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The Impact of FinTech Development on the Digital Transformation of Enterprises

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Abstract: Financial Technology empowers enterprises to rapidly enhance their own capabilities and lays a solid foundation for their stable development. Consequently, it is of great significance to further explore the specific relationship between FinTech and enterprises' digital transformation. This paper selects relevant data of enterprises from 2013 to 2023, adopts an empirical approach, and constructs a panel regression model to investigate the impact of FinTech on enterprises' digital transformation. The empirical results show that the development of FinTech exerts a positive effect on enterprises' digital transformation, with obvious regional heterogeneity effects and mediating effects of financing constraints. On this basis, the paper puts forward reference suggestions for promoting enterprises' digital transformation, which can serve as a reference for enterprises.

Keywords: Financial Technology; Digital Transformation; Mediating Effect of Financing Constraints.

1. Introduction

In the contemporary era of in-depth integration of informatization and digitalization, FinTech (Financial Technology), as a key driver of enterprises' digital transformation, is constantly reshaping the service models and business processes of the financial industry, and exerting a profound impact on the digitalization process of enterprises. By introducing modern information technologies and digital solutions, digital transformation comprehensively reconstructs enterprises' business processes, organizational structures, and value creation mechanisms, and has become a crucial path for enterprises to improve operational efficiency, enhance competitive advantages, and achieve sustainable development.

Relying on cutting-edge technologies such as big data, artificial intelligence, and blockchain, FinTech provides enterprises with a wealth of tools and solutions. It not only optimizes internal management processes and service capabilities, but also significantly improves the level of data value mining and precision marketing, thereby strengthening enterprises' core competitiveness. Particularly noteworthy is that FinTech drives enterprises to achieve digital transformation from two dimensions: capital support and technological empowerment. On the one hand, it alleviates financing constraints; on the other hand, it promotes the evolution of enterprises' digitalization level to a higher stage through the integration of underlying technologies.

Against this backdrop, in-depth exploration of the mechanism and impact paths of FinTech on enterprises' digital transformation holds important theoretical and practical significance. This paper adopts an empirical approach to systematically analyze the driving effect, regional heterogeneity, and mediating mechanism of FinTech on enterprises' digital transformation. It aims to provide theoretical basis and strategic references for enterprises' transformation practices, while offering new empirical evidence for relevant academic research.

2. Literature Review and Hypothesis Development

2.1. Literature Review

2.1.1. Research on FinTech

Research related to FinTech can be traced back to the first proposal of the concept in a Citibank report in 1993. Since then, FinTech has developed rapidly and continued to evolve on a global scale. The UK Financial Conduct Authority (FCA) defines it as a crucial path for financial service companies to achieve disintermediation, indicating that the rise of FinTech has significantly driven innovation and transformation in this field. In academic circles, the understanding of FinTech generally goes beyond the simple combination of "finance" and "technology"; instead, it is more often interpreted from the perspective of industrial transformation. Ma et al. (2017) pointed out that FinTech is a type of technological tool with broad impacts, which deeply integrates advanced technologies with financial needs and has significantly changed financial transaction and service models [1]. From the perspective of the ecosystem, Lee et al. (2018) emphasized that FinTech promotes the transformation of financial institutions by introducing innovative technologies and provides users with more personalized, convenient, and secure service experiences [2]. Michael et al. (2020) proposed a multi-dimensional framework, arguing that FinTech covers multiple aspects such as vertical applications, scalability, and innovation, highlighting its systematic nature and complexity [3].

2.1.2. Research on Digital Transformation

In terms of the connotation of corporate digital transformation defined by scholars, some argue that it essentially refers to a systematic reform of enterprises' transaction models, management models, and production methods through the comprehensive application of information technology. This reform aims to simplify business processes, improve efficiency, and thereby build market competitive advantages.This process typically involves several key stages: First, enterprises optimize

production management through technological improvements to enhance efficiency and quality; second, they promote the sharing and integration of internal and external data by establishing data chains, strengthening data-driven capabilities; finally, they realize centralized data management and analysis through cloud-based data storage, providing strong support for decision-making. The core goal of digital transformation is to reshape business models through innovative products and services, ultimately increasing corporate revenue [4].

Regarding the transformation path, digital transformation manifests as a complex process involving strategic choices, business operations, and organizational structure adjustments. Various factors are interrelated and work synergistically to drive the comprehensive transformation of enterprises. For local state-owned enterprises (SOEs) in particular, the successful implementation of digital transformation cannot be achieved without the high attention and strategic leadership of management. It is necessary to incorporate transformation performance into performance evaluation and establish corresponding incentive mechanisms to ensure the effective advancement of transformation efforts [5].In addition, enterprises can choose differentiated implementation paths based on their actual conditions—for example, incremental transformation starting from the production end, or leapfrog transformation starting from the sales link and relying on the optimization of resource allocation.

2.1.3. Research on FinTech and Digital Transformation

In recent years, driven by the rapid development of information technology and the in-depth transformation of the global economic structure, financial technology has become a key driver of corporate digital transformation. Research in this field has yielded abundant results, with the core conclusions summarized in the following four aspects:

First, financial technology exerts a significant positive impact on corporate digital transformation. Scholars' studies have shown that financial technology can play a facilitating role through such pathways as alleviating financing constraints, reducing financing costs, increasing R&D investment, and enhancing innovation output. Meanwhile, it can also optimize the efficiency of financial allocation, stimulate the vitality of digital technology innovation, and strengthen risk smoothing capabilities—providing multiple forms of support for the corporate digital transformation process [6]. It not only addresses capital needs but also consolidates the foundation for transformation by improving innovation and risk management capabilities.

Second, the role of financial technology in corporate digital transformation exhibits heterogeneity. Scholars have found that its driving effect on the digital transformation of non-state-owned enterprises and high-tech enterprises is more prominent. This is closely related to the flexibility and innovative advantages of such enterprises in resource acquisition, technology application, and market adaptation, enabling them to more efficiently translate the development opportunities brought by financial technology into tangible progress [7].

Third, corporate digital transformation plays a moderating role between financial technology and corporate innovation efficiency. Scholars' research indicates that corporate digital transformation can significantly amplify the role of financial technology in improving corporate innovation efficiency. This suggests that when promoting digital transformation, enterprises need to simultaneously explore ways to strengthen their innovation capabilities through financial technology tools, thereby achieving the goal of high-quality development.

Fourth, the effective implementation of financial technology and corporate digital transformation relies on a sound external environment. Scholars have pointed out that a well-developed market-oriented environment is a crucial prerequisite for fully unleashing the transformative driving force of financial technology. This requires governments and industry organizations to establish an adaptive system of policies and regulations to provide guarantees for the development and application of financial technology, while also strengthening supervision to maintain its healthy, stable, and sustainable development momentum.

2.2. Hypothesis Development

Empowered by fintech, the driving forces behind enterprises' digital transformation have been significantly enhanced, with its mechanism of action demonstrating diverse characteristics. Firstly, fintech effectively expands the resource boundaries of enterprises: by integrating scattered and small-scale financial resources in the market, it constructs a more extensive capital network. Platforms such as supply chain finance and trade finance provide enterprises with multi-level and high-efficiency capital circulation channels, which significantly improve financing convenience and help enterprises break through resource constraints . Secondly, fintech exhibits strong data processing capabilities: it can efficiently analyze massive volumes of unstructured data and generate high-value information flows through mining technologies. This enhances the matching degree between financial resources and enterprise needs, thereby alleviating financing pressures. Furthermore, fintech can also provide enterprises with data-driven decision support and market insights, assisting them in identifying market opportunities and promoting innovation, which injects new impetus into digital transformation.

Based on the above analysis, this study proposes Hypothesis 1: Fintech development exerts a positive promoting effect on enterprises' digital transformation.

Enterprises often struggle to advance innovation projects due to financing constraints. Particularly when facing financial pressure, they tend to prioritize cutting R&D investment. External financing thus becomes a key source of support for innovation. However, financial rationing exists in traditional financial markets, and many innovation initiatives are constrained by financing difficulties and high costs. By alleviating enterprises' financing constraints, fintech can significantly improve their financial stability and cash flow management, expand the capital sources for innovation activities, and thereby promote the implementation and continuous advancement of digital transformation projects.

Hence, this study proposes Hypothesis 2: Fintech alleviates financing constraints to enhance enterprises' financial stability, which in turn promotes their digital transformation.

The impact of fintech on enterprises' digital transformation may vary by region.On one hand, differences exist across regions in terms of economic development level, industrial structure, and technological foundation. Economically developed regions typically possess more complete hardware facilities and a more dynamic financial ecosystem, leading to higher acceptance and application of fintech among local enterprises. In contrast, underdeveloped regions lag behind in the digital transformation process due to constraints in infrastructure and industrial structure. On the other hand, the

regional financial innovation environment and the intensity of policy support also influence the penetration effect and mechanism of action of fintech.

Therefore, this study proposes Hypothesis 3: The impact of fintech on enterprises' digital transformation exhibits regional heterogeneity, with the most significant promoting effect observed in the economically developed eastern regions.

3. Research Design

3.1. Sample Selection and Data Sources

To conduct an empirical analysis of the impact of fintech on enterprises' digital transformation, this study selects the panel data of Chinese listed companies from 2013 to 2023 as the research sample.The fintech index adopts the number of fintech enterprises as its proxy variable, which is derived through keyword retrieval and statistical analysis on Tianyancha (a Chinese enterprise information query platform). The degree of enterprises' digital transformation is quantified by two steps: first, collecting the annual report texts of A-share listed companies on the Shanghai and Shenzhen Stock Exchanges via Python web crawler technology; second, applying the word frequency statistics method to process the collected texts.Data for control variables—including ownership nature, return on total assets (ROA), duality of chairman and general manager, asset-liability ratio, firm size, and firm age—are sourced from the China Stock Market & Accounting Research Database (CSMAR). To mitigate the interference of outliers on regression results, all continuous variables are subjected to Winsorization at the top and bottom 1% percentiles.

3.2. Variable Definitions

1. Measurement of Digital Transformation:This study employs text analysis technique to conduct frequency statistics on keywords related to digitalization (including "big data", "artificial intelligence", "cloud computing", "blockchain", and "digital technology") in the annual reports of listed companies. The total frequency of these keywords is used as the proxy variable for the degree of enterprises' digital transformation.

2. Measurement of Fintech:This study retrieves fintech-related enterprises through the Tianyancha platform. Based on the classification standards for fintech business models issued by the Basel Committee on Banking Supervision, the samples are screened and subjected to fuzzy matching to retain enterprises that conform to the characteristics of fintech business. Finally, the number of fintech enterprises in each prefecture-level city per year is used as the indicator to measure the level of fintech development in that region, where a higher value indicates a higher level of development.

3. Mediating Variable:Financing constraint is selected as the mediating variable, and its measurement method is developed based on existing studies.

4. Control Variables:The control variables include ownership nature, return on total assets (ROA), duality of chairman and general manager, asset-liability ratio, firm size, and firm age. All data are sourced from the China Stock Market & Accounting Research Database (CSMAR). See Table 1 for the specific definitions of these variables.

Table 1. Variable Definition Table

Variable Type	Variable Name	Variable Symbol	Variable Definition
Dependent Variable	Digital Transformation	DCG	Natural logarithm of the number of digital technology usages (based on word frequency statistics) by A-share enterprises
Independent Variable	Fintech	Fin	Natural logarithm of (the number of fintech companies in a prefecture-level city + 1)
Mediating Variable	Financing Constraint	FC	Financing constraint index (A larger FC value indicates a more severe financing constraint)
Control Variables	Ownership Nature	SOE	1 if the enterprise is state-controlled; 0 otherwise
	Return on Total Assets (ROA)	ROA	Net profit / Total assets
	Duality of Chairman and General Manager	Dual	1 if the chairman and general manager are the same person; 0 otherwise
	Asset-Liability Ratio	Lev	Year-end total liabilities / Year-end total assets
	Firm Size	Size	Natural logarithm of annual total assets
	Firm Age	Age	Natural logarithm of firm age (number of years since the enterprise's establishment)

3.3. Model Specification

To investigate the impact of financial technology on digital transformation, this study constructs the following research models:

$$DCG_{it} = \alpha_{it} + \theta_{it} Fin_{it} + \lambda_i CVs_{it} + \varepsilon_{it} \quad (1)$$

$$Fc_{it} = \alpha_{it} + \theta_{it} Fin_{it} + \lambda_i CVs_{it} + \varepsilon_{it} \quad (2)$$

$$DCG_{it} = \alpha_{it} + \theta_{it} Fin_{it} + \beta_{it} Fc_{it} + \lambda_i CVs_{it} + \varepsilon_{it} \quad (3)$$

In this study, the dependent variable is digital transformation (denoted as DCG), the independent variable is financial technology (denoted as Fin), and financing constraints (denoted as Fc) serve as the mediating variable. Additionally, CVs represent the control variables, while εit denotes the random error term of the model.

4. Research Results and Discussion

4.1. Descriptive Statistics and Correlation Analysis

Table 2 presents the descriptive statistics of the variables in this study. After data processing, there are no extreme outliers among all variables. The mean value of corporate digital transformation (DCG) after logarithmic transformation is 1.403, with a value range of 0 to 5.063; the mean value of the financial technology index is 4.638, with a range of 0 to 10.40.

The statistics of the remaining control variables also fall within a reasonable range, indicating that the overall data quality is good and can be used for subsequent analyses. In the correlation analysis, it can be observed that the correlation coefficient between the core independent variable (financial technology index) and the dependent variable (corporate digital transformation index) is 0.335, which initially indicates a positive correlation between the two. However, further verification of their causal relationship through regression analysis is still required.

Table 2. Variable Definition Table

Variable	(1)	(2)	(3)	(4)	(5)
	N	mean	sd	min	max
DCG	28,839	1.403	1.409	0	5.063
Fin	28,839	4.638	2.591	0	10.40
Size	28,839	22.18	1.316	19.82	26.27
Lev	28,839	0.419	0.209	0.0511	0.900
ROA	28,838	0.0418	0.0660	-0.249	0.218
Dual	28,839	0.287	0.453	0	1
SOE	28,839	0.345	0.475	0	1
Age	28,839	2.894	0.338	1.792	3.526

4.2. Baseline Regression Analysis

Table 3. Results of Regression Analysis

Variable	(1)	(2)	(3)	(4)
	DCG	DCG	Fc	DCG
Fin	0.118***	0.107***	-0.019***	0.106***
	(4.98)	(4.59)	(-12.86)	(4.47)
Fc				-0.128*
				(-1.89)
Size		0.283***	-0.144***	0.257***
		(12.24)	(-79.92)	(9.70)
SOE		-0.011	-0.005	-0.011
		(-0.21)	(-0.91)	(-0.22)
ROA		-0.297**	0.218***	-0.174
		(-2.42)	(15.20)	(-1.39)
Dual		-0.033	0.006**	-0.031
		(-1.50)	(2.57)	(-1.38)
Lev		-0.139*	-0.431***	-0.176**
		(-1.65)	(-57.71)	(-2.01)
Age		0.213	-0.008	0.136
		(1.38)	(-0.83)	(0.83)
Constant	0.191***	-6.313***	3.798***	-5.468***
	(2.64)	(-10.75)	(99.20)	(-7.74)
Observations	28,839	28,838	26,330	26,330
R-squared	0.299	0.318	0.447	0.311
Number of id	3,758	3,758	3581	3581
Company FE	YES	YES	YES	YES
Year FE	YES	YES	YES	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 3, Columns (1) and (2), present the full-sample regression results regarding the impact of financial technology on corporate digital transformation. This study employs the Ordinary Least Squares (OLS) method for estimation and controls for the two-way fixed effects of firm and year. This approach is intended to mitigate the omitted variable bias caused by time-invariant firm-specific characteristics and firm-invariant time-specific characteristics, thereby reducing endogeneity bias. The regression results show that regardless of whether control variables are included or not, the coefficient of the financial technology index is significantly positive at the 1% statistical level. This indicates that the development level of regional financial technology exerts a significant promoting effect on corporate digital transformation, verifying Hypothesis 1.

4.3. Mediating Effect Analysis

This study employs the stepwise regression method to verify the mediating effect of financing constraints. Specifically, the verification process is conducted in three steps:First, a regression analysis is performed to examine the impact of financial technology on corporate digital transformation;Second, a regression analysis is conducted to test the impact of financial technology on the mediating variable (financing constraints);Third, the mediating variable (financing constraints) is incorporated into the regression equation that explores the impact of financial technology on corporate digital transformation. The results of the above three steps are presented in Columns (3) and (4) of Table 3.

From this, it can be concluded that in the regression of Equation (1), the coefficient of the independent variable (Fin) is positive and significant. In the regression of the mediating variable (Equation (2)), the coefficient of the independent variable (Fin) is negative and significant—indicating that the more developed financial technology is, the lower the financing constraints faced by enterprises.In the regression incorporating the mediating variable (Equation (3)), the coefficient of Fin remains positive and significant, while the coefficient of the mediating variable (FC) is negative and significant. Therefore, it can be confirmed that financing constraints play a mediating role: the development of financial technology achieves financial stability by alleviating enterprises' financing constraints, which in turn affects corporate digital transformation. Hypothesis 2 is thus verified.

4.4. Heterogeneity Analysis

The analysis of this sample may overlook the structural impact caused by regional differences. Significant disparities exist in resource supply efficiency, transformation willingness, and innovation potential across different regions, which may alter the original impact of the "financial technology-corporate digital transformation" relationship.From the research perspective of this paper and referring to the classification experience in existing literature, China's regions are divided into three major regions—Eastern, Central, and Western—based on geographical location and climatic conditions:The Eastern region includes Beijing, Tianjin, Hebei Province, Liaoning Province, Shanghai, Jiangsu Province, Zhejiang Province, Fujian Province, Shandong Province, Guangdong Province, and Hainan Province;The Central region includes Shanxi Province, Jilin Province, Heilongjiang Province, Henan Province, Hubei Province, Hunan Province, Anhui Province, and Jiangxi Province;The Western region includes the Inner Mongolia Autonomous Region, Chongqing, Sichuan Province, the Guangxi Zhuang Autonomous Region, Guizhou Province, Yunnan Province, Shaanxi Province, Gansu Province, Qinghai Province, the Ningxia Hui Autonomous Region, the Xinjiang Uygur Autonomous Region, and the Tibet Autonomous Region.

The results of the heterogeneity regression analysis are as

follows. Table 4 shows that the regression coefficient of financial technology development on the digital transformation level in the Eastern region is significantly positive, while the coefficients for the Central and Western regions are positive but not significant. This indicates that financial technology exerts a stronger driving effect on corporate digital transformation in the Eastern region, thereby verifying Hypothesis 3 of this paper. This result may stem from the fact that the Eastern region is equipped with more sophisticated digital infrastructure, a more vibrant financial market, and more favorable policy support—all of which provide a more mature economic and institutional environment for financial technology to exert its enabling effect.

Table 4. Results of Heterogeneity Analysis

Variable	(1)	(2)	(3)
	East	Middle	West
Fin	0.135***	0.084	0.036
	(3.55)	(1.49)	(0.65)
Size	0.316***	0.224***	0.301***
	(8.75)	(4.72)	(5.37)
SOE	0.096	-0.043	0.011
	(1.40)	(-0.49)	(0.05)
ROA	-0.296*	-0.514*	-0.522
	(-1.78)	(-1.88)	(-1.43)
Dual	-0.038	-0.048	-0.045
	(-1.27)	(-0.92)	(-0.75)
Lev	-0.235*	-0.203	-0.068
	(-1.84)	(-1.14)	(-0.31)
Age	0.049	0.511	-0.622
	(0.24)	(1.27)	(-1.24)
Constant	-6.622***	-5.715***	-4.492***
	(-7.92)	(-4.09)	(-2.59)
Observations	14,520	4,561	3,379
R-squared	0.341	0.312	0.300
Number of id	1,965	553	403
Company FE	YES	YES	YES
Year FE	YES	YES	YES

Robust t-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5. Research Conclusion and Recommendations

This study examines the impact of financial technology on the digital transformation of Chinese enterprises, using data spanning the period 2013–2023. Building on relevant literature and existing research, a panel regression model is constructed to empirically investigate the effect of financial technology on the digital transformation of Chinese enterprises.The regression results show that the development of financial technology promotes the digital transformation of Chinese enterprises, verifying Hypothesis 1. This indicates that the advancement of financial technology not only meets the demand for expanding resource boundaries in enterprises' digital transformation but, more importantly, also stimulates enterprises' innovation momentum, thereby accelerating their digital transformation process.The mediating effect test reveals that the development of financial technology reduces enterprises' financing constraints, and the alleviation of financing constraints in turn exerts a positive impact on enterprises' digital transformation. Hypothesis 2 is thus verified.The heterogeneity test demonstrates that the impact of financial technology on enterprises' digital transformation exhibits regional differences, with a stronger effect observed for enterprises in the developed Eastern regions. Consequently, Hypothesis 3 is also verified.

Based on these empirical findings, this study puts forward the following recommendations, aiming to provide feasible references for the digital transformation of various enterprises.

First, efforts should be made to deepen the enabling role of financial technology and strengthen its driving effect on digital transformation. Governments and financial institutions may increase resource guidance and policy support for key areas of financial technology, and encourage technology enterprises to develop digital solutions applicable to different industrial scenarios, so as to meet enterprises' financing and technological needs during the transformation process.

Second, emphasis should be placed on coordinated regional development to bridge the digital divide in digital transformation. In view of the regional heterogeneity in the impact of financial technology, it is necessary to enhance investment in digital infrastructure and talent cultivation in the central and western regions, improve technology penetration and enterprises' digital literacy, and promote the balanced development of cross-regional digital transformation.

Third, innovation in financial service supply should be advanced to improve the accuracy and adaptability of digital support. Relying on financial technology tools, financial institutions ought to develop differentiated and full-cycle financial products and services—such as data-based dynamic financing models and risk pricing tools adapted to innovative projects—to better respond to the diverse financial needs of enterprises in their digital transformation.

Finally, focus should be laid on alleviating financing constraints, with particular attention to the structural financing difficulties of small and medium-sized enterprises. Policy design needs to focus on improving the credit infrastructure, building a multi-level financing support system, and expanding enterprises' financing channels through innovative financial tools, so as to provide sustainable financial guarantees for the digital transformation of vulnerable entities.

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