Research on the Impact of Digital Financial Inclusion on Regional Economic Growth

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Abstract: Select the panel data of 31 provinces in China from 2011 to 2020, match the indexes of various dimensions of digital inclusive finance, and study and analyze the impact of digital inclusive finance on regional economic development; The empirical results show that, first, digital inclusive finance can gather social idle funds, expand the supply of regional development funds, and directly drive regional economic growth, second, digital inclusive finance will drive regional economic upgrading by alleviating the pressure of corporate financing constraints, expanding fund raising channels, and driving technological innovation and development.The role of promoting the development of digital financial inclusion is more significant.

Keywords: digital financial inclusion; regional economy; Technological innovation

1. Introduction

The core of digital inclusive finance is "digital" and "inclusive", mainly through information technology to promote financial services to various regions, so that all social strata can enjoy policy resources fairly and equitably, break the traditional financial service model, and reduce the problem of limited financial coverage. With the rapid development of the Internet and artificial intelligence, inclusive finance has joined high-tech to break through the inherent limitations of financial services, and at the same time uses digital technology to collect and screen massive information to accurately serve vulnerable groups and make the coverage of financial services more comprehensive. Digital financial inclusion is not only the starting point of new opportunities for urban economies, but also a gap that widens the gap[1]. First of all, inclusive finance relies on digital technology to be relatively limited to cities with developed science and technology, and is not fully involved in remote and poor areas, resulting in a further widening gap between urban and rural areas. Secondly, there is a lack of perfect policy guidance and legal basis, the existing laws and regulations mainly focus on traditional finance, and the combination of digital inclusive finance and technology makes information more transparent, may infringe on personal interests, and in serious cases will lead to systemic risks, making the national economy seriously decline. In this context, the impact of digital financial inclusion on regional economies deserves further exploration[2].

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2. Literature review and research hypotheses

2.1. Impact of digital financial inclusion on regional economic growth

Inclusive finance relies on digital technology to refine and accurately deliver massive data, minimize information asymmetry and misallocation of financial resources, reduce the probability of elite capture, and reach the tail group, so that all regions and social strata can access financial services, thereby promoting the improvement of economic development in all aspects. At present, China is actively promoting digital inclusive finance, improving China's financial market, and alleviating the stagnation of regional economic development due to shortage of funds[3]. With the goal of "inclusiveness", digital inclusive finance uses science and technology to gather social idle funds, increase the supply of funds for regional economic development, alleviate the problem of "financial exclusion" caused by asymmetric market information and cumbersome lending procedures, and drive regional economic vitality. Based on this, the following hypothesis is proposed:

Due to the opaque information, risk difficult to control and other factors and traditional financial institutions themselves borrowing threshold is high, lack of fixed assets and other hardware facilities of enterprises can not obtain a large number of capital support, resulting in increased corporate working capital demand, huge capital gap is difficult to make up, with the vigorous implementation of digital inclusive finance to break the financing problem, digital inclusive finance with its low threshold, low cost and other characteristics, can alleviate the pressure of corporate borrowing funds, help enterprises get more capital supply, promote enterprise technological innovation, Stimulate regional economic development. Digital inclusive finance collects and screens massive amounts of information to enhance the transparency of enterprises and prevent enterprises from losing lending opportunities due to information asymmetry[4]. Improve the borrowing ability of enterprises, so that enterprises have sufficient funds to develop innovative projects, and at the same time use scientific and technological precision services to effectively control the cost and risk problems caused by technological innovation of enterprises, stimulate the enthusiasm of enterprises to carry out technological innovation projects, and help promote the development of regional economy. Based on this, the following hypothesis is proposed:

Hypothesis 1: Digital financial inclusion can positively impact regional economic development.

Hypothesis 2: Digital financial inclusion positively impacts regional economic development through technological innovation.

2.2. Heterogeneity analysis of digital financial inclusion on regional economic growth

From the perspective of geographical distribution, compared with the eastern region, the economic development of the central and western regions is slow, and the threshold of traditional financial institutions is higher, and the time and distance restrictions lead to lower willingness of enterprises to borrow. In order to cope with changes in the external environment, enterprises invest their own funds in their production and operation, aggravating the shortage of funds for technological innovation. The development of digital inclusive finance has

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research direction: data mining.

significantly improved the level of financial development, expanded financing channels, reduced service costs, enabled enterprises to meet the main business while having surplus funds to make up for the gap in R&D investment, and promoted the steady development of enterprise technological innovation activities, thereby driving regional economic growth. Based on this, the following hypothesis is proposed:

Hypothesis 3:There are regional differences in the impact of digital financial inclusion on economic development.

3. Study design

3.1. Variable Definition

The panel data of 31 provinces in China from 2011 to 2020 was selected, and the index of various dimensions of digital financial inclusion was matched as the research sample, and the relevant data came from Guotai'an database and EPS statistical data platform. In addition, in order to ensure the credibility of the research results, a series of control variables are selected in this paper, and the relevant variables and their specific explanations are shown in Table 1.

Table 1: Detailed description of the study variables

The variable type	The variable name	Variable symbol	Variable description
The variable being explained	Regional economic growth	$gdp1$	Expressed as a logarithmic value of GDP per capita
	Regional economic growth rate	$gdp2$	Expressed as the growth rate of GDP per capita
Explanatory variables	Total Index	$Index$	According to the China Digital Financial Inclusion Index released by Peking University
	Breadth of coverage	$Coverage$	
	Use depth	$Usage$	
	Digital support services	$Digital$	
Mediation variables	Technological innovation	$innovation$	The number of patent applications is measured logarithmically
Control variables	Urbanization rate	$urban$	Total urban population/total population
	Industrial structure	$structure$	(secondary industry added value + tertiary industry added value)/GDP
	Scale of fiscal expenditure	$govern$	Local financial support/GDP
	Infrastructure level	$infra$	Highway mileage/land area by region
	Consumption level of residents	cpi	Expressed in consumer price index

3.2. Research methodology model

In order to specifically study the impact of digital financial inclusion on regional economic growth, the following basic model is constructed on the basis of the assumptions proposed above:

$$gdp_{it} = \alpha_0 + \alpha_1 x_{it} + \alpha_2 Control_{it} + d_i + \varepsilon_{it} \quad (1)$$

$$innovation_{it} = \beta_0 + \beta_1 x_{it} + \beta_2 Control_{it} + d_i + \varepsilon_{it} \quad (2)$$

$$gdp_{it} = \gamma_0 + \gamma_1 x_{it} + \gamma_2 innovation_{it} + \gamma_3 Control_{it} + d_i + \varepsilon_{it} \quad (3)$$

where the variable is explained gdp_{it} indicates regional economic growth, i indicates the province, t indicates the year; x_{it} Indicates the level of development of digital financial inclusion, $Control_{it}$represents a control variable, $\alpha_0$constant term, α_1 indicates the size of the total effect, β_1, γ_1 Indicates the direct effect of digital financial inclusion on regional economic growth, γ_2 indicates the size of the mediating effect, ε_{it} represents the error term, d Represents an unobservable individual effect.

4. Empirical analysis

This paper selects 31 provinces in China from 2011 to 2020, and obtains a total of 300 data, as shown in Table 2, the maximum regional economic growth rate is 0.77 and the minimum value is 0.0718, indicating that the development level of each region is different, and there is a significant gap between the maximum and minimum values of the digital inclusive financial index, indicating that the development level of digital inclusive finance in various regions has significant differences.

Table 2 :Basic statistical characteristics of major variables

variable	Observations	average value	median	standard deviation	minimum	maximum
Regional economic growth	300	10.97	10.66	0.52	9.732	11.88
Regional economic growth rate	300	0.25	0.2484	0.136	0.0718	0.77
Digital financial inclusion	300	199.97	200.13	92.66	16.57	412.3
Breadth of coverage	300	180.53	190.2	90.43	1.72	354.6
Use depth	300	198.0	188.72	92.45	6.54	440.9
Digital support services	300	276.57	312.72	116.23	6.7	442.3
Technological innovation	300	9.34	9.77	1.76	4.4	13.2
Urbanization rate	300	0.432	0.430	0.202	0.227	0.857
Industrial structure	300	0.9470	0.9460	0.0670	0.76	0.957
Scale of fiscal expenditure	300	0.27	0.26	0.2	0.13	1.37
Infrastructure level	300	1.33	1.12	1.560	0.088	9.52
Consumption level of residents	300	100.5	100.7	1.446	100.88	107.22

As shown in Table 3, digital inclusive finance has a significant positive impact on the regional economy, indicating that digital inclusive finance can use science and technology to gather social idle funds, break financial lending barriers, drive regional capital supply, inject continuous vitality into high-quality economic development, replace the explanatory variables

with regional economic growth rates, and the results are consistent with the above, further illustrating the robustness of the results, assuming that H1 is verified.

Table 3 :Regression analysis of digital financial inclusion on regional economic growth

variable	(1) Regional economic growth	(2) Regional economic growth rate
Digital financial inclusion	0.00297***	0.0014**
	(5.25)	(4.14)
Constant terms	8.5897***	8.897***
	(11.77)	(11.95)
Control variables	control	control
Observations	300	300
Goodness-of-fit	0.894	0.844
Individual fixed effect	control	control
Year fixed effect	control	control

As shown in Table 4 to Table 6, the sub-dimensions of digital inclusive finance, coverage breadth, depth of use and the impact of digital support services on regional economic growth, table (1) column shows the regression results of the regional economic growth of the interpreted variable, table (2) column, using the regional economic growth rate instead of the interpreted variable for robustness test, it can be seen that the coverage breadth has the greatest impact on regional economic growth, possibly because digital inclusive finance increases the coverage of finance, can benefit more multilateral and distant regions, narrow the tail differences, and make each regionAll social strata can touch financial services, thereby promoting the improvement of economic development in all aspects and driving regional economic growth. Again, verify that the H1 hypothesis holds.

Table 4 : Regression analysis of regional economic growth by coverage breadth

variable	(1) Regional economic growth	(2) Regional economic growth rate
Breadth of coverage	0.0027***	0.003***
	(4.73)	(4.24)
Constant terms	8.855***	0.801***
	(11.78)	(11.54)
Control variables	control	control
Observations	300	300
Goodness-of-fit	0.891	0.814
Individual fixed effect	control	control
Year fixed effect	control	control

Table 5: uses in-depth regression analysis of regional economic growth

variable	(1) Regional economic growth	(2) Regional economic growth rate
Use depth	0.0009***	0.0005***
	(3.57)	(2.94)
Constant terms	8.560***	8.001***
	(11.40)	(11.25)
Control variables	control	control
Observations	300	300
Goodness-of-fit	8.295	8.141
Individual fixed effect	control	control
Year fixed effect	control	control

Table 6: Regression analysis of regional economy at the level of digitalization

variable	(1) Regional economic growth	(2) Regional economic growth rate
The level of digitalization	0.000644***	0.0003***
	(4.33)	(3.27)
Constant terms	9.046***	8.112***
	(12.24)	(11.82)
Control variables	control	control
Observations	300	300
Goodness-of-fit	8.277	0.898
Individual fixed effect	control	control
Year fixed effect	control	control

The research method of Wen Zhonglin's mediation effect was used[5] .As shown in Table 7, digital inclusive finance has a significant positive impact on regional economic development, and the results of adding technological innovation as an intermediary variable are consistent with the above, indicating that digital inclusive finance can reduce the financial pressure of enterprises, promote enterprises to increase investment in R&D funds, promote enterprise technological innovation, and thus drive regional economic development, assuming that H2 is verified.

Table 7: Mediating effects of technological innovation

variable	(1) Regional economic growth	(2) Technological innovation	(3) Regional economic growth
Digital financial inclusion	0.00226***	0.0052**	0.0022**
	(5.86)	(2.03)	(5.43)
Technological innovation			0.0443***
			(4.33)

Constant terms	8.546*** (11.73)	12.5505*** (2.72)	8.0259*** (11.12)
Control variables	control	control	control
Observations	300	300	300
Goodness-of-fit	0.877	0.898	0.898
Individual fixed effect	control	control	control
Year fixed effect	control	control	control

As shown in Table 8, the sample is divided into the eastern region and the central and western regions, it can be seen that the digital inclusive finance in the eastern region has played a significant positive role in regional economic development[6], while the effect in the central and western regions is not too obvious, adding technological innovation as an intermediary variable, the results are consistent with the above, may be that the resource endowment in the eastern region, in the resource allocation and digital production facilities and other conditions are superior to the central and western regions[7], resulting in a significant difference in the effect of digital inclusive finance, assuming that H3 is verified[8].

Table 8 : Regional heterogeneity regression results

variable	Eastern region		Midwest	
	(1)	(2)	(3)	(4)
Digital financial inclusion	0.1742** (0.0673)	0.112*** (0.064)	0.0211 (0.0144)	0.018 (0.010)
Technological innovation		0.237*** (0.091)		0.023*** (0.062)
Constant terms	-13.41 (13.678)	-12.380 (13.23)	13.268*** (3.006)	13.022 (3.18)
Control variables	control	control	control	control
Observations	100	100	200	200
Goodness-of-fit	0.819	0.878	0.898	0.805
Individual fixed effect	control	control	control	control
Year fixed effect	control	control	control	control

5. Conclusions and policy recommendations

The panel data of 31 provinces in China from 2011 to 2020 was selected to match the indices of various dimensions of digital inclusive finance, and the impact of digital inclusive finance on regional economic development was studied and analyzed. The study finds that, first, digital financial inclusion can reduce lending barriers, reach "tail groups", and stimulate regional economic vitality. Second, digital inclusive finance can reduce corporate financing constraints, increase investment in technological innovation, and drive regional economic growth; third, the development of digital inclusive finance in the eastern region and the central and western regions is uneven, resulting in digital inclusive finance being more significant for regional economic growth in the eastern region.

Based on this, this paper makes the following recommendations:

First, improve the digitalization of inclusive finance and strengthen the scientific and technological innovation of finance. With the help of scientific and technological strength, overcome the shortcomings of traditional financial services, increase the coverage and assistance of finance, create a good financial environment, quickly screen massive data according to digital information technology, shorten the review time, strengthen regional economic development funds, and promote the rapid growth of regional economy.

Second, give full play to the "inclusiveness" of digital inclusive finance and reach the "tail group". Increase the coverage of digital inclusive finance, strengthen the construction of digital infrastructure, so that remote and poor areas can reach, pay attention to talent training, expand the basic knowledge of finance, master digital inclusive financial services, create a good financial environment, and inject continuous vitality into regional economic development.

Third, improve the regulatory policies for digital inclusive finance and drive the healthy development of the regional economy. In order to create a good financial environment to drive regional economic development, it is necessary to formulate relevant policies, first of all, we must plan the overall development direction of digital inclusive finance, and secondly, formulate digital inclusive finance to promote technological innovation policies, through the formulation of relevant policies, control the risks brought by the development of digital inclusive finance, promote its healthy development, narrow the development gap between regions, and thus promote regional economic growth.

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