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How Digital Finance Affects Economic Development

—A Study Based on 31 Provinces in Inland China

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Abstract

With the continuous development of digital technology, the rapid integration of digital technology and the financial industry will have a significant impact on China's economic development trend and quality. Based on the fixed effect model and data from 31 Chinese provinces from 2013 to 2021, this paper investigates whether digital finance affects economic development, delves deeper into the mechanism of digital finance's impact on economic development, and examines regional differences in development. It is discovered that digital finance has a significant positive impact on economic development, and further mechanistic analysis shows that digital finance contributes to economic development by attracting foreign direct investment and optimizing the industrial structure. Digital finance plays a different role in promoting different regions, with the greatest impact on the western region, followed by the central region, while the impact on the eastern region is unclear, particularly in low-income regions.

Keywords

Digital Finance, Industrial Economy, Economic Growth

1. Literature Review

In recent years, in the context of a global economy that is gradually evolving towards a technology and digital technology-based economy, the financial industry of various countries has focused on the new model of digital inclusive finance. According to Ketterer (2017) and Acharya (2017), as the financial services industry began to accelerate its transformation (Ketterer, 2017), the transformative development that resulted is likely to improve and expand the opportunities for

enterprises and individuals to obtain financing, as well as improve formalization and financial inclusion (Acharya, 2017). Digital finance, as a new financial service method based on digital technology, has the greatest advantage in assisting financial development. The Chinese economy has entered a new phase of "gear shifting, speed reduction and efficiency increase". Technological innovation is critical to achieving long-term economic development. Financial development underpins technological innovation, and economic growth is also dependent on financial development. Many scholars investigate the relationship between digital finance and the level of economic development from the perspective of digital finance, providing us with a reference for understanding the economic effects of digital finance. According to Manyika et al. (2016), the GDP of emerging economies is expected to increase by 3.7 trillion USD and 95 million jobs by 2025 as a result of the popularization and use of digital finance (Manyika et al., 2016). Brown et al. (2012) believe that digital finance can provide a variety of financial services and products to businesses and individuals, increasing public consumption and promoting economic development (Brown et al., 2012). According to Tomo et al. (2007), digital finance is an important measure to promote China's high-level development. Introducing new digital technologies into the financial industry can effectively promote resource allocation, reform, and high-level development (Tomo, Yan, & Chen, 2007).

More scholars are studying the relationship between technological innovation and digital finance these days, but they fall short of investigating how digital finance affects economic development from other perspectives. Foreign direct investment and industrial structure are linked not only to economic development but also to digital finance. Anwar and Sun (2019) discovered that, from an industry standpoint, foreign direct investment can significantly promote enterprise development and entrepreneurial activities, as well as have positive spillover effects on enterprises and stimulate the vitality of the entire industry (Anwar & Sun, 2019). According to Popkova et al. (2021), most current research on the digital economy is conducted at the macro level, focusing on the impact on international investment patterns and paths, the impact on international investment efficiency, and the impact on international investment policies (Popkova et al., 2021). According to Jorge et al. (2017), there is a close relationship between financial development and industrial structure upgrading, and the development of digital finance can promote industrial structure upgrading (Jorge, 2017). Just as Chen (2021) believes that the financial market environment is not as completely competitive and monopolistic as it once was, enterprises with smaller production scales must develop new financial technologies (Chen, 2021). Lim et al. (2019) discovered that when the level of economic development is high, a market-oriented financial structure can promote technological progress and industrial structure upgrading (Lim et al., 2019). According to Ng (2015), the adjustment and upgrading of China's industrial structure will also promote high-quality development. Industrial structure is commonly used as an intermediary factor in China to promote high-level development (Ng, 2015).

2. Introduction

This paper first introduces digital finance, and then uses data from Peking University China Digital Financial Inclusion Index and China Statistical Yearbook to study data from 31 provinces and cities in China from 2013 to 2021. After sorting out the obtained data, descriptive statistics and basic understanding of the data are provided. Then, two-way fixed effect model estimation and moderating effect analysis of FDI and industrial structure are carried out, and then endogeneity and robustness test are carried out. On this basis, the heterogeneity analysis is further carried out, and finally the final conclusion of this paper is drawn.

At present, more and more scholars study the relationship between technological innovation and economic development, but they have not deeply studied the impact of digital finance on a region. This paper will take 31 provinces in China as examples to study the importance of digital finance and combine it with the current situation of each region. However, this paper only takes China's provinces as an example, which is not enough to make the experimental results universal. In other countries, digital finance may have completely different effects under different states.

3. Research Hypothesis and Data Sources

3.1. Model Building

According to the purpose of this paper, explained variables, explanatory variables and control variables have been set according to the references and the discussion of the mechanism, and established the panel data model by setting the variables and the type of variable data:

$$\ln \mathrm{GDP}_{it} = \alpha_0 + \alpha_1 \ln \mathrm{FIN}_{it} + \alpha_2 \mathrm{URBAN}_{it} + \alpha_3 \mathrm{UR}_{it} + \alpha_4 \mathrm{OLD}_{it} + \alpha_5 \mathrm{YOUNG}_{it} + \alpha_6 \mathrm{REV}_{it} + \mu_i + \nu_t + \varepsilon_{it}$$

$$\ln \mathrm{GDP}_{it} = \alpha_0 + \alpha_1 \ln \mathrm{FIN}_{it} + \alpha_2 \ln \mathrm{FDI}_{it} + \alpha_3 \ln \mathrm{FIN}_{it} * \ln \mathrm{FDI}_{it} + \alpha_4 \mathrm{URBAN}_{it} + \alpha_5 \mathrm{UR}_{it} + \alpha_6 \mathrm{OLD}_{it} + \alpha_7 \mathrm{YOUNG}_{it} + \alpha_8 \mathrm{REV}_{it} + \mu_i + \nu_t + \varepsilon_{it}$$

$$\ln \mathrm{GDP}_{it} = \alpha_0 + \alpha_1 \ln \mathrm{FIN}_{it} + \alpha_2 \ln \mathrm{IND}_{it} + \alpha_3 \ln \mathrm{FIN}_{it} * \ln \mathrm{IND}_{it} + \alpha_4 \mathrm{URBAN}_{it} + \alpha_5 \mathrm{UR}_{it} + \alpha_6 \mathrm{OLD}_{it} + \alpha_7 \mathrm{YOUNG}_{it} + \alpha_8 \mathrm{REV}_{it} + \mu_i + \nu_t + \varepsilon_{it}$$

where, α_0 is the constant representing the mean value of lnGDP when other values are zero, and α_i is the coefficient term representing the coefficient of the effect of the explanatory or control variable on the explanatory variable, which enables to observe how the variables are influenced in the direction. Where *i* represents the *i*-th Chinese province and city, *t* represents the year in which the data are located, and ε_{it} represents other factors that are not taken into account in the model. In terms of values, this is the difference between the actual and true values, μ_i represents the individual effect and ν_t represents the Time Fixed Effect. In this paper, the individual and time effects on the explanatory variables are controlled for, which allows for more accurate model results. Ln stands for natural logarithm, and the GDP, FIN and FDI are treated by natural

logarithm. Among them, GDP is the regional gross product, FIN is the digital inclusive finance index, URBAN is the urban population/total population, UR is the per capita disposable income of urban residents/rural residents, indicating the income gap between urban and rural areas, OLD is the dependency ratio of the elderly, YOUNG is the dependency ratio of children, and REV is the fiscal expenditure/GDP. IND is the added value of tertiary industry/added value of secondary industry, and FDI is foreign direct investment. According to the above model the following hypotheses are proposed: 1) The digital economy is able to influence economic development through foreign direct investment and industrial structure. 2) The promotion of digital finance mitigates regional economic development imbalances and reduces injustice.

3.2. Descriptive Statistics

This paper presents descriptive statistics for China's provincial and municipal data, including the number of observations, mean, standard deviation, minimum and maximum values, as shown in the table below (see Table 1).

The number of numerical samples is 248, The mean value of lnGDP is 9.7804, with a standard deviation of 0.9855, a minimum value of 6.7193 and a maximum value of 11.6151, with little interval fluctuation in the data. The mean value of lnFIN is 5.4933, with a minimum value of 6.7193 and a maximum value of 11.6151, the mean value of lnFDI is 8.5815, with a minimum value of 4.3968 and a maximum value of 12.1348, and the mean value of IND is 1.4033, with a minimum value of 0.6653 and a maximum value of 5.2968, with a wide range of fluctuations.

4. Empirical Analysis

4.1. Regression Analysis

Next, a fixed effects model is estimated to obtain the results of this paper (see Table 2).

Table 1. Descriptive statistics.

Variable	Obs	Mean	Std. Dev.	Min	Max
lnGDP	248	9.7804	0.9855	6.7193	11.6151
lnFIN	248	5.4933	0.2877	4.7458	6.0683
lnFDI	248	8.5815	1.5216	4.3968	12.1348
IND2	248	1.4033	0.7348	0.6653	5.2968
URBAN	248	0.5856	0.1279	0.2334	0.9415
UR	248	2.5680	0.3643	1.8451	3.5557
OLD	248	14.7190	3.5456	7.0000	23.8000
YOUNG	248	23.1222	6.4086	11.7000	38.4000
REV	248	0.2992	0.2093	0.1188	1.3538

Table 2. Baseline regression.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	lnGDP	lnGDP	lnGDP	lnGDP	lnGDP	lnGDP
lnFIN	0.5371***	0.5144***	0.4866***	0.4217***	0.4157***	0.3970***
	(4.7088)	(4.0784)	(3.9242)	(3.3875)	(3.4463)	(3.5345)
URBAN		0.1033	−0.0122	−0.0092	−0.1403	−0.0901
		(0.4247)	(−0.0504)	(−0.0389)	(−0.6022)	(−0.4151)
UR			−0.2730***	−0.2275**	−0.2510***	−0.1929**
			(−3.0587)	(−2.5414)	(−2.8872)	(−2.3642)
OLD				−0.0092***	−0.0134***	−0.0093***
				(−2.6998)	(−3.8415)	(−2.7754)
YOUNG					0.0130***	0.0108***
					(3.8095)	(3.3625)
REV						−0.8788***
						(−5.7059)
Constant	6.8302***	6.8943***	7.8156***	8.1895***	8.1211***	8.2980***
	(10.9017)	(10.6787)	(11.1488)	(11.6268)	(11.8977)	(13.0437)
District Fixed Effect	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES
Observations	248	248	248	248	248	248
R-squared	0.9975	0.9975	0.9976	0.9977	0.9979	0.9982
r2_a	0.9971	0.9971	0.9972	0.9973	0.9974	0.9978
F	22.1732***	11.1333***	10.8390***	10.1985***	11.5965***	16.5775***

Note: *** means the effect is significant at the 1% level of significance, ** means the effect is significant at the 5% level of significance, * means the effect is significant at the 10% level of significance. Inside brackets are t-values or z-values. Same as below.

The estimation results of the model show that under the control of provincial and municipal effects and Time fixed effect, the adjusted R-square of the model is 0.9978, the goodness of fit is 99.78%, and the F-test value is 16.5775, which is significant at 1% significance level, that is, the overall model has passed the significance test. The coefficient of influence of lnFIN is 0.3970 and there is a significant influence. In particular, every 1% increase in the Digital Inclusion Index causes an average increase of 0.3970% in the economy. The control variables UR, OLD, YOUNG and REV all have significant effects, and there is a significant positive effect for YOUNG and a significant negative effect for UR, OLD and REV.

4.2. Mechanism Test

The next empirical analysis of whether FDI and industrial structure IND affect the relationship between lnFIN and lnGDP, that is, a moderating effect analysis is performed as shown below (see Table 3).

Table 3. Mechanism test.

	(1)	(2)
VARIABLES	lnGDP	lnGDP
lnFIN	0.3617***	0.1155
	(3.3158)	(0.9968)
lnFDI	−0.1497***	
	(−3.0407)	
c.lnFIN#c.lnFDI	0.0304***	
	(3.5065)	
IND2		−0.7144***
		(−5.6030)
c.lnFIN#c.IND2		0.1005***
		(5.1293)
URBAN	−0.0353	0.3789*
	(−0.1674)	(1.6652)
UR	−0.2416***	−0.1911**
	(−2.9643)	(−2.4919)
OLD	−0.0117***	−0.0040
	(−3.5116)	(−1.2493)
YOUNG	0.0127***	0.0062**
	(4.0102)	(2.0047)
REV	−0.9428***	−0.5649***
	(−6.2040)	(−3.5407)
Constant	8.4400***	9.7200***
	(13.4590)	(15.0132)
District Fixed Effect	YES	YES
Time Fixed Effect	YES	YES
Observations	248	248
R-squared	0.9983	0.9984
r2_a	0.9979	0.9981
F	15.2452***	18.5013***

The interaction coefficient between lnFIN and lnFDI is 0.0304, which is significant at the significance level of 0.01, indicating that there is a significant positive interaction, implying that as lnFDI increases, so does the positive influence between lnFIN and lnGDP, implying that digital finance can improve the traditional financial financing environment, improve information transparency and market efficiency, and stimulate enterprise innovation. So as to improve the level of financial services, reduce the risk of foreign investment, achieve the goal of improving the foreign investment environment, and then increase the attractiveness of foreign investment, meet the capital demand in economic construction to some extent, and bring a lot of employment and tax revenue. And due to the influx of foreign investment, it can to a certain extent also promote the development of China's foreign trade and ultimately economic development. The interaction coefficient between lnFIN and IND is 0.1005, which is significant at the 0.01 level of significance. That is, as industrial structure improves, the positive influence between lnFIN and lnGDP grows. The Internet and the level of science and technology are inextricably linked to digital finance. On the one hand, the development of digital finance has greatly enriched financial derivatives, stimulated enterprise and individual consumption demand, and, to some extent, promoted the development of tertiary industry. On the other hand, the development of digital finance can promote scientific and technological innovation as well as the development of new industries, and existing industries can also be upgraded by new technologies, thereby profoundly affecting the industrial structure. While industrial structure optimization and upgrading can promote the transformation of economic development mode, generate new economic growth points, shift from quantitative to qualitative change, and promote economic development. As a result, hypothesis 1 holds.

4.3. Endogeneity Test

To prevent endogeneity from influencing the model results, the mean of the Digital Inclusion Index for neighbouring provinces is analysed as an instrumental variable as shown below (see Table 4).

It can be seen that, based on the use of neighboring provinces of digital inclusive finance lnFINN as a tool variable, the influence coefficient of lnFIN is 0.4963, which is significant at 0.05 level. That is, when endogeneity is taken into account, there is still a significant positive impact of the digital inclusive financial index (see Table 5).

It can be seen that based on the one-period lagged digital inclusive finance l. LnFIN as an instrumental variable, the influence coefficient of lnFIN is 0.3906, which is significantly indigenous at the level of 0.1. That is, there is still a significant positive impact of the Digital Inclusion Index when endogeneity is taken into account.

5. Robustness Test

Next, the robustness test is conducted, the sub-index digital inclusive finance

Table 4. Endogeneity analysis.

	(1)	(2)
VARIABLES	lnFIN	lnGDP
lnFIN		0.4963**
		(1.9833)
lnFINN	0.6218***	
	(7.20)	
URBAN	0.6050***	−0.0956
	(5.26)	(−0.3364)
UR	−0.0427	−0.2191***
	(−0.94)	(−2.6468)
REV	−0.0401	−0.9683***
	(−0.47)	(−6.2767)
YOUNG	−0.0014	0.0079**
	(−0.85)	(2.5550)
Constant	1.7335***	7.7521***
	(3.89)	(6.3526)
District Fixed Effect	YES	YES
Time Fixed Effect	YES	YES
Observations	248	248
Number of id	31	31
F	2151.40***	.
Wald chi2		1.07e+07***

Table 5. Endogeneity analysis.

	(1)	(2)
VARIABLES	lnFIN	lnGDP
lnFIN		0.3906*
		(1.8416)
L.lnFIN	0.4580***	
	(11.42)	
URBAN	0.0976	0.2479
	(1.19)	(1.1996)

Continued

UR	0.0882***	−0.1743**
	(2074)	(−2.1670)
OLD	−0.0006	−0.0045
	(−0.48)	(−1.3579)
YOUNG	0.0003	0.0036
	(0.24)	(1.1555)
REV	0.0232	−0.8883***
	(0.38)	(−6.0132)
Constant	2.5893***	8.1185***
	(12.09)	(7.8343)
District Fixed Effect	YES	YES
Time Fixed Effect	YES	YES
Observations	217	217
Number of id	31	31
F	3244.29***	
Wald chi2		1.37e+07

coverage Width of the digital inclusive finance index and the degree of digitization Dig are used as the substitution variables of the robustness test to conduct the robustness test. If the results remain unchanged, it indicates that the robustness test is passed (see Table 6).

It can be seen that the influence coefficient of lnWidth is 0.1624, which is significant at the significance level of 0.05, and the influence coefficient of lnDig is 0.2620, which is significant at the significance level of 0.01, and there is also a significant positive influence. This shows that the financial coverage and the degree of digitalization can affect the experimental results to a large extent, so the cities with particularly good economic development are excluded. Therefore, the robustness test of changing variables is passed. Subsequently, four municipalities directly under the Central Government, namely Beijing, Shanghai, Tianjin and Chongqing, are excluded for robustness testing (see Table 7).

As can be seen, there is still a significant positive effect of lnFIN at the 0.01 level of significance during the stepwise addition of the variables, and therefore the robustness test is passed.

6. Discussion

In order to study the regional differences in the impact of digital finance on economic growth in the eastern, central and western regions, the regions are divided according to economic types. The regression results of the eastern, central and western regions are as follows (see Table 8).

Table 6. Robustness tests.

	(1)	(2)
VARIABLES	lnGDP	lnGDP
lnWidth	0.1624**	
	(2.0437)	
lnDig		0.2620***
		(4.1822)
URBAN	−0.0106	0.3314*
	(−0.0457)	(1.6618)
UR	−0.1648*	−0.2825***
	(−1.9368)	(−3.4085)
OLD	−0.0099***	−0.0143***
	(−2.9131)	(−4.3042)
YOUNG	0.0099***	0.0125***
	(3.0019)	(3.9212)
REV	−0.8986***	−0.8295***
	(−5.7232)	(−5.4218)
Constant	9.5213***	8.9589***
	(19.6284)	(21.3902)
District Fixed Effect	YES	YES
Time Fixed Effect	YES	YES
Observations	248	248
R-squared	0.9981	0.9982
r2_a	0.9977	0.9978
F	14.6346***	17.7450***

Table 7. Robustness tests.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	lnGDP	lnGDP	lnGDP	lnGDP	lnGDP	lnGDP
lnFIN	0.6619***	0.6203***	0.5853***	0.4620***	0.4600***	0.4649***
	(5.0587)	(4.4054)	(4.2055)	(3.3987)	(3.5016)	(3.9514)
URBAN		0.2745	0.3122	0.3712	0.2445	0.1063
		(0.8058)	(0.9303)	(1.1571)	(0.7837)	(0.3794)
UR			−0.2595***	−0.1248	−0.1546	−0.0283
			(−2.6657)	(−1.2734)	(−1.6258)	(−0.3247)
OLD				−0.0177***	−0.0217***	−0.0180***
				(−4.3397)	(−5.3187)	(−4.8569)

Continued

YOUNG					0.0128***	0.0098***
					(3.7511)	(3.1735)
REV						−1.0440***
						(−6.8147)
Constant	6.1351***	6.2107***	7.0570***	7.6073***	7.5156***	7.5741***
	(8.5674)	(8.5916)	(9.0591)	(10.0778)	(10.2961)	(11.5860)
District Fixed Effect	YES	YES	YES	YES	YES	YES
Time Fixed Effect	YES	YES	YES	YES	YES	YES
Observations	224	224	224	224	224	224
R-squared	0.9977	0.9977	0.9977	0.9980	0.9981	0.9985
r2_a	0.9972	0.9972	0.9973	0.9975	0.9977	0.9982
F	25.5903***	13.0959***	11.3843***	14.0651***	14.8611***	23.1827***

Table 8. East region, central region, West region regression results.

	Eastern region	Central region	Western region
VARIABLES	lnGDP	lnGDP	lnGDP
lnFIN	−0.1074	0.6986**	0.8115***
	(−0.3989)	(2.3282)	(5.8118)
URBAN	−0.1391	−0.2593	0.3335
	(−0.4782)	(−0.4025)	(0.6710)
UR	−0.1604	−0.1814	−0.1642
	(−0.8019)	(−1.0569)	(−1.5273)
OLD	−0.0130***	−0.0021	0.0031
	(−2.7711)	(−0.2465)	(0.4364)
YOUNG	0.0040	0.0057	0.0038
	(0.5380)	(0.9023)	(1.0796)
REV	0.6995**	−3.3961***	−0.6510***
	(2.0531)	(−8.0406)	(−4.1638)
Constant	11.3688***	7.4832***	5.1975***
	(7.7323)	(4.6110)	(6.4513)
District Fixed Effect	YES	YES	YES
Time Fixed Effect	YES	YES	YES
Observations	88	64	96
R-squared	0.9981	0.9965	0.9990
r2_a	0.9975	0.9948	0.9987
F	2.1069*	21.8794***	11.5298***

From the regression results it can be seen that the impact of lnFDI on lnGDP in the East region is insignificant, while the impact coefficients for the central and west are 0.6986 and 0.8115 respectively, and are significant at the 5% and 1% levels of significance respectively. That is the greatest impact of digital finance is in the western region, followed by the central region, and the impact on the eastern region is not obvious. This may also be due to the eastern region itself more developed economy and has a higher level of technological development, so the impact of digital finance on economic development is less obvious. Then, in order to investigate whether there is a significant difference in the economic development of digital finance between regions with high and low economic levels, the results were grouped according to median GDP as follows (see Table 9).

As seen, the coefficient of influence of lnFIN is 0.8874 in areas with low economic levels. Moreover, it is significant at 0.01 level of significance. The coefficient

Table 9. Regression results for high and low economic level groups.

	Low economic level	High economic level
VARIABLES	lnGDP	lnGDP
lnFIN	0.8874***	0.0006
	(6.2563)	(0.0029)
URBAN	0.4362	0.1903
	(1.5018)	(0.6371)
UR	−0.2990***	0.2333
	(−3.3042)	(1.4415)
OLD	−0.0212***	−0.0145***
	(−3.7710)	(−3.5114)
YOUNG	0.0118***	0.0023
	(3.3232)	(0.4468)
REV	−0.7781***	−0.1199
	(−4.8035)	(−0.3490)
Constant	5.1240***	10.0425***
	(6.0255)	(9.4527)
District Fixed Effect	YES	YES
Time Fixed Effect	YES	YES
Observations	128	120
R-squared	0.9979	0.9948
r2_a	0.9973	0.9932
F	27.8959***	3.4094***

of lnFIN is 0.0006 in high economic regions, which is not significant at the 0.1 level of significance, that is the impact of digital finance on the economy is more pronounced in low economic regions. According to the regression of the eastern, central and western regions and the grouping of high and low economic levels, in China, digital finance has differences in the economic development of different regions, and its influence on the regions with lower economic development level is more obvious than that on the regions with higher economic development level. By promoting the development of digital finance in regions with low economic level, the economic development can be improved, thus alleviating the imbalance of regional economic development, so hypothesis 2 holds.

7. Conclusion and Recommendation

This paper discusses the relationship between digital finance and economic development from the perspectives of foreign direct investment and industrial structure, and studies the impact of digital finance on economic development in different regions of China, drawing the following conclusions: 1) The adjustment effect reveals that as foreign direct investment improves, there is a positive interaction between digital finance and economic development, and as industrial structure improves, there is also a positive interaction between digital finance and economic development. That is, by increasing foreign direct investment and optimizing industrial structure, digital finance can promote economic development. 2) The development of digital finance in China has varied effects across the country. The western region suffers the most, followed by the central region, but not the eastern region. Furthermore, in terms of promoting economic development, digital finance has a more visible impact on low-income regions. As a result of the preceding conclusions, the following recommendations can be made: 1) Encourage enterprises to actively pursue technological innovation, combine traditional industries with digitization, promote common development with the real economy, and promote industrial structure optimization and upgrading. Make use of the benefits of digital finance to attract more foreign investment. Meanwhile, the government should do a good job of guiding high-quality foreign investment, actively implementing various policies of external opening, and promoting regional economic development. 2) To continue to play a role in promoting economic development through digital finance. To alleviate the unbalanced development of regional economies, it is necessary to further develop digital finance in economically backward western regions. Accelerating the digital transformation of financial institutions, creating a more perfect financial system, and promoting regional economic development through policy support are all necessary.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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