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Digital Finance and FDI: Spatial Spillover, Moderating Mechanisms, and Regional Heterogeneity Analysis

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Abstract. This study examines the impact of digital finance (DF) on foreign direct investment (FDI) using panel data from 30 Chinese provinces (2011-2022). By employing a spatial Durbin model and moderating effect analysis, we identify key mechanisms and spatial patterns. Results indicate that DF significantly boosts local FDI inflows by reducing information asymmetry and improving capital allocation efficiency. Innovation capital and human capital act as positive moderators, enhancing DF's effect on FDI. Spatial spillovers exhibit a "local agglomeration-peripheral suppression" pattern, driven by factor siphoning and policy competition. Regional heterogeneity reveals the strongest effect in western China, followed by the eastern region, while the central region shows no significant impact due to slower industrial digitization. Among DF dimensions, coverage breadth has the greatest influence, followed by usage depth, with digitization level displaying a lagged effect. The study offers theoretical insights and policy recommendations for optimizing regional FDI strategies.

Keywords: digital finance; FDI; spatial spillover; policy implications.

1. Introduction

The rapid growth of digital finance (DF) has positioned it as a transformative force in global economic development. In China, DF has become deeply embedded across economic sectors, exemplified by widespread mobile payment adoption and digital currency initiatives. The government has prioritized DF in national strategies, such as the FinTech Development Plan (2019-2021), which aims to "enhance financial technology applications and strengthen financial support for the real economy." Scholarly research underscores DF's role in improving efficiency, lowering costs, and optimizing resource allocation. As digital technologies advance, DF's economic impact is expected to expand further.

FDI remains a vital driver of economic growth, technological progress, and industrial upgrading worldwide. However, China faces mounting challenges in attracting FDI, including trade tensions with the U.S. and competitive pressures from low-cost Southeast Asian markets. To counter these trends, policymakers have introduced measures like business environment reforms and targeted incentives. For instance, the State Council's Opinions on Further Optimizing the Foreign Investment Environment and Enhancing FDI Attraction (August 2023) outlines fiscal support, streamlined approvals, and other facilitation policies. Stabilizing FDI is critical for sustaining economic growth and fostering innovation, making it imperative to address recent declines.

Given the strategic importance of DF and FDI, this study investigates their relationship using provincial-level data (2011-2022). We analyze DF's direct effects on FDI, spatial spillovers, and the moderating roles of human capital and innovation. Our findings contribute to theory by establishing a regional "agglomeration-competition" framework and empirically validating the "DF-factor quality-FDI" transmission mechanism. Practically, the results provide actionable insights for policymakers to tailor FDI strategies across regions.

2. Literature Review

As the core achievement of financial innovation, DF (Digital Finance), supported by digital technology, breaks through the time-space limitations of traditional finance, expands service boundaries and supply, forming advantages of high efficiency, convenience, and low cost (Xue Qingmei et al., 2025). Against the backdrop of global economic digital transformation and the

reconstruction of the international investment pattern, the interaction relationship between DF and FDI has become the focus of academic research. Deepening the research on the relationship between the two can not only provide theoretical support for China to optimize the foreign capital structure and promote high-quality economic development but also offer a Chinese solution for cross-border capital allocation in the global digital economy era.

The relationship between financial development and FDI has long been debated between the "promotion theory" and the "inhibition theory". The promotion theory holds that the financial system creates an efficient financing environment for foreign-funded enterprises through capital accumulation, technology spillover, and risk-dispersion functions: Based on urban panel data, Liu Songtao et al. (2023) empirically showed that a 1% increase in DF can significantly promote a 74.96% growth in FDI inflows, with its core mechanism lying in alleviating the financing constraints of foreign-funded enterprises and improving service efficiency; Huang Xinfei et al. (2023) further revealed that financial development forms a positive cycle with FDI to jointly promote industrial upgrading through capital allocation optimization and technology spillover mechanisms. The inhibition theory, however, emphasizes that financial deepening may trigger negative effects such as intensified competition in factor markets: The transnational study by Islam et al. (2020) showed that the attraction of financial market development to FDI is weaker than that of financial institution development, and institutional quality differences lead to differentiated effects; Zhang Guojian et al. (2024), based on a non-linear model, found that financial development has a threshold effect, and after exceeding the critical value, the promoting effect reverses to inhibition.

With the innovative diffusion and in-depth application of digital technology, the location selection logic and value creation model of FDI are undergoing a paradigm shift. Lu Yuxiu (2023), based on data from 285 cities, showed that a 1-unit increase in the digital economy index can significantly promote a 2.3% growth in urban FDI inflows, with its mechanism lying in improving information transparency and reducing transaction costs; Cui Riming et al. (2023) revealed that the digital economy creates investment opportunities in high-tech fields for foreign-funded enterprises through technological innovation networks and industrial digital transformation. However, unbalanced regional digital development may exacerbate the gap in attracting investment. Wang Zhixin et al. (2023) found that eastern cities form a "Matthew effect" due to the advantage of digital finance, and their attractiveness to foreign capital reaches 1.8 times that of central and western cities; Zhou Wuqi et al. (2023) emphasized that the improvement of digital trade rules can enhance the attractiveness of high-end FDI by reducing institutional transaction costs. These studies collectively show that technology empowerment and institutional innovation are reshaping the global capital flow pattern.

With the deep integration of digital technology and finance, the impact of DF on FDI has become a new focus: Liu Feifei et al. (2022) found that digital DF indirectly promotes FDI by expanding coverage breadth (most significantly) and increasing consumption willingness; Wang Zhixin et al. (2023), based on urban data, revealed that it significantly promotes FDI inflows by optimizing the business environment, promoting economic agglomeration, and stimulating innovation and entrepreneurship vitality, presenting a non-linear characteristic of increasing "marginal effect" and geographical heterogeneity (more significant in the east); Chen Yongsheng et al. (2023) further revealed that its action mechanism lies in alleviating information asymmetry, promoting market integration, and optimizing resource allocation, and the effect is more prominent in regions with complete network infrastructure and underdeveloped traditional finance. These studies collectively show that DF, as a supplementary innovation to traditional finance, provides new momentum for attracting foreign capital, but attention needs to be paid to its adaptability to the institutional environment and regional development levels.

Synthesizing the existing literature, the research on the relationship between financial development and FDI has yielded rich results and laid a research foundation, but there are still the following deficiencies: First, the research perspective mostly focuses on the national or regional overall level, with insufficient attention to the provincial individual level; second, it generally ignores the spatial spillover effect generated by DF through cross-regional transmission mechanisms; third, the research

on the micro-mechanisms driving FDI by DF is not in-depth enough, especially the action paths at the factor market level such as human capital and technological factors have not been fully revealed. This paper will base itself on the provincial development perspective, systematically examine the direct impact and spatial spillover effect of DF, and deeply analyze its action mechanism at the factor market level, filling the research gap and providing a new theoretical perspective.

3. Research Design

3.1 Variable Selection

This paper selects panel data from 30 provinces in China from 2011 to 2022 (Tibet is excluded due to data limitations), with raw data mainly sourced from each city's statistical yearbook. A small number of missing values are filled using the interpolation method.

(1) FDI (*lnFDI*)

FDI is the dependent variable in this study. Following the approach of Xie Kejin et al. (2023), it is represented by the logarithmic form of the actual foreign capital utilized by each city. Based on the annual RMB-USD exchange rate released by the National Bureau of Statistics, the unit is uniformly converted into 100 million RMB for calculation.

(2) Digital Finance (*Digital*)

Digital finance (DF) is the core explanatory variable. Referencing the research of Zhang Haijun et al. (2025), the Peking University Digital Finance Index published by the Peking University Digital Finance Research Center is used for measurement.

(3) Innovation Capital (*lnPatent*) and Human Capital (*lnHuman*)

Innovation capital and human capital serve as moderating variables. Based on the studies of Zhou Xia et al. (2024) and Wang Zhixin et al. (2023), innovation capital is measured by the logarithm of the number of patent authorizations per capita in each province over the years, and human capital is measured by the logarithm of the number of college students per 10,000 people.

(4) Control Variables

Drawing on the practices of Wang Zhixin et al. (2023) and Liu Feifei et al. (2022), the model controls for the following variables: financial development (*FinDev*), government intervention (*Inter_Gov*), infrastructure (*Facility*), industrial structure (*Secondary, Tertiary*), etc. In addition, year and provincial fixed effects are also controlled in the regression.

The descriptions of the main variables in this paper are shown in Table 1.

Table 1. Description of Main Variables

Variable Name	Variable Symbol	Variable Definition
Foreign Direct Investment (FDI)	*lnFDI*	Actual amount of foreign capital used by the city in the current year (100 million RMB, logarithm taken)
DF	*Digital*	Peking University Digital Finance Index
Innovation Capital	*lnPatent*	Number of patent applications authorized (pieces, logarithm taken)
Human Capital	*lnHuman*	Number of college students per 10,000 people (persons / 10,000 people, logarithm taken)
Financial Development	*FinDev*	Deposits and loans / GDP
Government Intervention	*Inter_Gov*	Fiscal expenditure / GDP
Infrastructure	*Facility*	Highway and railway density (kilometers per 100 square kilometers)
Industrial Structure	*Secondary*	Proportion of the secondary industry in GDP
	Tertiary	Proportion of the tertiary industry in GDP

3.2 Model Specification

To test the relationship between DF and FDI, this paper specifies the following benchmark model：

$$lnFDI_{it} = \beta_0 + \beta_1 Digital_{it} + \Phi Control_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (1)$$

Where: $lnFDI_{it}$ represents the FDI level of city i in year t; $Digital_{it}$ represents the development level of DF in city i in year t; $Control_{it}$ represents the vector group of control variables; η_i and $\mu_t$represent provincial fixed effects and year-fixed effects respectively; ε_{it} is the standard error term, and city-level heteroscedasticity-robust standard error is adopted.

On the basis of the benchmark model, this paper incorporates moderating variables and their interaction terms with the core explanatory variable, and conducts centralization treatment on the moderating variables and the core explanatory variable (Rasoolimanesh et al., 2021). The specific specification is as follows：

$$lnFDI_{it} = \beta_0 + \beta_2 c\_Digital_{it} + \vartheta c\_M_{it} + \sigma c\_Digital_{it} \times c\_M_{it} + \Phi Control_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (2)$$

Where, c_M_{it} is the centralized moderating variable, $c\_Digital_{it}$ is the centralized core explanatory variable, and the meanings of other variables are the same as those in model (1).

To examine the spatial influence law of DF on FDI, this paper uses the Spatial Durbin Model to study the spillover effect of DF. The specific specification is as follows.

$$lnFDI_{it} = \delta \sum_{j=1}^{n} w_{ij}\, lnFDI_{jt} + \beta_3 Digital_{it} + \theta \sum_{j=1}^{n} w_{ij}\, Digital_{jt} + \Phi Control_{it} + \eta_i + \mu_t + \varepsilon_{it} \quad (3)$$

Where, w_{ij} is the spatial weight matrix, $\sum_{j=1}^{n} w_{ij}\, lnFDI_{jt}$ represents the spatial lag term of the explained variable $\sum_{j=1}^{n} w_{ij}\, Digital_{jt}$ represents the spatial lag term of the core explanatory variable Digital, δ represents the spatial correlation of foreign capital attraction, and the meanings of other variables are the same as those in model (1).

4. Empirical Results and Analysis

4.1 Descriptive Statistical Analysis

The descriptive statistical results of the main variables in this paper are shown in Table 2.

Table 2. Descriptive Statistics

Variables	Sample Size	Mean	Standard Deviation	Minimum	Maximum
lnFDI	360	5.447	1.775	-1.580	7.818
Digital	360	243.928	107.640	18.330	460.691
lnPatent	360	10.293	1.458	6.219	13.679
lnHuman	360	13.517	0.805	10.730	14.853
FinDev	360	3.320	1.154	1.518	8.131
Inter_Gov	360	0.247	0.102	0.107	0.643
Facility	360	0.994	0.526	0.095	2.292
Tertiary	360	48.002	9.714	29.700	83.900
Secondary	360	42.351	8.777	15.800	59.000

4.2 Benchmark Regression Analysis

The results in Table 3 show that the regression coefficients of DF on FDI are all significant at the 1% level, indicating that the research conclusions have strong robustness. Among them, the goodness-of-fit of the model in column (4) is higher and the explanatory power is stronger. Among them, every 1% increase in the DF level can significantly promote a 2% growth in the FDI level of the province. Its action mechanism lies in that digital finance relies on digital technology to reduce information asymmetry, improve the efficiency and coverage of financial services, optimize the regional capital

allocation ability, and build a more convenient financial support system for FDI entry, thus enhancing the attractiveness.

Table 3. Benchmark Estimation Results

lnFDI	(1)	(2)	(3)	(4)
Digital	0.029***	0.025***	0.021***	0.020***
	(0.004)	(0.004)	(0.004)	(0.004)
Constant	4.230***	4.381***	1.075	-6.995**
	(0.290)	(0.195)	(2.054)	(2.785)
Control Variables	NO	NO	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Provincial Fixed Effects	NO	YES	NO	YES
N	360	360	360	360
R2	0.143	0.144	0.160	0.224

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively; figures in parentheses are robust standard errors.

4.3 Moderating Effect Analysis

The technology spillover effect of FDI relies on the local innovation capacity to undertake. Zhao Tao et al. (2020) found that the digital economy promotes FDI inflows through technology diffusion, and the effect is more significant in patent-intensive regions. In this paper, the number of patent authorizations is used to measure innovation capital (*c_lnPatent*), and this index can reflect the region's technical absorption capacity driven by DF. At the same time, DF relies on high-skilled talents, and the number of college students per 10,000 people is more forward-looking than the average years of education and can reflect the quality of potential human capital. Therefore, the number of college students per 10,000 people is used to measure human capital (*c_lnHuman*). By constructing a model of the interaction term between the core explanatory variable and the dual moderating variables, the moderating mechanism of innovation capital and human capital on the effect of DF promoting FDI is examined.

Table 4. Results of Moderating Effect

lnFDI	(1)	(2)	(3)	(4)
c_Digital	0.014***	0.015***	0.0249***	0.015***
	(0.005)	(0.005)	(0.004)	(-0.005)
c_lnPatent	0.701***	0.526***		
	(0.114)	(0.176)		
c_Digital×c_lnPatent	0.001***	0.001***		
	(0.000)	(0.000)		
c_lnHuman			0.957***	-0.387
			(0.204)	(0.427)
c_Digital×c_lnHuman			0.001**	0.001**
			(0.000)	(0.000)
Constant	6.891***	-0.687	5.837**	-2.355
	(2.476)	(3.307)	(2.415)	(3.264)
Control Variables	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Provincial Fixed Effects	NO	YES	NO	YES
N	360	360	360	360
R^2	0.219	0.248	0.187	0.236

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively; figures in parentheses are robust standard errors.

Columns (1) and (3) are the regression results with year fixed effects controlled but provincial fixed effects not controlled. Column (2) is the regression result of the interaction term of innovation

capital and various factors. All control variables are introduced and both year and provincial fixed effects are controlled. Among them, it shows that the coefficient of the interaction term of innovation capital is significantly positive at the 1% level. The spatial spillover effect of patent quality significantly affects foreign investment in high-tech industries, and there is a threshold distance of 300 kilometers, indicating that the technological synergy effect needs to rely on an innovation ecosystem within a certain geographical scope for support. Innovation capital promotes technology absorption and patent transformation by reducing financing costs, forming a foreign-capital attraction mechanism that coordinates the innovation ecosystem and DF. Column (4) is the regression result of the interaction term of human capital and various factors. All control variables are introduced and both year and provincial fixed effects are controlled. The results show that the coefficient of the interaction term of human capital is significantly positive at the 1% level. High-R & D human capital optimizes the labor market and reduces the operating costs of foreign capital by improving knowledge-absorption ability and the effect of foreign-capital technology transfer, forming a positive regulatory relationship between the improvement of digital-finance efficiency and FDI inflow. Research shows that DF further strengthens the attraction efficiency for FDI through the positive regulatory effects of innovation capital and human capital.

5. Analysis of Spatial Spillover Effects

5.1 Spatial Autocorrelation Test

It can be seen from the test results in Table 5 that the spatial Moran's index in most years shows a significant spatial positive-aggregation characteristic. The insignificance of the Moran's index in the early stage mainly stems from the fact that digital finance was in the exploration stage before 2014. The differences in financial-digital infrastructure between regions were significant, and regional segmentation and information barriers inhibited the spatial spillover effect. With the improvement of the digital-finance ecosystem, digital technology breaks through geographical restrictions and improves the coordination of resource allocation, and the spatial autocorrelation of FDI is significantly enhanced. The results show that FDI presents a significant spatial positive-aggregation characteristic.

Table 5. Test Results of Moran's Index

Year	*Moran's I*	*Year*	*Moran's I*
2011	0.128	2017	0.349^{***}
2012	0.138	2018	0.413^{***}
2013	0.120	2019	0.358^{***}
2014	0.206^{*}	2020	0.343^{***}
2015	0.344^{***}	2021	0.421^{***}
2016	0.419^{***}	2022	0.321^{***}

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively.

5.2 Analysis of Spatial Spillover Effects

Table 6 results show that the direct effect of DF on FDI is significantly positive, but the indirect effect is negative, and its mechanism includes two aspects: First, the impact of the siphon effect: In the initial stage of the establishment of coastal free trade pilot zones, there is a significant agglomeration effect on foreign capital, and surrounding provinces rely on the DF service network and efficient capital allocation ability to form a factor siphon, resulting in the obstruction of local FDI inflows; Second, the "race to the bottom" in the policy substitution effect —— the competition for FDI among regions may fall into a vicious competition cycle. Some surrounding provinces attract foreign capital through "policy depression" strategies such as lowering environmental regulations, relaxing labor protection, and providing unconventional tax incentives (Yue Jingui et al., 2018). FDI

tends to flow into regions with more lenient policies, and if the local area adheres to the policy bottom line, it may be at a disadvantage in the competition.

Table 6. Results of Spatial Durbin Model

Variable Name	*Main*	*W*X*	Direct Effect	Indirect Effect	Total Effect
Digital	0.021***	-0.167*	0.021***	-0.016*	0.005
	(0.004)	(0.009)	(0.004)	(0.010)	(0.012)
Control Variables			YES		
Year Fixed Effects			YES		
Provincial Fixed Effects			YES		
N			360		
R^2			0.057		

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively; figures in parentheses are robust standard errors.

In summary, the spatial effect of DF on FDI presents a complex pattern of "local agglomeration-peripheral inhibition". This differentiation is essentially the result of the dynamic balance of regional factor flow and spatial competition: As a potential "core area", the local region forms an agglomeration magnetic field with increasing returns to scale through DF development, attracting foreign capital to concentrate in this region, manifesting as a significant direct positive effect. However, the surrounding "peripheral areas" form an anti-magnetic system through strategies such as the creation of policy depressions and factor siphoning in the race to the bottom competition, leading to the spatial diversion of foreign capital that should have flowed to the core area. This "agglomeration-competition" interaction between the core and the periphery not only confirms the model expectation that the core area strengthens the attractiveness to foreign capital through knowledge spillover and industrial collaboration but also reveals the realistic mechanism by which the peripheral areas break spatial equilibrium through policy substitution and factor competition. This phenomenon indicates that the spatial allocation of FDI driven by DF is not a simple core radiation process but a dynamic equilibrium formed by the game between agglomeration force and dispersion force among regions. This provides a new theoretical perspective for understanding the co-existing characteristics of "local agglomeration and global competition" in the distribution of provincial-level FDI in China.

6. Heterogeneity Analysis

To further empirically explore the heterogeneity of DF on the level of FDI, first, from a regional perspective, the sample is divided into three groups: the Eastern Region, the Central Region, and the Western Region, and heterogeneity analysis is carried out accordingly.

Table 7. Results of Heterogeneity Analysis from Regional Perspective

	Eastern Area	Middle Area	Western Area
Digital	0.016***	0.003	0.029**
	(0.005)	(0.008)	(0.014)
FinDev	-0.530***	-1.448***	0.071
	(0.126)	(0.384)	(0.353)
Inter_Gov	1.903	20.747***	0.579
	(2.541)	(5.082)	(3.196)
Facility	0.260	2.105***	0.748
	(0.394)	(0.437)	(0.587)
Tertiary	0.149***	-0.127*	-0.064
	(0.034)	(0.070)	(0.064)
Secondary	0.104***	-0.139**	-0.032
	(0.031)	(0.067)	(0.065)
Constant	-5.117*	14.253**	6.534

	(2.764)	(6.057)	(5.575)
Year Fixed Effects	YES	YES	YES
Provincial Fixed Effects	YES	YES	YES
N	156	72	132
R^2	0.444	0.430	0.169

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively; figures in parentheses are robust standard errors.

The regional heterogeneity analysis in Table 7 shows that the impact of DF on FDI presents significant regional differences: DF in both the Eastern and Western Regions significantly promotes FDI, but the promoting intensity in the West is higher than that in the East, while no significant effect is presented in the Central Region. This stems from the fact that DF in the East developed earlier and has formed a complete ecological system, and its agglomeration effect on FDI tends to be stable but with a diminishing marginal promotion effect. DF in the Central Region did not have a significant positive impact on FDI. The reason lies in that the industrial structure in the Central Region is dominated by the traditional manufacturing industry, and there is insufficient adaptability between DF and the real industry, failing to effectively transform into foreign investment attraction. Moreover, in the process of undertaking industrial transfer from the East, it relies more on cost advantages rather than financial innovation to drive foreign capital inflows, and the enabling role of DF is weakened.

7. Robustness Test

To ensure the reliability of research conclusions, this paper conducts robustness tests from multiple dimensions. First, exclude the special years 2020-2021. The impact of the epidemic in 2020-2021 on DF and FDI has a complex linkage, and a single variable is difficult to accurately measure the comprehensive effect during this period, so the data are excluded. The regression results in column (1) show that the coefficient of DF on FDI is 0.017 and significantly positive, indicating that after excluding the epidemic years, the positive promotion effect of DF on FDI still holds, verifying the robustness of the benchmark results.

Secondly, control for differences in administrative models. There are essential differences in the administrative models and economic development logic between municipalities directly under the central government and ordinary provinces, and their special administrative attributes may trigger unquantifiable endogenous interference. Therefore, after excluding the samples of the four municipalities directly under the central government in China and regressing the data of ordinary provinces, the results in column (2) show that the DF coefficient is 0.018, still significantly and positively promoting FDI, indicating that after eliminating the influence of differences in administrative models, the research conclusions are still reliable.

Finally, address the endogeneity problem. This paper uses the instrumental variable method for testing. The instrumental variable needs to meet the conditions of relevance and excludability: the first-stage results show that the instrumental variable (L_Digital) is significantly positively correlated with DF, and the DF coefficient in the second-stage is still significantly positive, indicating that the impact of DF on FDI is still robust after controlling for endogeneity. Tests such as Kleibergen-PaaprkLM are all significant, verifying the validity of the selection of instrumental variables.

Table 8. Results of Robustness Test

	OLS *lnFDI* (1)	OLS *lnFDI* (2)	IV-2SLS First stage (3)	IV-2SLS Second stage (4)
Digital	0.017***	0.018***		0.023***
	(0.005)	(0.005		(0.006)
L_Digital			0.743***	
			(0.037)	
Constant	-3.196	-5.939**	36.101	-9.233**

	(3.108)	(3.020)	(30.234)	(3.721)
Kleibergen-Paap rk LM statistic				70.82***
Stock-Wright LM S statistic				18.68***
Control Variables	YES	YES	YES	YES
Year Fixed Effects	YES	YES	YES	YES
Provincial Fixed Effects	YES	YES	YES	YES
N	330	312	330	330
R^2	0.178	0.274		0.924

Note: ***, **, * represent significance levels of 1%, 5%, and 10% respectively; figures in parentheses are robust standard errors.

8. Conclusions and Suggestions

Based on China's provincial-level panel data from 2011 to 2022, this study reveals the action mechanism of digital finance driving FDI through the Spatial Durbin Model and moderating effect analysis: Digital finance significantly improves the provincial FDI level by reducing information asymmetry and optimizing capital allocation efficiency, verifying the empowerment logic of digital technology for financial services. Innovation capital and human capital present differentiated adjustment paths, the former strengthens the effectiveness of digital finance through technological collaboration and intellectual property financing, and the latter enhances the attractiveness to foreign capital by improving technological adaptation capabilities. The study finds that there is a spatial effect of "local agglomeration-peripheral inhibition" among provinces, reflecting the dual role of regional factor siphoning and policy competition. Regional comparison shows that the promotion effect of digital finance in the West is significantly stronger than that in the East, and the Central Region fails to form an effective drive due to the lag in industrial digitalization. In the subdivided dimensions, the driving effect of coverage breadth is the most significant, followed by usage depth, and there is an obvious lag in the degree of digitalization. This study breaks through the boundaries of traditional theories, clarifies that the "technology-human capital" dual-wheel drive reshapes the logic of foreign capital flow, and provides a new paradigm for regional coordination. In the future, it is necessary to deepen the linkage research between digital finance and institutional opening-up, explore precision strategies combined with micro-enterprise data, and support the innovation of foreign investment policies under the "double-cycle" pattern.

Based on this, the government should strengthen the deep integration of digital finance and high-tech industries, build an industry-university-research collaborative innovation platform to accelerate the transformation of technological achievements, and improve the intellectual property financial service system to lower the financing threshold for technology-intensive enterprises. At the regional development level, differentiated strategies need to be implemented: the East should build a core demonstration zone of digital finance to radiate industrial chain upgrading, the Central Region should promote the digital transformation of traditional industries to form an investment-attracting model of "intelligent transformation + cost advantage", and the West should improve the inclusiveness level of digital finance and combine resource advantages to construct a model of "technology import-resource development". In terms of cross-regional collaboration, resource sharing can be achieved through jointly building a digital finance collaborative platform. Also, a provincial-level policy coordination mechanism can be established to standardize investment-attracting behaviors. Moreover, investment in digital infrastructure in the central and western regions can be increased to narrow the regional digital divide, and the balanced allocation of foreign capital can be promoted.

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