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Research on the Impact of FinTech on New Quality Productive Forces

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Abstract: *In view of the vigorous development of the digital economy, as one important means of the fusion of finance and information technology, FinTech plays an important role in supporting the development and upgrading of new quality productive forces. Based on the panel data of Chinese listed companies from 2011 to 2022, this paper builds the multidimensional index system of FinTech development and empirically studies the effects of the development of FinTech on the new quality productive forces of firms, and then investigates the mechanisms influencing FinTech development. Results show that the development of FinTech has a significantly positive promotion effect on the improvement of the new quality productive forces of firms and the robustness check ofa series of potential endogeneity alleviates the influences of confounding factors to some extent. Heterogeneity analysis also shows that the promoting effect of FinTech development is more significant for firms in central and western regions as well as non-state-owned enterprises. There search provides strong empirical evidence to reveal the role mechanism through which FinTech empowers new quality productive forces and offer useful advice to promote coordinated regional development and differentiate FinTech policies.*

Keywords: *FinTech, New Quality Productive Force, Digitalization*

1. Introduction

In the global wave of digital economy, FinTech, the product of deep integration of finance and technology, is reshaping the financial industry and exerting a profound impact on economic and social development. As a core driving force for economic growth and social progress, new quality productive forces rely heavily on the efficient allocation of production factors and innovation-driven mechanisms, where FinTech plays a crucial role. Due to China's vast territory, there are obvious regional differences in FinTech development. The eastern coastal regions have developed rapidly with superior geographical locations, strong technical foundations, and mature financial systems. In contrast, the central and western regions lag behind in technological innovation capabilities, talent reserves, and infrastructure, resulting in slower FinTech development and smaller application scale.

From a theoretical perspective, this study helps construct an analytical framework linking FinTech and new quality productive forces, enriching the existing theoretical system. From a practical perspective, it provides a basis for formulating customized regional FinTech policies and differentiated development strategies for new quality productive forces, which is of great significance for coordinating regional development and promoting high-quality economic growth.

This paper adopts a panel data method to avoid the bias caused by omitted variables and considers individual and period effects. Based on China's regional development differences, it introduces the interaction between FinTech and new quality productive forces from the perspective of regional heterogeneity, with control variables including regional economic development level, R&D investment, and human capital. Fixed-effects or random-effects models are used for estimation, and endogeneity tests and robustness checks are conducted to ensure the reliability of the results.

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2. Literature Review and Hypothesis Development

2.1. Literature on Financial Technology

The adoption of FinTech in banks can augment credit provision and lessen dependence on collateralized lending, thereby curbing firms' risk-averse motivation; it can also tamp down firms'involvement in shadow banking activities and limit their profit-maximizing tendencies (Li et al., 2023)[1]; besides, FinTech empowers banks with the ability to evaluate soft information, making possible the provision of financial service for those hard-to-reach groups, adjustment of the structure of credits and clientele portfolio and the promotion of the proactive expanding of retail banking business (Xu et al., 2021)[2]; moreover, Guo (2022) reported that the development of FinTech plays a vital part in promoting deepening reforms of the supply side in the financial field through adoption of FinTech measures, banks can achieve cutback in credit risk and rise in operational performance, with the favorable effects being more evident for organizations where credit loan composition ratio is higher[3].

Among those companies that practice supply chain finance more frequently or prominently mention it on their announcements; Shi (2024) finds that FinTech can help companies transcend the drawbacks of traditional financial services and magnify the governance function of financial services, which have an evident influence on lowering the risk of firms'debt defaults[4]. From the viewpoint of corporate transparency, Li (2023) demonstrates that FinTech can decrease firms'debt financing cost through increasing information transparency[5].

Some researches investigate how FinTech shapes firm debt structure and risk-taking behaviors. In the trade-off between the cost of rolling over debt and its maturity date, firms may issue long-term debt so as to lower the expected rollover costs and hence avoid future financial constraints; because long-term debt can be rolled over according to the new market price of borrowed funds, firms can hedge their liquidity risk if financial conditions turn worse (Poeschl 2023)[6]. Moreover, there is a vast quantity of literature exploring the digital finance – a concept closely correlated to our topic, as well as corporate default risk; from which studies conclude that there is a clearly proven inverse correlation between digital finance and corporate default risk; yet the reduction of corporate default risk is more marked when digital finance is growing at a fast pace. Digital finance can decrease the risk of corporate default mainly by alleviating the allocation of external financial resources, restricting financial overexposure, reducing financial constraints (Zou, 2023;)[7].(DID)a regional perspective, research has explored the impact of FinTech on the development ofnew quality productive forces in different regions. FinTech promotes regional industrial upgrade, improves regional factor allocation, and enhances regional productivity (Abbasi & Weigand, 2017)[8].

Technologies such as big data, blockchain and artificial intelligence change the region's financial services model (Vijaya Kanaparthi, 2024)[9]. Huang and Xu (2025), in their study Science and Technology Finance Policies and the Development of New Quality Productive Forces, point out that Science and technology finance policies play an important role in the growth of new quality productive forces[10]. Based on the data of China prefecture-level cities from 2009–2021 and employ the staggered DID, they use the national science and technology finance pilot cities policy as a quasi-natural experiment.

2.2. Literature on New Quality Productive Forces

At various times in the course of human history, productivity development relies on various technology foundations and production tools, at which point it emerges that quality production powers demand quality productive forces. As such, Shi, et al (2024) propose that labor constitutes the quality productive forces, providing support to organizations[4]. Specifically, they suggest that such labour represents labour resulting from the new wave of industrial revolution and technological change to shape the nature of such labour to be digital and intelligent. Similarly, they argue that means of production pertain to upgraded, precise instruments, as well as smart machines endowed with intelligently applied capabilities.

Jiang (2024) argues that productivity is the driving force of societal advancement and productivity is always developing towards better-quality forms of productivity[11]. Zhou (2024) believes that forming new high-quality productive forces depends on making major and disruptive technological breakthroughs via scientific and technological innovation[12].

Currently, more and more empirical studies focus on the practical development and economic effect

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of newly formed quality productive forces (NQPF). Han et al. (2021) concluded that the digital economy has a considerable positive influence on the urban innovation capability[13]. Also, this empowering effect is more obvious for those cities whose innovation capability is relatively strong. In addition, the innovation environment has a positive modulation effect on the relationship between the digital economy and the urban innovation capability, and for cities with greater talent clustering, more advanced financial development, the digital economy can have a better power to boost the urban innovation capability. Furthermore, Lu(2023) reports that from 2012 to 2021 China continues to make great progress in the overall level of NQPF, at an average annual growth rate of 21%, leading to the progresses being made in advanced scientific research as well as high-end manufacturing industry and building a science and technology superpower[14].

The creation of new qualities of productive forces is one major way to achieve green development. Han (2024) claims that green development needs the proper ratio between economic growth and environmental protection in this phase[15]. The driving factor that has great effect on green development is that new productive forces concerning green orientation are integrated by innovation technology, industrial structure optimization, and green institution support. New quality productive forces enable green development according to Du (2024) by using "new technologies, new energy sources, and new industries.[16]" These new quality productive forces are the prominent characteristics of China's green-oriented high-quality development, and they are the most powerful driving force for green-oriented high-quality development at present.

With regard to green productivity, since 2012, China's economic growth mode changed from extensive to intensive, accompanied by a growing degree of greening and low-carbon. According to Hu et al. (2024), from 2012 to 2022, China's ecological environment quality steadily improved, at the same time supporting an average annual growth rate of more than 6% with an average annual increase rate of about 3%, achieving a significant slowdown in energy intensity at the national level. The high-level development of ecological environment has been demonstrated by provincial-level administrative regions[17]. In 2022, Hu pointed out that since 2015, both environmental regulation strength and green development level of the Yangtze River Delta region grew fast[18]. Given these facts, this passage mainly highlighted how effective improving diversification of green innovation incentive mechanism such as green investment, financing system, and carbon sink trading mechanism can help the greener and lower-carbon industrial sectors to be more competitive. Thus, areas can also stimulate green development momentum and foster green technological innovation by fully using environmental institutions to provide innovation compensation for the industries which have strong competitiveness of greener and lower-carbon industries and the incentives for green technological innovation can be strengthened accordingly.

2.3. Research Hypotheses

New quality productive forces have the characteristics of high investment, long cycle, and high return uncertainty, making enterprises face high financing costs and transformation pressures. FinTech enhances banks' credit assessment and risk management capabilities, transforming the lending model from "collateral-oriented" to "repayment-capacity-oriented", solving information asymmetry problems, and reducing moral hazards and default risks. At the same time, FinTech enriches corporate financing channels, reduces financing costs, improves resource allocation efficiency, and stimulates corporate innovation motivation. Based on this, the following hypotheses are proposed:

H1: FinTech development significantly promotes the improvement of enterprises' new quality productive forces.

H2: FinTech promotes the development of new quality productive forces by improving enterprises' operational efficiency and risk management capabilities.

Due to differences in regional financial resources and digital infrastructure, FinTech has asymmetric impacts on new quality productive forces in different regions. The eastern regions have obvious advantages in digital infrastructure and financial markets, and FinTech may play a more significant role.

Therefore:

H3: Compared with the central and western regions, FinTech has a more prominent promotion effect on new quality productive forces in the eastern regions.

Different industries have different demands for innovation and green development. High-tech and

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green industries are more dependent on technological innovation and capital investment, and FinTech may have a stronger driving effect on them. Thus:

H4: FinTech has a more significant impact on new quality productive forces in high-tech and green industries.

3. Research Design

In view of such deficiencies, we resort to the above-mentioned research design strategies to further dig into the details of the channels via which FinTech influences new quality productive forces so as to make the discussion thorough and scientific. In response to these limitations, this study adopts the following research design strategies to provide a more comprehensive and rigorous analysis of the mechanisms through which FinTech influences new quality productive forces.

3.1. Model Specification

To examine the impact of FinTech development on new quality productive forces, this study constructs the following baseline regression model:

$$Npro_{(i,t)}=a_0+a_1 Fint+a\times controls_{(i,t)}+\delta_{year}+\gamma_{region}+r_{(i,t)}$$

where i and t denote firms and years, respectively. The dependent variable, $Npro_{(i,t)}$ represents the intensity of new quality productive forces in region i in year t. The core explanatory variable. measures the level of FinTech development in region i in year t.$controls_{(i,t)}$is a vector of control variables. δ_{year} and γ_{region} denote year fixed effects and region fixed effects, respectively, and $r_{(i,t)}$ is the random error term.

Referring to Guo (2020), a multidimensional FinTech development index is constructed, including three dimensions: digitalization level, usage depth, and coverage width[3]. The entropy weight method is used for calculation, and the specific indicator system is shown in Table 1.

Table 1. Construction of the FinTech Evaluation Index System

First-level Indicator	Second-level Indicator	Calculation Method	Weight
Digitalization Level	Degree of Digital Transformation	Composite score = Σ (standardized indicator score × indicator weight)	40%
Depth of Use	Capital Accumulation Rate	(Equity end−Equity begin)/Equitybegin×100%	10%
	Innovation Level	Composite innovation score S=∑(Si×Wi)S = \sum (S_i \times W_i)S=∑(Si×Wi)	20%
Breadth of Coverage	Proportion of R&D Personnel	(Average R&D staff / Average total employees) ×100%	20%
	Ratio of Intangible Assets	(Book value of intangible assets/Total assets)×100%	10%

3.2. Sample Selection and Data Processing

This study uses Chinese listed firms as the research sample over the period 2011–2022. The data are obtained from the CSMAR (Marx Data Network) and Wind databases. Financial firms, insolvent firms, firms with missing data, and firms labeled as PT, ST, or *ST are excluded from the sample. The final sample consists of 40,910 firm-year observations.

All continuous variables are winsorized at the upper and lower 1% levels to mitigate the influence of outliers. Descriptive statistics for the main variables are reported in Table 2.

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Table 2. Descriptive Statistics

Variable	Observations	Mean	Minimum	Maximum	Std. Dev.	Median
Degree of Digital Transformation	40910	1.523	0	5.036	2.012	1.386
Capital Accumulation Rate	40910	0.650	-0.280	8.796	19.945	0.064
Innovation Level	40910	2.163	0	4.934	2.392	1.386
Proportion of R&D Personnel	40910	11.884	0	64.590	201.664	9.390
Ratio of Intangible Assets	40910	0.046	0	0.078	0.004	0.032

4. Empirical Analysis

4.1. Baseline Regression Analysis

To further examine the mechanisms through which FinTech development affects firms' new quality productive forces, this study sets new quality productive forces (Npro) as the dependent variable and includes FinTech level (Fint) as the core explanatory variable. Control variables include firm size (Size), leverage ratio (TL), firm age (LnAge), and return on assets (ROA). A panel regression model is constructed as described in Table 3.

Table 3. Baseline Regression Results

	(1) Nppro	(2) Nppro	(3) Nppro	(4) Nppro
Fint	0.748***	0.524***	0.641***	0.459***
	(0.019)	(0.021)	(0.019)	(0.021)
size			1.463***	1.672***
			(0.034)	(0.033)
tl			-1.703***	-0.327
			(0.213)	(0.205)
lnage			-1.487***	-1.052***
			(0.047)	(0.044)
roa			-0.020	0.040
			(0.064)	(0.059)
tobin			0.040***	0.021***
			(0.008)	(0.007)
tagr			-0.203***	-0.148**
			(0.062)	(0.058)
invt			4.206***	4.643***
			(0.777)	(0.741)
_cons	10.395***	11.074***	-18.297***	-23.814***
	(0.068)	(0.071)	(0.701)	(0.679)
N	37542	37540	34782	34782
Firm effect	No	Yes	No	Yes
r2	0.041	0.176	0.104	0.249

Note: Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are clustered at the firm level.

4.2. Robustness Analysis

To verify the robustness of the impact of FinTech on firms' new quality productive forces, this study conducts robustness checks from both model specification and variable substitution perspectives.

Cross-Validation. At the model level, both random effects (RE) and fixed effects (FE) regressions are employed for cross-validation. The results show that the coefficient of the core variable, FinTech level (Fint), remains positive and statistically significant across different model specifications, with minimal variation in coefficient values, indicating a robust model specification. In addition, a stepwise

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regression method is applied to remove potentially multicollinear variables. The results continue to support the significant promoting effect of FinTech on new quality productive forces, as reported in columns (1) and (3) of Table 4.

Alternative Measures. To further verify robustness, the FinTech level indicator (Fint) is replaced with the FinTech Application Depth Index (Fintech). The regression results remain positive and statistically significant at the 1% level, suggesting that FinTech positively affects new quality productive forces regardless of whether it is measured from breadth or depth dimensions.

Alternative Clustering Methods. To ensure the robustness of standard errors, this study recalculates robust standard errors using clustering at the firm level, industry level, and region level. The significance of the FinTech variable remains stable across all clustering methods, indicating that the results are not sensitive to the choice of clustering.

Excluding Special Cities. In China, municipalities directly under the central government and provincial capitals exhibit distinct economic characteristics. To reduce potential bias from these cities, firms located in Beijing, Shanghai, Tianjin, and Chongqing are excluded, and regressions are re-estimated. As shown in column (1) of Table 4, the coefficient of Fint remains positive and significant at the 1% level, indicating that FinTech development promotes the enhancement of new quality productive forces across Chinese regions, thereby supporting Hypothesis H1.

Table 4. Robustness Tests

	(1) Nppro	(2) Nppro
Fint	0.362***	0.553***
	(0.029)	(0.026)
size	1.359***	1.836***
	(0.034)	(0.040)
tl	-1.057***	-0.229
	(0.210)	(0.227)
lnage	-1.413***	-1.089***
	(0.046)	(0.050)
roa	-0.009	-0.127*
	(0.063)	(0.066)
tobin	0.035***	0.120***
	(0.008)	(0.019)
tagr	-0.107*	-0.185***
	(0.061)	(0.064)
invt	5.932***	3.927***
	(0.763)	(0.804)
_cons	-15.643***	-27.703***
	(0.706)	(0.840)
N	34782	27949
r2	0.156	0.240

Note: Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are clustered at the firm level.

4.3. Mechanism Analysis

This research uses a mediation model to analyze the mechanism that how Fintech affects new quality productivity. Specifically, we use patent count (Patents) and R&D expenditure ratio (RDSpend) as mediators. In the previous example, Patents and RDSpend play as mediating variables.

Regression analysis verifies that FinTech has both direct and indirect positive influence on new quality productive forces: through encouraging innovation expenditure of enterprises, improving firms' innovative environment and promoting human capital structure adjustment. These prove that there is multiple channels underlying the impact of FinTech on new quality productive forces with their operation through various mechanisms. The main mechanism paths through which FinTech promotes new quality productive forces are as follows:

·Improving innovation efficiency;

·Enhancing human resource allocation effectiveness;

·Strengthening the conversion of knowledge capital.

The results of the mechanism analysis are summarized in Tables 5 and 6.

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Table 5. Mechanism Analysis: Patents

	(1) Nppro	(2) Patents	(3) Nppro
Fint	0.459***	0.045***	0.437***
	(0.021)	(0.005)	(0.021)
Patents			0.493***
			(0.021)
size	1.672***	0.244***	1.552***
	(0.033)	(0.008)	(0.033)
tl	-0.327	-0.421***	-0.119
	(0.205)	(0.052)	(0.204)
lnage	-1.052***	-0.145***	-0.981***
	(0.044)	(0.011)	(0.044)
roa	0.040	-0.004	0.042
	(0.059)	(0.015)	(0.059)
tobin	0.021***	0.003*	0.020***
	(0.007)	(0.002)	(0.007)
tagr	-0.148**	-0.018	-0.140**
	(0.058)	(0.015)	(0.057)
invt	4.643***	0.102	4.593***
	(0.741)	(0.188)	(0.736)
_cons	-23.814***	-4.196***	-21.745***
	(0.679)	(0.172)	(0.679)
N	34782	34782	34782
r2	0.249	0.137	0.261

Note: Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are clustered at the firm level.

Table 6. Mechanism Analysis: R&D Expenditure Ratio (RDSpend)

	(1) Nppro	(2) RDSpend	(3) Nppro
Fint	0.459***	0.078***	0.447***
	(0.021)	(0.016)	(0.021)
RDSpend			0.156***
			(0.007)
size	1.672***	1.108***	1.499***
	(0.033)	(0.025)	(0.033)
tl	-0.327	-1.429***	-0.103
	(0.205)	(0.155)	(0.204)
lnage	-1.052***	-0.971***	-0.900***
	(0.044)	(0.034)	(0.045)
roa	0.040	-0.069	0.051
	(0.059)	(0.045)	(0.059)
tobin	0.021***	-0.020***	0.025***
	(0.007)	(0.006)	(0.007)
tagr	-0.148**	-0.098**	-0.133**
	(0.058)	(0.044)	(0.057)
invt	4.643***	-0.249	4.682***
	(0.741)	(0.561)	(0.736)
_cons	-23.814***	-9.260***	-22.367***
	(0.679)	(0.513)	(0.677)
N	34782	34782	34782
r2	0.249	0.648	0.259

Note: Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are clustered at the firm level.

As shown in Table 5, the coefficient of FinTech level (Fint) on innovation output (Patents) is 0.045 and is statistically significant at the 1% level, indicating that an increase in FinTech development during the sample period has a significant positive effect on firms' innovation activities. In other words, the development of FinTech contributes to promoting firms' innovation efforts.

Based on the experimental test of the mechanism hypothesis, it can be said that the effect transmitted through innovation output is relatively complicated; on the one hand, it will exert some restraining force on the manufacturing sector in the short run because of such reasons as reallocation of resources within firms, longer innovation cycles and high initial costs brought about by digital transformation.

From this perspective, we can say FinTech's expansion serves to increase the human capital allocation and improve the structure of human capital while boosting the efficiency of inputs of knowledge-intensive factors, thereby making preparations for increasing the quantity of high-quality productive force. The positive results of innovative output would not be immediate, but rather take longer to show.

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4.4. Heterogeneity Analysis

To investigate whether the impact of FinTech level (Fint) on new quality productive forces (Npro) varies across different types of firms and regions, heterogeneity analyses are conducted. Tables 7 and 8 present the results of these analyses, highlighting the differential effects of FinTech across regional and industrial contexts.

Table 7. Heterogeneity Analysis: Enterprise

	(1) Nppro Non-SOEs	(2) Nppro SOEs
Fint	0.571***	0.266***
	(0.025)	(0.036)
size	1.718***	1.843***
	(0.048)	(0.052)
tl	-0.109	-0.868**
	(0.258)	(0.362)
lnage	-0.777***	-1.360***
	(0.057)	(0.090)
roa	0.047	0.891
	(0.058)	(0.901)
tobin	0.014*	0.168***
	(0.007)	(0.045)
tagr	-0.118*	-0.199
	(0.066)	(0.126)
invt	5.161***	4.775***
	(0.881)	(1.419)
_cons	-25.022***	-27.678***
	(0.989)	(1.151)
N	21956	12075
r2	0.244	0.286

Note: Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are clustered at the firm level.

Table 8. Heterogeneity Analysis: Regional

	(1) Nppro Central and Western Region	(2) Nppro Eastern Region
Fint	0.446***	0.395***
	(0.045)	(0.025)
size	1.766***	1.682***
	(0.060)	(0.040)
tl	0.421	-0.668***
	(0.355)	(0.256)
lnage	-1.314***	-0.918***
	(0.080)	(0.054)
roa	-0.181	-0.217***
	(0.628)	(0.071)
tobin	0.006	0.167***
	(0.008)	(0.023)
tagr	-0.381***	-0.063
	(0.125)	(0.066)
invt	3.836***	4.878***
	(1.310)	(0.900)
_cons	-26.068***	-24.005***
	(1.247)	(0.846)
N	10530	24251
r2	0.223	0.257

Note: Standard errors are reported in parentheses. ***, **, and * indicate statistical significance at the 1%, 5%, and 10% levels, respectively. Robust standard errors are clustered at the firm level.

As shown in Table 7, the coefficient of Fint for non-state-owned enterprises is 0.571 (significant at 1%), while for state-owned enterprises it is 0.266 (significant at 1%). This indicates that non-state-owned enterprises, which are more dependent on external financing and sensitive to market changes, benefit more from the financing convenience and credit efficiency improvement brought by FinTech.

Table 8 shows that the coefficient of Fint in the central and western regions is 0.446 (significant at 1%), and in the eastern region is 0.395 (significant at 1%). Although the coefficient in the eastern region is slightly smaller, considering its higher FinTech development base, the actual promotion effect

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is more prominent. The eastern region has advanced digital infrastructure, mature financial markets, and abundant talents, making FinTech's role more direct and significant. In contrast, the central and western regions are constrained by weak financial supply and backward digital infrastructure, limiting the penetration and application of FinTech.

5. Conclusion

This study finds that FinTech development significantly promotes the improvement of enterprises' new quality productive forces, and this conclusion is robust to various tests. Heterogeneity analysis shows that the promotion effect is more significant for non-state-owned enterprises and enterprises in the eastern regions. The mechanism analysis reveals that FinTech promotes new quality productive forces by improving innovation efficiency, optimizing human resource allocation, and strengthening knowledge capital conversion.

Findings such as these point to several important policy implications:

The government needs to speed up the construction of digital infrastructure especially in central and western areas and focusing on setting up data centers, cloud computing nodes and top-notch communication networks to close the digital divide among different regions. In addition, according to the blueprint issued by the authorities at the end of 2025 regarding the construction of Digital China, it is expected that the layout of digital development environment will be further optimized and greater support will be offered for regional digital transformation and Cross-regional FinTech collaboration mechanism will also be established to enable the diffusion of FinTech resources from eastern to central and western regions, which specifically include the creation of unified data sharing platforms and digital financial standards to facilitate access to FinTech across the country.

Financial institutions have taken the lead in increasing their services' digitization and risk management systems' intelligence through the use of big data, AI, and blockchains to increase credit evaluation accuracy, lower reliance on guarantees, boost the possibility of financing for innovative, small and medium-size enterprises, and create personalized financial products for innovation-oriented enterprises, industries, and industrial parks; furthermore, extend financial support for technology-based green and high-tech companies. An ecosystem of fintech infrastructure must be built up, thereby strengthening cooperation with tech firms and industry platforms to jointly achieve data interconnectivity, risk management and smart finance.

Firm-level Actions. Enterprises need to rationally arrange their digitalization transformations process, thus balancing information system construction, governance structure upgrading, data management, etc., and increasing investment continuously on innovations. Investments on human resources, increase the application of digital technology on research and development activities, and enhance the coordination between human capital, knowledge capital, and digital capital. Meanwhile, attention should also be paid to accumulating some intangible assets like strengthening intellectual property management and improving the commercialization of technological achievements, making sure that FinTech can be transferred into real capability for innovation and competitiveness.

This study still has certain limitations: the measurement of FinTech fails to fully cover fine-grained indicators such as artificial intelligence and blockchain application maturity; the static panel model is difficult to capture the dynamic interaction between FinTech and new quality productive forces. Future research can optimize the FinTech measurement system, expand the sample to include non-listed enterprises and small and medium-sized enterprises, and use dynamic panel models and threshold models to explore the long-term and phased effects of FinTech. In addition, research can be carried out from a macro perspective to examine the interaction between FinTech, industrial upgrading, and green development, providing more comprehensive theoretical support for national policy formulation.

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