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The Influence Mechanism of Sci-Tech and Finance Integration Policies on New-Quality Productivity in Chinese Cities - Based on DID Model

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Abstract: In the era of knowledge economy, technological progress is a key measure of national strength and a focal point of competition among nations. This paper utilizes data from 285 prefecture-level cities in China from 2009 to 2019, employing the Difference-in-Differences (DID) method to study the impact of policies combining technology and finance on local new quality productivity. The research indicates that the effective integration of technology and finance observably enhances the new quality productivity of prefecture-level cities, mainly achieved by improving regional innovation capabilities and optimizing industrial structures. Heterogeneity tests show that the impact of this integration varies across different regions, with more developed areas benefiting more, while less developed areas experience a lag effect. This may be related to factors such as regional resources, financial infrastructure, and types of industries. Further research will delve into the reasons for these differences and conduct mediation-heterogeneity analysis to propose more effective policy measures.

Keywords: Science and Technology Finance, New Productive Forces, Difference-in-Differences Model, Mechanism Analysis

1. Introduction

Since the 21st century, technological advancement has emerged as a critical indicator of national modernization, with innovation being a central objective. Since 1985, China has implemented a finance-technology integration strategy, leveraging financial mechanisms to drive technological innovation. In 2011, China initiated a pilot policy for science-technology finance integration, selecting 16 regions to promote the synergy between science, technology, and finance, thereby providing financial support to technology enterprises to enhance technological capabilities and global competitiveness. Science-technology finance involves innovating financial investment mechanisms for technology funding, guiding financial institutions to develop innovative products, optimize services, and establish platforms to achieve effective integration of technological innovation and financial capital. This approach aims to deliver financing and financial services to technology enterprises across all development stages, supported by comprehensive policy and institutional frameworks. In 2023, Chinese President Xi Jinping emphasized the development of new quality productive forces (NQPF), driven by science and technology, to break away from traditional development methods. Technological finance is the key guarantee for the development of NQPF, and

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it also reflects the level of development of technological finance. The integration of technology and finance meets the requirements of NQPF, but there is currently a lack of scientific analysis of their connections. Therefore, the integration of science and technology with finance meets the fundamental requirements of new productive forces.

Research on the integration of science and technology policies with new productive forces has been conducted in several areas:

First, how does science and technology finance enhance industrial innovation? Scholars have divided their answers into two main schools. Some argue that science and technology finance promotes industrial improvement and innovation, while others highlight its role in easing financing difficulties for tech companies and providing financial support. Li Yingming et al. and Yang Lisheng et al. argue from both theoretical and practical perspectives that the integration of science and finance can efficiently promote industrial structure upgrading and enhance innovation capabilities [1-2]. Zheng Shiming et al. and Zhou Shaofu et al. contend that the implementation of science and finance policies improves the efficiency of financial allocation to technological innovation while reducing and diversifying the financing difficulties and risks for tech companies, providing financial security for their innovation [3-4]. However, there is limited research verifying the mechanisms through which science and technology finance facilitates the development of new productive forces. This study argues that science and technology finance should promote the development of new productive forces, thereby fostering innovative and sustainable regional economic growth.

Second, the interplay between scientific innovation, technological advancement, and financial mechanisms is pivotal in fostering the evolution of novel productive capacities. Scholars generally agree that the development of new productive forces is key to escaping the “middle-income trap,” with insufficient innovation and increasing international high-tech competition being significant factors behind the lack of vitality in developing countries. Thus, improving technological innovation is the foundation for development. Deng Yu believes that the development of new productive forces requires highly developed science and technology finance for support [5]. High-quality science and technology finance must shift from quantitative growth to qualitative improvement. Lu Minfeng et al. argue that science and technology finance not only directly promotes technological innovation but also accelerates the formation and progress of new productive forces by optimizing resource allocation and promoting industrial structure upgrading [6]. Regarding the connection between science and technology finance and the real economy, scholars have reached three main consensuses: first, technological finance drives real economic growth by combining innovation with financial services, fostering new productive forces. Second, it aligns with the goal of developing new productive forces by supporting technological innovation and optimizing resource allocation. Third, all paths to developing new productive forces are closely linked to technological finance.

Based on this, this study will explore the mechanisms through which the integration of science and technology finance policies affects the development of new productive forces. This study makes three substantive academic contributions: Firstly, it conducts a dual-dimensional investigation examining how science-technology-financial(STF) integration mechanisms influence neo-production capacity systems through both conceptual frameworks and empirical applications, while implementing rigorous policy efficacy assessment. Secondly, the research addresses critical research voids regarding STF's catalytic effects on productive force evolution within sub-provincial administrative units, establishing novel analytical frameworks for metropolitan innovation economics. Thirdly, the paper deciphers the operational mechanisms through which STF initiatives drive technological advancement, formulating innovative implementation pathways for territorial innovation ecosystems and sustainability transitions.

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2. Literature Review and Hypotheses

2.1. The Connotation and Realization Path of New Productive Forces

Emerging as a cutting-edge paradigm of socioeconomic advancement, new productive forces are fundamentally distinguished by innovation-driven governance mechanisms that transcend conventional economic growth models and historical trajectories of productivity evolution. These forces manifest as technologically sophisticated systems marked by superior efficiency and quality benchmarks, embodying an evolved form of production capabilities that operationalize contemporary developmental principles. The nurturing and enhancement of such forces emerges as both a foundational imperative and strategic priority within the framework of achieving economically optimized developmental outcomes [7]. Academic researchers have extensively analyzed the conceptual dimensions and operational mechanisms through which new productive forces can be effectively realized and optimized [8].

The technological innovation transformation drives the upgrading of industries and the emergence of future new industries, thus empowering the development of new productive forces [9]. Yang et al. indicates that the strategic integration of technological innovation and financial policy interventions can effectively facilitate the dual transformation of enterprises towards green and digital paradigms [10], consequently enabling profound restructuring of industrial frameworks and the realization of sustainable development with enhanced quality attributes. The development of science and technology finance advances the digital transformation of industries and enhances innovation capabilities, which aligns with the inherent requirements of new productive force development [11]. Hu Gang et al. posits that the strategic implementation of science and technology-oriented financial mechanisms significantly augments the competitive advantage and market responsiveness of emerging productive forces [12]. Li et al. propose, through mechanism analysis [13], that the integration of science and finance reduces market information asymmetry, thus decreasing the misallocation of resources, improving innovation levels, and promoting the development of new productive forces. Based on this, the following hypothesis is proposed:

Hypothesis 1: The connection of technology and finance can facilitate the development of new productive forces.

2.2. The Significance of the Integration of Technology and Finance

The concept of integrating technology and finance was first proposed by Schumpeter in his 1912 book The Theory of Economic Growth [14], and through theoretical and practical validation, the outstanding contribution of technology finance to economic and social development has been confirmed. Since the 21st century, the level of technological development has become a strategic area of competition among nations, with technological innovation bringing convenience to human life and injecting vitality into economic and social development.

(1) The Impact of Technology and Finance connection on Industrial Structure: The connection of technological innovation frameworks with financial policy instruments has the potential to elevate regional innovation capacity indices while facilitating the transition towards high-quality economic growth paradigms, thereby driving structural transformation and value-chain upgrading within industrial ecosystems [2]. The deep connection of industry and capital improves the ability and quality of capital management, thereby improving the industrial and capital structures, which is the main goal of science and technology finance [15]. Research by Zhen et al. indicates that science and technology finance optimizes the structure of advanced human capital [16], thereby improving industrial structure and innovation capabilities. Lu Minfeng argues that the connection of technology and finance can also improve labor productivity [6], accelerate the development of emerging industries, and thus

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optimize regional industrial structures, promoting high-quality economic development. Zhong et al. suggest that science and technology finance can optimize industrial structures by improving the total factor productivity of enterprises and enhancing innovation levels [17]. Xu Yueqian et al. use a bidirectional fixed-effects model to verify that the connection of technology and finance policies can promote regional economic development through industrial structure optimization [18]. Based on this, the following hypothesis is proposed:

Hypothesis 2: The combination of technology and finance promotes the development of new productive forces through industrial structure optimization.

(2) The Impact of Technology and Finance connection on Regional Innovation Capabilities: The pilot policies for integrating science and technology finance have a significant positive impact on urban innovation levels, and this effect is sustained, potentially generating a "siphon effect" on the innovation activities of surrounding cities [19]. At the same time, Xiao et al. [20]find that science and technology finance reduces information asymmetry in market competition for tech-based companies, improving innovation abilities and significantly facilitating the conversion of innovative achievements, thus improving regional technological innovation levels. Ma Lingyuan et al. [21]argue that pilot regions for technology and finance connection promote regional innovation levels by improving local financial development efficiency and increasing government spending on science and technology. Yiadom et al. [22] claim that the intervention of science and technology finance significantly enhances enterprise innovation capabilities, serving as a key driver for sustained economic development. Guo Jingxian et al. [11] reveal, through mechanism tests, that the connection of technology and finance significantly improves enterprise management and operational abilities, thereby enhancing innovation efficiency, stimulating corporate innovation vitality, and promoting the sustainable and healthy development of regional economies. Zhang et al. [23] demonstrate, through empirical analysis, that the connection of science and technology finance has a significant linear promoting effect on enterprise exploratory and innovative abilities. Thus, the connection of technology and finance not only directly enhances corporate innovation strength but also indirectly promotes regional innovation levels by optimizing resource allocation and improving the innovation environment, forming a virtuous cycle. This process is an important driving force for the development of new productive forces [24]. Based on this, the following hypothesis is proposed:

Hypothesis 3: The connection of technology and finance promotes the development of new productive forces by improving regional innovation levels.

2.3. The Regional Differences in the Policy of Combining Technology and Finance

Research indicates that there are significant regional differences in the implementation of the policy combining technology and finance, leading to varying policy outcomes. The policy effect is particularly prominent in the eastern coastal regions, which benefit from a mature financial system and a solid foundation in technological innovation. In contrast, the central and western regions, constrained by resource endowments and development levels, show relatively weaker policy effects [4]. Furthermore, due to the cluster development characteristics of technological innovation and the unique advantages of large cities in attracting concentrated innovation resources, the implementation of this pilot policy has been more effective in large cities [3]. Therefore, optimizing the allocation of resources across regions and reducing regional development disparities are key to enhancing the overall effectiveness of the policy combining technology and finance. This is also a necessary condition for the balanced development of new productive forces. This paper will further explore the specific impact of regional differences on policy effectiveness, analyze resource allocation optimization strategies, and provide a scientific basis for policy formulation, promoting regional coordinated development and achieving the comprehensive enhancement of new productive forces.

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3. Empirical Methods and Variable Descriptions

3.1. Basic Model Setup

Since 2011, China has begun piloting the integration of technology and finance, with the first batch of pilot regions including 16 areas such as Tianjin and Shanghai. This study uses the DID method to investigate the impact of this policy on the development of new productive forces in the pilot regions. The "integration of technology and finance" is treated as a quasi-natural experiment, with pilot regions serving as the treatment group and non-pilot regions as the control group. The following Difference-in-Differences econometric model is constructed:

$$\mathrm{NPRO}_{it} = \beta_0 + \beta_1 \mathrm{Fintech}_{it} + \beta_2 \mathrm{Time}_{it} + \beta_3 \mathrm{Fintech}_{it} \times \mathrm{Time}_{it} + \beta_4 \mathrm{Controls}_{it} + \varepsilon_{it} \quad (1)$$

To further quantify the policy effect, a model with a virtual interaction term is set up as follows:

$$\mathrm{NPRO}_{it} = \gamma_0 + \gamma_1 \mathrm{Fintech}_{it} \times \mathrm{Time}_{it} + \gamma_2 \mathrm{Controls}_{it} + \varepsilon_{it} \quad (2)$$

In these models, NPRO refers to the level of development of new productive forces in prefecture-level cities. Fintech is a binary variable representing the combination of technology and finance, with pilot regions coded as 1 and non-pilot regions coded as 0. Time is a time variable, coded as 0 before 2011 and 1 after 2011. Controls include a series of controllable variables that may affect the development of new productive forces in prefecture-level cities, such as GDP, FDI levels, and total scientific expenditure.

3.2. Variable Setup and Descriptive Statistics

(1) Level of Development of New Productive Forces - This paper adopts the new productive force measurement indicators proposed by Han Wenlong et al., which assess the level of development of new productive forces in 285 prefecture-level cities in China from 2009 to 2022 through three dimensions: new quality labor, new quality labor objects, and new quality labor materials. The Topsis-Entropy Weight Method is used for indicator weighting. The specific details are shown in Appendix Table 1.

(2) Variables Related to the Integration of Technology and Finance - This study constructs a DID model in terms of both city and time dimensions to explore the impact mechanism of the technology-finance integration policy on the development of new-type productivity in prefecture-level cities. The model specifically includes the following two elements: First, Fintech is a dummy variable for pilot cities of technology-finance integration. Based on the relevant policy, 53 cities that implemented the pilot program serve as the treatment group, while non-pilot areas serve as the control group. Second, Time is a dummy variable representing the time point of policy implementation, specifically before or after 2011. The model is as follows:

$$\mathrm{Fintech} = \begin{cases} 0 & \text{for non-pilot areas} \\ 1 & \text{for pilot areas} \end{cases} \qquad \mathrm{Time} = \begin{cases} 0 & \text{for before policy implementation} \\ 1 & \text{for after policy implementation} \end{cases} \quad (3)$$

(3) Control Variables - The development of new productive forces is influenced not only by the integration of technology and finance but also by multidimensional factors such as industrial structure, economic foundation, international capital investment, and the levels of technological and educational development. Therefore, this article selects the natural logarithm of regional gross domestic product (GDP), the number of ordinary higher education institutions (NHS), and the natural logarithm of the total regional fiscal expenditure on science and technology as control variables. First, GDP, as an important indicator of regional economic development, reflects the economic foundation of the area, and the development of new productive forces must be built upon a certain economic foundation. Second, NHS stands for ordinary higher education institutions that foster innovative, research-

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focused talents, enhance regional innovation levels, and positively influence new productive forces development. Third, the level of science and technology expenditure is an important indicator for measuring the development of regional science and technology. Science and technology expenditure helps to enhance regional innovation vitality and capacity, affecting the development of new productive forces.

(4) Mechanism Variables - This paper introduces mechanism variables to explore in-depth the impact path of the integration of technology and finance on new productivity, including industrial structure optimization, regional innovation capability, and other dimensions, in order to reveal the specific mechanisms of policy effects. A detailed analysis of regional heterogeneity in policy implementation is conducted to examine the differentiated performance of different regions under the influence of policies, further verifying the actual effect of technology and finance integration policies. Industrial optimization is measured by the ratio of the added value of the secondary and tertiary industries to GDP (IDS), while regional innovation capability is represented by the number of invention patents granted (NIP).

(5) Descriptive Statistics of Data - The research subjects in this paper are 285 cities above the prefecture level with relatively complete data, covering the period from 2009 to 2019. The original data used in the indicators such as average wages of employees (yuan), broadband internet access users (thousands), robot installation density (units per 10,000 people), the number of inventions applied for in the year (items), and the number of artificial intelligence enterprises (companies) are sourced from the National Bureau of Statistics, Ministry of Science and Technology, and statistical yearbooks of various prefecture-level cities. The construction of the new productivity development indicators is based on the methodology of Han Wenlong et al. [24].

Among the 285 prefecture-level city samples selected for this study, the first batch of technology-finance integration pilot areas includes 16 regions: Zhongguancun National Independent Innovation Demonstration Zone in Beijing, Tianjin, Shanghai, Wuhan, Changsha High-tech Zone, Chongqing, Chengdu High-tech Zone, Mianyang, Dalian, Qingdao, Shenzhen, and others. These areas are converted into city units, involving 41 pilot cities such as Beijing, Tianjin, and others. Among these pilot cities, there are 13 provincial capitals, municipalities directly under the central government, or special administrative regions, including Beijing, Wuhan, Shenzhen, etc. As shown in Table 1:

Table 1: Descriptive Statistics of Data

Variable Name	Sample Size	Mean	Standard Deviation
NPRO	3135	0.046	0.068
DID	3135	0.144	0.351
LGDP	3135	16.459	0.950
NHS	3135	8.677	14.757
LTEP	3135	10.206	1.401
IDS	3135	0.087	0.052
NIP	3135	0.021	0.068

4. Empirical Results Analysis and Tests

4.1. Baseline Regression

This paper uses the Difference-in-Differences (DID) method to analyze whether the integration of technology and finance has promoted the development of new productivity at the prefecture-level cities. After adding city and time fixed effects, regression on equation (2) is conducted, with the results shown in column (1) of Table 2. The regression results indicate that the pilot implementation

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of this policy has a significant impact on the development of new productivity at the prefecture level. Based on the regression results, it can be preliminarily concluded that the implementation of this policy has promoted the development of new productivity. To mitigate the endogeneity bias in the results, this paper follows the approach of Lu Shengfeng et al., with columns (2), (3), and (4) providing further regression analysis by adding control variables for total GDP, the number of general higher education institutions, and the level of scientific expenditure.

The integration of technology and finance has significantly enhanced new quality productivity, with a positive coefficient of 0.025. When GDP control variables are introduced, the policy effect remains significant but diminishes, suggesting GDP's moderating role. Total GDP is pivotal for regional industrial transformation and productivity upgrading, underscoring the economic foundation's importance for new quality productivity development. Technology expenditure and the number of universities significantly boost new quality productivity by fostering technological innovation and talent cultivation.

Table 2: Difference-in-Differences Baseline Regression.

	(1)	(2)	(3)	(4)
VARIABLES	NPRO	NPRO	NPRO	NPRO
DID	0.025***	0.024***	0.020***	0.020***
	(0.004)	(0.004)	(0.004)	(0.003)
LGDP		0.017***	0.016***	0.006***
		(0.003)	(0.003)	(0.003)
NHS			0.002***	0.002***
			(0.001)	(0.001)
LTEP				0.006***
				(0.001)
Fixed effect	Yes	Yes	Yes	Yes
Observations	3,135	3,135	3135	3,135
R-squared	0.174	0.484	0.679	0.684

Standard errors in parentheses
***p<0.01,**p<0.05,*p<0.1

Currently, China is in a period of economic downturn, with relatively excess production capacity and a significant issue of industries being large but not strong. Therefore, the vigorous development of new productivity and enhancement of technological innovation capabilities are inevitable requirements for China’s economic recovery. Research results show that the integration of technology and finance has a significant positive impact on the development of regional new productivity. Therefore, the development and innovation of fintech serve as a powerful booster for the development of regional new productivity. At this stage, various regions are actively responding to policy calls, developing fintech, cultivating innovation-driven talents, and stimulating financial vitality. This aligns with the new development philosophy and has a positive effect on optimizing China’s economic structure and boosting the market. It further indicates that the integration of technology and finance policies is beneficial for the development of new productivity, thereby boosting the economy and promoting high-quality, sustainable economic growth.

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4.2. Parallel Trend Test

In the baseline analysis, this paper has used the DID method to verify the causal relationship between the integration of technology and finance and the development of new productivity. However, it is still necessary to conduct a parallel trend test for the DID model to validate the effectiveness of the conclusion. As shown in Appendix Figure 1, the parallel trend test results for this study's DID model indicate that before 2010, the control group and the treatment group exhibited the same trend in new productivity development. Therefore, the conclusion of this paper passes the parallel trend test.

4.3. Robustness Test

This study follows the methodology of Han Wenlong et al. to conduct a robustness test of the regression results by selecting and replacing explanatory variables with sample data (After the placebo was tested, the results remained robust, with the test results as shown in the Appendix Figure 2). Specifically, the sample size for new productivity development is reduced by 10% for regression analysis, and the integration of technology and finance policy is replaced by the natural logarithm of the number of employees in strategic emerging industries at the prefecture level (LNJP) for regression. The regression results are shown in Appendix Table 2.

Column (1) presents the regression results for the original sample, while columns (2) and (3) present the regression results for the reduced sample and the regression results with transformed explanatory variables, respectively. All results show significant positive effects, fully demonstrating the robustness of the conclusion that the integration of technology and finance promotes the development of new productivity at the regional level.

Based on the above research findings, it can be confirmed that the integration of technology and finance has a positive impact on the new productivity of prefecture-level cities, thus validating Hypothesis 1.

5. Mechanism Analysis

5.1. Optimize the industrial structure

This study uses the ratio of the added value of the secondary industry to the added value of the tertiary industry as an indicator of industrial structure optimization (IDS), normalizes the data, and constructs a moderating effect model. The regression results are presented in column (1) of Table 3.

The results show that industrial structure optimization has a significant positive moderating effect on the technology-finance integration effect, significant at the 1% level. This suggests that the more optimized the industrial structure, the more pronounced the effect of technology-finance integration on the promotion of new productivity. Based on these results, it can be inferred that optimizing the industrial structure is a key pathway to enhancing the effects of the technology-finance integration policy. Through the optimization of the industrial structure, the digital and intelligent transformation of regional industries can be promoted, breaking away from traditional development models, further unleashing and developing new productivity, thereby achieving high-quality economic development. Based on the above findings, it can be confirmed that the technology-finance integration policy, by optimizing regional industrial structures, significantly enhances new productivity levels, thus validating Hypothesis 2.

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5.2. Enhance the regional innovation capability

This study uses the number of invention patents granted in prefecture-level cities (NIP) as an indicator of regional innovation capacity, normalizes the data, and constructs a moderating effect model. The regression results are presented in column (2) of Table 3.

The results show that the more investment in technology-finance, the more apparent the improvement in regional innovation capacity, which in turn promotes new productivity development. Based on these results, it can be inferred that technology-finance integration, by enhancing regional innovation capacity, effectively promotes new productivity improvement. By boosting regional innovation capacity, stimulating innovation vitality, accelerating the transformation of scientific and technological achievements, and forming a positive cycle, regional economic competitiveness is further consolidated and enhanced, leading to sustainable development. Additionally, the study finds that the synergistic effect of technology-finance integration and regional innovation capacity is more pronounced under the background of industrial structure optimization, further confirming the key roles of industrial structure optimization and regional innovation capacity in promoting new productivity development through technology-finance integration. Based on the above conclusions, it can be confirmed that technology-finance integration has a positive impact on new productivity development through the pathway of enhancing regional innovation capacity, thus validating Hypothesis 3.

Table 3: Mechanism Variable Regression Results

VARIABLES	(1) IDS	(2) NIP
did	0.022***	0.012***
	(0.004)	(0.002)
Constant	0.084***	0.019***
	(0.002)	(0.004)
Observations	3,135	3,135
Number of id	285	285

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

5.3. Heterogeneity Analysis

This paper further divides the prefecture-level cities across the country into the Southeast, Southwest, Northwest, and North China regions. After adding year and regional fixed effects, the impact of the technology-finance integration policy on new productivity is studied by region. The results are shown in Appendix Table 3.

The heterogeneity analysis shows that the combination of science, technology, and finance has a more significant effect on promoting new quality productivity in the Eastern and Southern regions, while the policy effect is weaker in the Western and Central regions. Possible reasons include:

Differences in Financial Development, Technological Innovation Levels and Capital Vitality. First, The Southeastern regions have a stronger financial foundation, allowing science and technology finance policies to significantly support industrial upgrading and new quality productivity. In contrast, the Central and Western regions, with lower economic development and underdeveloped financial systems, face limitations in fully empowering new quality productivity. Second, The Southeastern regions are economically advanced with more technology-driven enterprises, abundant education and talent resources, and higher technological levels, making the combination of finance and technology more effective. However, the Central and Western regions have lower innovation levels and a

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shortage of resources, weakening the empowerment effects of science and technology finance policies. Third, The Southeastern regions have dynamic financial markets with rapid capital flows, making it easier to finance technological innovation. In contrast, the Central and Western regions have sluggish financial markets, limiting the effectiveness of science and technology finance policies in boosting innovation financing channels.

5.4. Further Analysis

In order to further investigate the mechanisms behind the differing policy effects across the five regions, this paper will mediate the effects of industrial structure and regional innovation capacity levels. It explores how different mechanisms in different regions influence the promotion of new quality productivity development. The specific analysis results are shown in Appendix Table 4-1 and 4-2.

Further analysis shows that in the southeastern region, the integration of technology and finance has significantly enhanced regional innovation capacity, while the industrial structure also plays a role in empowerment, jointly promoting the development of new productive forces, with the effect on regional innovation capacity being more prominent. However, in the western region, the impact of technology and finance on industrial structure optimization and upgrading is not significant. This paper identifies two reasons: First, the western region is primarily focused on animal husbandry, with fewer industries related to technological innovation and manufacturing, resulting in a lack of targets for technology-finance empowerment, and thus, a minimal impact on new productive forces. Second, there are fewer technology-driven enterprises in the western region, leading to insufficient innovation vitality and delayed development of new productive forces. Through further mediation and heterogeneity analysis, this paper argues that policies combining technology and finance can promote the development of regional new productive forces through multiple pathways, with improving regional innovation capacity being the main mechanism and industrial structure upgrading as a supporting mechanism.

6. Conclusion

Technology and finance are key factors for high-quality economic development and technological innovation. This paper uses a difference-in-differences model based on ten years of data from 285 prefecture-level cities in China, with “the integration of technology and finance” as a quasi-natural experiment, to empirically analyze the mechanism by which technology and finance promote the development of new productive forces. The empirical results and mechanism analysis indicate the following: First, the integration of technology and finance can promote the development of regional new productive forces, and this result remains robust even after controlling for variables such as GDP. Second, the policy combining technology and finance promotes the development of new productive forces by enhancing regional innovation levels. This mechanism is significant in the eastern, western, southern, northern, and central regions of China, with the empowerment effect being more pronounced in areas with a strong economic base and a higher level of technological innovation. Third, the policy combining technology and finance promotes the development of new productive forces by optimizing regional industrial structures. This mechanism exhibits clear regional heterogeneity, being insignificant in the western regions. This may be due to the western region’s focus on animal husbandry, with fewer technology-driven industries, thereby suppressing the empowerment effect.

This article proposes the following suggestions for the future development of China's science and technology finance:

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Firstly, deepen the reform of science and technology finance, follow the objective laws, promote the reform of the financial market, and leverage the role of finance in supporting the real economy and technological development. The government needs to introduce relevant laws and regulations, establish a standardized market, financial institutions should reduce the risk of information asymmetry, and provide financing support for the science and technology innovation industry. Secondly, balance regional development and narrow the regional economic gap. The eastern region should strengthen financial innovation and cooperation with technology companies, improve the precision of policies; the central and western regions need to increase financial resource input, improve the infrastructure for scientific and technological innovation, promote the optimization of industrial structure, and enhance economic strength and the level of scientific and technological innovation. Policymakers should consider regional characteristics, formulate differentiated support measures, promote the balanced improvement of innovation levels, and achieve high-quality economic development. Finally, strengthen the injection of funds and human resources in the western region, ensure the capacity for scientific and technological innovation. Increase investment in education and financial subsidies, cultivate scientific research talents, and accumulate human capital.

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Appendix

The appendix could be available at https://pan.baidu.com/s/1Xbo9wOtIQGvuIV-KoSUj1Q?pwd=0030