of outliers on the empirical results, this paper further applies a two-sided 1% shrinkage to all continuous variables. Finally, 37,954 firm-year observations are obtained.

#### **3.2. Definition of Variables**

Explained variable: misallocation of enterprise credit resources (*FM*). Drawing on the studies of Ting Shao (2010), Yuhao Zhou and Shengyong Zhang (2014), this paper uses the extent to which a firm's cost of funds deviates from the industry's average cost of funds to reflect the extent of the

misallocation of enterprise credit resources [3,52]. Besides, the cost of corporate funds is measured using the ratio of interest expense in finance costs to total liabilities net of accounts payable. Since the degree of deviation of the cost of funds of enterprises from the industry average cost of funds can be positive or negative, in order to standardize the measurement of the degree of misallocation, the calculated deviation is taken as an absolute value, and the larger the indicator, the higher the degree of misallocation of credit resources.

Core explanatory variable: enterprise digital transformation (*DT*). Referring to the study of Fei Wu et al. (2021), this paper takes the word frequency of digital transformation-related keywords in enterprise annual reports as a proxy variable for the level of enterprise digital transformation [41]. Specifically, the word frequencies of five aspects related to digital transformation, namely, artificial intelligence technology, blockchain technology, cloud computing technology, big data technology and digital technology application, are classified and extracted from enterprise annual reports, and then summed up to form the total word frequencies and logarithmized them. The larger the indicator, the higher the level of enterprise digital transformation.

Control variables. Following the existing literature, this paper controls for firm's size, age, leverage, profitability, growth capacity, Tobin's Q, percentage of tangible assets, operating cash flow, shareholding concentration, institutional shareholding ratio, proportion of independent directors, two jobs in one, and government subsidy as firm-level characteristics. Meanwhile, this paper also controls for the macro-level characteristics of government regulation.

### 3.3. Modeling

In order to test the impact of enterprise digital transformation on misallocation of enterprise credit resources, this paper designs the model as follows:

$$FM = \alpha + \beta DT + \sum Control + \sum year + \sum Industry + \varepsilon \quad (1)$$

In this model, the explanatory variable *FM* represents the misallocation of enterprise credit resources, the explanatory variable *DT* stands for the enterprise digital transformation, *Control* represents the control variable selected, *year* and *Industry* are the year and industry fixed effects respectively, and  $\varepsilon$  is the random perturbation term.

## 4. Empirical Results and Analysis

### 4.1. Descriptive Statistics

Table 1 shows the results of descriptive statistics of the variables. As shown in the table, the mean value of misallocation of enterprise credit resources (*FM*) is 0.649, the median is 0.574, and the minimum and maximum values are 0.010 and 3.581 respectively, indicating that there is a large variation in the degree of credit resources misallocation among enterprises. The mean value of enterprise digital transformation (*DT*) is 1.276, and the median is 0.693, indicating that the degree of development of digital transformation across enterprises shows significant differentiation and is basically consistent with the results of the existing literature by Fei Wu et al. (2021) [41].

### 4.2. Baseline Regression

In order to study the impact of enterprise digital transformation on misallocation of enterprise credit resources, this paper uses model (1) to conduct multiple regression tests. To make the regression results robust, this paper controls for time and industry fixed effects and corrects for standard errors using individual clustering effects. In the baseline regression, the study uses a progressive regression strategy. Table 2 reports the regression results. Column (1) presents the empirical results controlling only for time and industry fixed effects, and the estimated coefficient of *DT* is significantly negative at the 1% level. Column (2) presents the empirical results after the addition of the set of control variables, and the estimated coefficient of *DT* is still shown to be negative and passes the 1% statistical

significance test. It indicates that the development of enterprise digital transformation has a significant inhibitory effect on misallocation of enterprise credit resources, and the higher the degree of enterprise digital transformation, the lower the degree of enterprise credit resources misallocation. Therefore, hypothesis 1 is proved.

**Table 1.** Descriptive statistics of main variables

Variable	Obs.	Mean	Std	Min	Median	Max
<i>FM</i>	37954	0.649	0.535	0.010	0.574	3.581
<i>DT</i>	37954	1.276	1.374	0.000	0.693	4.997
<i>scale</i>	37954	22.122	1.282	19.310	21.926	26.120
<i>age</i>	37954	17.593	6.082	4.000	17.000	33.000
<i>lev</i>	37954	0.416	0.205	0.051	0.409	0.989
<i>ROE</i>	37954	0.058	0.143	-0.956	0.072	0.362
<i>growth</i>	37954	0.352	0.999	-0.757	0.121	8.128
<i>tobinq</i>	37954	1.999	1.259	0.855	1.603	9.347
<i>PPE</i>	37954	0.355	0.175	0.016	0.343	0.797
<i>ocf</i>	37954	0.048	0.070	-0.189	0.048	0.258
<i>stg</i>	37954	0.593	0.152	0.226	0.603	0.952
<i>org</i>	37954	0.447	0.250	0.004	0.465	0.928
<i>indep</i>	37954	0.374	0.053	0.300	0.333	0.571
<i>merge</i>	37954	0.288	0.453	0.000	0.000	1.000
<i>sub</i>	37954	0.442	1.043	0.000	0.130	7.564
<i>gov</i>	37954	0.025	0.031	0.000	0.011	0.136

### 4.3. Endogeneity and Robustness Checks

To further examine the robustness of the regression results and to address potential endogenous issues, this paper conducts several robustness and endogeneity checks including: substituting the core explanatory variable, adding control variables, reducing the sample size, and doing the propensity score matching method. The results of these checks consistently indicate that the regression coefficients for *DT* are largely in agreement with the baseline regression results, affirming the reliability and robustness of the study's conclusions. (Due to space limitations in the publication, detailed results are available upon request.)

### 5. Mediation Analysis

The theoretical analysis in the previous section shows that the main channels of enterprise digital transformation to inhibit enterprise credit resources misallocation. Therefore, this paper selects enterprise "internal controls quality", "accrued surplus management" and "debt financing cost" for verification. In order to portray the mechanism paths of enterprise digital transformation affecting the misallocation of enterprise credit resources, the study uses the mediation effect model for testing referring to the study of Zhonglin Wen et al. (2004) [53].

**Table 2.** Baseline regression results

	(1)	(2)
	<i>FM</i>	<i>FM</i>
<i>DT</i>	-0.023*** (-5.83)	-0.012*** (-3.05)
<i>scale</i>		-0.049*** (-9.46)
<i>age</i>		0.001* (1.71)
<i>lev</i>		-0.248*** (-8.61)
<i>ROE</i>		-0.357*** (-10.83)
<i>growth</i>		0.002 (0.49)
<i>tobinq</i>		0.005* (1.69)
<i>PPE</i>		-0.096*** (-3.35)
<i>ocf</i>		0.509*** (9.54)
<i>stg</i>		0.008 (0.25)
<i>org</i>		-0.018 (-0.86)
<i>indep</i>		0.050 (0.71)
<i>merge</i>		0.005 (0.60)
<i>sub</i>		-0.003 (-0.72)
<i>gov</i>		-0.089 (-0.62)
Year and Industry fixed effects	Yes	Yes
Obs.	37954	37954
R <sup>2</sup>	0.088	0.125

Note: \*\*\*, \*\*, and \* represent 1%, 5%, and 10% significance levels, respectively. T-values for two-sided tests corresponding to robust standard errors for individual clustering are in parentheses. The following tables are identical.

### **5.1. Enterprise Digital Transformation, Enterprise Internal Controls Quality and Misallocation of Enterprise Credit Resources**

This paper adopts the "internal control index" disclosed by DIB database as a proxy for the quality of internal control of enterprises [42,54], which is denoted as *IC*. Column (1) of Table 3 shows that the coefficient of *DT* is significantly positive at the 1% level, indicating that enterprise digital transformation significantly improves the quality of corporate internal controls. Column (2) shows that the coefficient of *IC* is significantly negative at the 1% level, revealing that the improvement of corporate internal controls quality significantly inhibits corporate credit resources misallocation; the coefficient of *DT* is negative at the 5% significance level and the absolute value of the coefficient decreases, suggesting that improving the quality of corporate internal controls is one of the intermediary factors of enterprise digital transformation to inhibit misallocation of enterprise credit resources.

### **5.2. Enterprise Digital Transformation, Accrued Surplus Management and Misallocation of Enterprise Credit Resources**

Drawing on existing literature, this paper refers to the modified Jones model of Dechow et al.(1995), and constructs variable *DA*, as a proxy variable for the corporate accrued surplus management [55]. Column (3) of Table 3 shows that the coefficient of *DT* is significantly negative at the 1% level, indicating that enterprise digital transformation significantly reduces the scope for corporate surplus management and improves the quality of accounting information. Column (4) shows that the coefficient of *DA* is significantly positive at the 1% level, revealing that accrued surplus management does exacerbate credit resource misallocation of enterprises; the coefficient of *DT* is negative at the 5% significance level and is significantly lower in absolute value than that at the baseline regression, indicating that after controlling for the accrued surplus management of enterprises, the marginal effect of the impact of enterprise digital transformation on the misallocation of enterprise credit resources decreases. This implies that the accrued surplus management is a partial mediator between the development of enterprise digital transformation and the mitigation of enterprise credit resources misallocation.

### **5.3. Enterprise Digital Transformation, Debt Financing Cost and Misallocation of Enterprise Credit Resources**

Drawing on the studies of Zhihua Wei et al. (2012) and Guangzi Li and Li Liu (2009), the study constructs variable *cost* to represent the firm's debt financing cost [46,50]. Column (5) of Table 3 shows that the coefficient of *DT* is significantly negative at the 10% level, indicating that the digital transformation of enterprises can significantly reduce their debt financing costs. Column (6) shows that the coefficient of *cost* is significantly positive at the 1% level, revealing that the reduction of corporate debt financing cost can indeed inhibit the misallocation of enterprise credit resources; the coefficient of *DT* is significantly negative at the 5% significance level and the absolute value of the coefficient decreases compared to the baseline regression, which implies that the reduction of debt financing cost is one of the intermediary factors between the development of enterprise digital transformation and the mitigation of enterprise credit resources misallocation.

## **6. Heterogeneity Analysis**

Considering that the inhibitory effect of enterprise digital transformation on misallocation of enterprise credit resources may change due to the differences in enterprise micro characteristics and macro market environment, this paper conducts heterogeneous regression analyses on the nature of property rights and technological attributes of enterprises at the micro level, and on the degree of marketization of the region where the enterprise is located at the macro level respectively, in order to further explore the differences in the impact of enterprise digital transformation on misallocation of enterprise credit resources under different conditions.

**Table 3.** Results of mediation analysis

	(1)	(2)	(3)	(4)	(5)	(6)
	<i>IC</i>	<i>FM</i>	<i>DA</i>	<i>FM</i>	<i>cost</i>	<i>FM</i>
<i>DT</i>	2.658*** (3.28)	-0.008** (-1.98)				
<i>IC</i>		-0.000*** (-6.38)				
<i>DT</i>			-0.441*** (-5.04)	-0.008** (-2.08)		
<i>DA</i>				0.001*** (3.86)		
<i>DT</i>					-0.000* (-1.88)	-0.010** (-2.57)
<i>cost</i>						9.390*** (19.94)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year and Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	34581	34581	34328	34328	37954	37954
R <sup>2</sup>	0.236	0.129	0.472	0.127	0.305	0.175

At the micro level, for one, this paper divides the enterprise samples into non-state-owned enterprises and state-owned enterprises, and constructs the variable *pro*, which takes the value of 1 when the enterprise is non-state-owned, and 0 otherwise. Next, add the nature of the enterprise's property rights (*pro*), the interaction term between digital transformation and the nature of the property rights ( $DT \times pro$ ) into the model (1). The regression results in column (1) of Table 4 show that the coefficient of  $DT \times pro$  is significantly negative at the 1% level, indicating that compared with state-owned enterprises, the digital transformation of non-state-owned enterprises has a more significant positive moderating effect on the inhibition of enterprise credit resources misallocation. There may be two reasons: firstly, credit discrimination, meaning credit resources flow more to state-owned enterprises, is one of the forms of credit resources misallocation (Yuhao Zhou and Shengyong Zhang, 2014) [52]. While non-state-owned enterprises are subjected to more serious financing discrimination than state-owned enterprises (Guangzi Li and Li Liu, 2009) [46], and have been facing the "difficult and expensive financing" dilemma, causing the degree of distortion of resources allocation more serious. The digital transformation can effectively improve enterprise performance, reduce information asymmetry, and then reduce the financing cost of non-state enterprises, and ultimately play a more obvious inhibiting effect on the misallocation of credit resources of non-state enterprises; secondly, there are multiple constraints on the development of state-owned enterprises, such as a high degree of path dependence (Sujian Huang et al, 2018) [56], which largely affects the development of its paradigm shift and development status leapfrog. Besides, SOEs are not aiming at profit maximization, and they are more likely to make inefficient investments due to policy burdens, which ultimately leads to the weakening of the effect of SOEs' digital transformation on misallocation of credit resources. For another, the study refers to the study of Qi Shi et al. (2020) and constructs the variable *ht*, classifying the samples of firms that are in the high-tech industry as high-tech firms, with the *ht* taking the value of 1, or 0 otherwise [57]. The interaction of the firm's technological attributes (*ht*), and the digital transformation and technological attributes term ( $DT \times ht$ ) are added into model (1). The regression results in column (2) show that the  $DT \times ht$  coefficient is significantly negative at the

1% level, indicating that the inhibitory effect of digital transformation on credit resources misallocation is more pronounced in high-tech firms relative to non-high-tech firms. The possible reason is that high-tech enterprises have a natural technological first-mover advantage. Related to non-high-tech enterprises, they can use digital transformation technology more effectively, applying it to the optimization of processes in enterprise production, operation, and management, which in turn enhances the inhibitory effect of digital transformation of high-tech enterprises on the misallocation of credit resources. At the same time, the high-risk characteristics of high-tech enterprises and the information asymmetry that exists between high-tech enterprises and banks make them face more serious credit constraints (Li Li et al., 2015) [58], leading to the relatively high degree of credit resources misallocation. As a result, the inhibitory effect of the digital transformation of high-tech enterprises on the misallocation of credit resources will be more significant.

**Table 4.** Results of heterogeneity analysis

	(1)	(2)	(3)
	<i>FM</i>	<i>FM</i>	<i>FM</i>
<i>DT</i> × <i>pro</i>	-0.026*** (-3.70)		
<i>pro</i>	0.046*** (3.31)		
<i>DT</i> × <i>ht</i>		-0.021*** (-2.85)	
<i>ht</i>		-0.038 (-0.27)	
<i>DT</i> × <i>market</i>			-0.006*** (-3.40)
<i>market</i>			0.007* (1.77)
<i>DT</i>	0.007 (0.98)	-0.002 (-0.37)	0.049*** (2.66)
Controls	Yes	Yes	Yes
Year and Industry fixed effects	Yes	Yes	Yes
Obs.	37954	37954	37948
R <sup>2</sup>	0.126	0.125	0.125

At the macro level, enterprises may be affected by the degree of marketization in their regions. It has been found that the marketization process improves the efficiency of capital allocation in China's high-tech industries (Kuiqiao Dai and Youjin Liu, 2020) [7]. And considering the differences in the degree of marketization in regions (Xiaolu Wang et al., 2019) [59], there is a necessity to study the moderating role of the degree of marketization on the impacts of the digital transformation of enterprises and the misallocation of credit resources. Therefore, this paper adopts the marketization index reported in Xiaolu Wang et al. (2019) as a proxy indicator for the degree of marketization in the region [59], denoted as *market*. Next, the degree of marketization of the region (*market*), and the interaction term between enterprise digital transformation and the degree of marketization of the region (*DT*×*market*) are added in model (1). The regression results in column (3) of Table 4 show that the coefficient of *DT*×*market* is significantly negative at the 1% level, indicating that the inhibitory effect of enterprise digital transformation on credit resources misallocation is more

pronounced in regions with a high degree of marketization. The possible reasons for this are that regions with a higher degree of marketization have faster information transmission speeds, lower levels of information asymmetry and more sound market mechanisms, thus ensuring that enterprises can more effectively curb the misallocation of credit resources through digital transformation.

## **7. Conclusion**

How to improve the efficiency of credit resources allocation has always been an important issue in academic and practical research, while the development of enterprise digital transformation has been confirmed by a large number of studies to bring profound changes to enterprises. Although the influence factors of credit resources allocation have been examined in the literature from macro and micro perspectives, few scholars have studied the impact of enterprise digital transformation on enterprise credit resources allocation at the micro level. Therefore, this paper takes Chinese Shanghai and Shenzhen A-share listed companies from 2007 to 2022 as the research objects, empirically examines the impact of enterprise digital transformation on misallocation of enterprise credit resources, and carries out mediation analysis of enterprise internal controls quality, accrual surplus management and debt financing cost, as well as conducts heterogeneity analysis based on the micro characteristics of the enterprises and the macro market environment. The study conclusions mainly obtained can be listed as follows.

First, enterprise digital transformation significantly inhibits misallocation of enterprise credit resources. Second, enterprise digital transformation can effectively improve the quality of enterprise internal controls, reduce the management of accrued surplus and the cost of debt financing, and then inhibit the misallocation of enterprise credit resources. Third, when the enterprise is a non-state-owned enterprise or a high-tech enterprise, and is located in a region with a higher degree of marketization, the inhibitory effect of digital transformation on the misallocation of enterprise credit resources is stronger.

This paper has the following insights for policy formulation and enterprise development. As for policy formulation, firstly, steadily promote the digital transformation of enterprises, encourage enterprises to carry out digital transformation through appropriate government subsidies, and guide enterprises to apply artificial intelligence, blockchain, cloud computing, big data and other digital technologies to optimize the business management mode, improve the efficiency of information circulation, and help enterprises to complete the decision of reasonable credit resources allocation. Secondly, using the sharing characteristics of data, build an information cloud platform to enhance information exchange between enterprises and the capital market and reduce the degree of information asymmetry. At the same time, use digital technology to improve the transparency of enterprise information, improve internal and external supervision mechanisms, and improve the quality of enterprise information disclosure, so as to promote the market's reasonable investment and financing and alleviate the mismatch of credit resources. Thirdly, combining the current situation of the impact of enterprise digital transformation on credit resources mismatch under different micro features and macro environments, give priority to supporting the promotion of digital transformation among non-state-owned enterprises, high-tech enterprises and enterprises in regions with a high degree of marketization, focusing on cultivating their ability to carry out credit resources allocation activities relying on data technology, and attempting to build a group of practically excellent enterprises, which, after forming a new mode of digital transformation, will drive other enterprises to carry out digital transformation and provide practical experience for their exploration of digitization-enabled credit resources allocation. Meanwhile, encourage and guide enterprises with different characteristics to execute differentiated digital transformation modes to avoid inefficient homogenized transformation. Fourthly, recognizing that marketization plays a stronger role in digital suppression of credit resources misallocation, a pilot city for digital transformation can be set up to promote the marketization process while advancing the digital transformation of enterprises in the region, and to promote the digital transformation cohort effect, so as to maximize the release of the effect of digital suppression of credit resources misallocation and to play the role of the digital economy as an engine

of economic growth. As for enterprises, firstly, they should actively respond to digital transformation, use digital technology to carry out changes in operation and management, explore the digitization and intellectualization of decision-making processes, enhance the efficiency of internal and external information acquisition, information processing and information circulation, establish a digital process supervision system, and grasp investment and financing opportunities through Internet to reduce transaction costs and thus improve the efficiency of their own credit resources allocation. Secondly, it attaches importance to the excavation and cultivation of composite talents mastering digital technology, and at the same time focuses on cultivating the computer application ability of employees, so as to enhance the level of digital transformation of enterprises, and serve the allocation of credit resources more efficiently. Thirdly, non-state-owned enterprises and high-tech enterprises should be aware of the benefits of digital transformation to the long-term development of enterprises, especially the active use of digital technology to make up for the disadvantage of financing costs brought about by credit discrimination, optimize the allocation of enterprise resources, and contribute to the sustainable and high-quality development of enterprises.

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