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Research on Impact of Digital Financial Inclusion on Upgrading of Industrial Structure

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Abstract

This paper mainly uses the provincial panel data of 2010-2019 to study the impact of digital inclusive finance on the upgrading of industrial structure through empirical regression. The study found that the development of digital inclusive finance has a positive and direct impact on the upgrading of industrial structure, but also an indirect impact. Indirectly affecting the main income effect and the effect of scientific and technological innovation, increasing income and stimulating scientific and technological innovation can make digital inclusive finance play a role on the upgrading of industrial structure. Finally, the data heterogeneity was analyzed, and it was found that the impact of digital inclusive finance on the upgrading of industrial structure has regional heterogeneity, among which the eastern region had the most obvious effect, while the effect of the central and western regions gradually decreased. Based on the above findings, this paper puts forward corresponding policy suggestions on the upgrading of industrial structure on digital inclusive finance.

Keywords

Digital Inclusive Finance; Industrial Structure; Income Effect; Scientific and Technological Innovation.

1. Introduction

China's economy has now entered a new stage, and the traditional mode of production and high input, crude income and industrial structure has been unable to adapt to the current economic environment, and can not adapt to the current economic development goals. China's economy from high-speed growth to high-quality development stage, we must carry out industrial structure upgrading. Finance is a way for the government to intervene, regulate economic operation and adjust economic relations. While promoting the upgrading of industrial structure, financial support is also needed. However, the current financial development can no longer meet the needs of technological innovation and industrial structure upgrading. Inclusive finance focuses on inclusion and encourages financial innovation. It can enrich the level of the financial market, improve the utilization rate of resources, provide efficient financial services for emerging small and micro enterprises and urban and rural low-income people, support the development of new industries, provide new impetus for the upgrading of industrial structure, and provide a new Angle for the healthy development of China's economy in the breadth of financial development.

With the development of the Internet, inclusive finance has also been developed to a certain extent, and the digital inclusive finance development model of "big data + artificial intelligence" has emerged. Compared with traditional inclusive finance, it has a broader and broader connotation, and is of great practical significance for promoting industrial transformation and promoting national economic development. On this basis, this paper systematically studies how digital financial inclusion promotes the upgrading of industrial structure by using the panel data of various provinces from 2011 to 2019. First of all, this project will conduct a systematic

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analysis of the mechanism of digital inclusive finance, and on this basis, provide theoretical reference for promoting China's industrial transformation. Secondly, the data are divided into central, eastern and western regions, and the development differences of each region are studied. Finally, the paper explores the mechanism of digital inclusive finance on industrial structure upgrading from the perspectives of income and scientific and technological innovation, and provides effective policy contributions to this research direction.

2. Literature Review and Theoretical Basis

2.1. Literature Review

As a product of the deep integration of finance and information technology, digital inclusive finance has shown a rapid development trend in the world in recent years, especially in China, and its impact on the upgrading of industrial structure has attracted wide attention from the academic community. From different perspectives and dimensions, scholars have discussed the role of digital inclusive finance in upgrading industrial structure. Salman and Pais (2011) found that the development of inclusive finance can promote economic and social modernization [1]. Kapoor A (2014) believes that inclusive finance forms a virtuous circle between finance and economy by optimizing resource allocation, and radiates this virtuous circle into industrial development [2]. Bruh (2014) believes that inclusive finance can expand the coverage of financial services and allocate funds reasonably among industries, thus helping to upgrade industrial structure [3]. Li et al (2020) explores the unbalanced panel data of CHFS and finds that the development of digital inclusive finance can increase the level of household recurrent expenditure, bridge the consumption gap between urban and rural residents, and promote the upgrading of the industrial structure at the consumption end [4].

More and more domestic scholars have studied the relationship between digital inclusive finance and industrial upgrading. Zhang Xiaoyan (2016) believes that inclusive finance can promote the upgrading of industrial structure from a long-term and stable perspective through empirical analysis [5]. According to the research of Fan Xuechun (2017), the penetration and availability of inclusive financial services play a significant role in promoting the upgrading of industrial structure, but the depth of financial services hinders the upgrading of industrial structure [8]. Liu Xiaoyi (2013) analyzed China's macroeconomic data from 1978 to 2011 and concluded that there was a long-term, stable and two-way causal link between the two industries [6]. Gu Yongkun and Liu Yongtian (2017) show that with the development of China's financial industry, the degree of upgrading and rationalization of China's industrial structure is also constantly improving [9]. The research of Su Rengang (2020) shows that inclusive finance plays an important role in improving industrial structure through the Internet. However, financial inclusion has a "threshold" effect, which first promotes the upgrading of industrial structure and then hinders its development [10]. Tang Wenjin and Li Shuang (2019) analyzed the role of inclusive finance on industrial upgrading in China by establishing a threshold model, and the results showed that the role of digital inclusive finance is non-linear [7]. Cao Kaiyan and Zhou Xiaofei (2019) believe that there is an interactive relationship between inclusive finance and economic growth through the empirical model built, in which finance plays an important role in resource allocation efficiency, thus promoting the upgrading of industrial structure [13]. By using the threshold model, Tu Qiangnan and He Yiqing (2021) studied that digital inclusive finance has a promoting effect on the development of low-end manufacturing industry, but in high-end manufacturing industry, digital inclusive finance has a inhibiting effect. Based on this, some scholars have studied this issue from the perspective of conduction pathway [11]. Xie Fuhui (2018) also found that digital inclusive finance can promote the upgrading of industrial structure by promoting enterprise innovation [12]. Wang Ruifang's (2019) research shows that the development of inclusive finance can promote the upgrading of industrial structure, and

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presents a "U-shaped" effect [15]. Du Jinmin's (2020) research shows that digital inclusive finance can promote the upgrading of industrial structure through technology upgrading, capital accumulation, narrowing of income gap, and consumption driving [14]. According to the research of Zhang Qingjun and Huang Ling (2021), the development of digital inclusive finance can fill the blind spot of traditional financial services, but its effect on economic development is only to "speed up" but not to "improve quality", and it has regional heterogeneity [17]. Sun Qian and Xu Zhangyong (2021) found that the development of inclusive finance has a significant promoting effect on the industrial structure in poor areas, but not a significant effect on poverty alleviation in non-poverty areas. The main reasons are the differences in natural environment, institutional environment and development stage between poor areas and non-poor areas [18]. According to the research of Cui Haiyang and Yuan Qianying (2022), digital finance can improve the income level of residents, but the impact on the central and western regions is much greater than that on the eastern region, which is of great significance for narrowing the income gap between the eastern and western regions and promoting the inclusive development of China. From the perspective of transmission mechanism, the development of digital finance has a more obvious effect on the optimization of China's industrial structure, the increase of the proportion of the tertiary industry, and the role of the central and western regions. The research results show that in the central and western regions, digital finance has a greater role in promoting the growth of residents' income in economically backward areas [19]. According to the research of Guo Shouting and Jin Zhibo (2022), in the context of economic globalization, there is a U-shaped nonlinear relationship between the development of digital inclusive finance and the upgrading of industrial structure. Only when digital inclusive finance reaches a certain level can it promote the upgrading of regional industrial structure. Based on this, this project proposes a new research idea: The effect of inclusive finance development represented by "edge" on the upgrading of regional industrial structure presents an "inverted U" type nonlinear feature, that is, when "edge" inclusive finance exceeds a certain threshold, it has a negative spatial spillover effect on the improvement of regional industrial structure. This conclusion is still valid after removing endogenous factors [16].

2.2. Theoretical Basis

2.2.1. Relations between Digital Financial Inclusion and Industrial Structure

As an important part of financial technology, digital inclusive finance can reach remote areas and low-income groups that are difficult to be covered by traditional financial institutions through the Internet and mobile communication technology, thereby narrowing the financial divide. Reducing the cost of services makes financial services more cost-effective. Using big data, cloud computing and other technologies, digital inclusive finance can achieve rapid approval, instant payment and other functions, greatly improve the speed and convenience of financial services, guide capital flow to efficient and promising industries, optimize the allocation of resources among different industries, and promote the optimization and upgrading of industrial structure.

At the same time, by providing lower barriers and more flexible financial products and services, digital financial inclusion contributes to the overall financial inclusion of society, helps vulnerable groups improve their financial situation, and promotes social equity. Through digital inclusive finance, upstream and downstream enterprises in the industrial chain can collaborate more closely, share information and resources, form an ecosystem of collaborative innovation, and accelerate the upgrading of the entire industrial chain.

Therefore, hypothesis H1 can be proposed: Digital financial inclusion can promote the upgrading of industrial structure.

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2.2.2. Mechanism of Digital Inclusive Finance to Upgrade Industrial Structure

Digital inclusive finance can not only directly affect the upgrading of industrial structure, but also indirectly affect the upgrading of industrial structure through the income effect and the effect of scientific and technological innovation.

In terms of income utility, digital inclusive finance attracts the attention of middle and low-income people with its wide coverage, strong inclusiveness and low threshold. It solves the problems of information asymmetry and high service cost faced by middle and low income people. Enable low-income people to access credit, savings, insurance and other financial products and services, reasonable allocation of resources to increase income. At the same time, the job opportunities of middle and low income groups mainly come from small and medium-sized enterprises, and digital inclusive finance can make the stable operation of small and medium-sized enterprises through the allocation of resources, so as to ensure the income source of middle and low income groups. Rising incomes also increase their spending power and willingness to invest, thus stimulating domestic demand and promoting the development of consumption-oriented industries. In addition, digital financial inclusion can indirectly promote employment and income growth by improving the financing efficiency of small and micro enterprises and self-employed people, and further promote the transformation of industrial structure to high value-added and service-oriented.

Therefore, hypothesis H2 can be proposed: Digital financial inclusion can promote the upgrading of industrial structure through the income effect.

In terms of the effectiveness of scientific and technological innovation, digital inclusive finance provides more convenient and low-cost financing channels for start-ups and small and micro enterprises, lowers the threshold of entrepreneurship, and stimulates the innovation vitality of society. Innovative enterprises tend to focus on emerging areas, such as high-tech, green energy, digital economy, etc., the development of these industries can lead to the upgrading of industrial structure. Digital inclusive finance can also accurately identify innovative projects with growth potential through big data analysis, provide customized financial services, promote the transformation and industrialization of scientific and technological achievements, and accelerate the growth of emerging industries and the transformation and upgrading of traditional industries.

Therefore, hypothesis H3 is proposed: Digital inclusive finance can promote the upgrading of industrial structure through the effect of scientific and technological innovation.

3. Model Design and Data Analysis

3.1. Model Setting

Based on the above assumptions, this paper uses a two-way fixed-effect model to study the impact mechanism of digital financial inclusion on industrial structure upgrading. The baseline regression model is set as follows: $UPi, t = \alpha + \beta DIFIi, t + \gamma Xi, t + \mu i + \nu t + \zeta i$, in the formula t (1), i and t represent provinces and years respectively. UP indicates the industrial structure upgrading index of the province, DIFI is the digital inclusive financial index, X is the series of factor matrix affecting the industrial structure upgrading of the province, μi and νt are the fixed effects of the province and time respectively. β is the core coefficient concerned in this paper, which mainly measures the net effect of digital inclusive finance on the upgrading of industrial structure. If β is significant and greater than 0, it indicates that digital inclusive finance can significantly promote the upgrading of industrial structure.

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3.2. Variable Selection

3.2.1. Explained Variable

The upgrading of industrial structure refers to the change of the economic growth mode of a country or region, which is reflected in the gradual transformation of the primary industry to the second and third industries. In terms of measuring the upgrading of industrial structure, this paper assigns each type of industry to the whole of China to represent the overall situation of industrial structure. The data is between 1-3, and the closer it is to 3, the greater the proportion of tertiary industry and the higher the industrial structure.

3.2.2. Explanatory Variable

This project adopts the Peking University Digital Financial Inclusion Index of Peking University Network Finance Research Center, constructs the "digital financial inclusion" index system from the three dimensions of "digital financial coverage", "digital financial utilization depth" and "digital financial inclusion degree", and quantifies the quantitative indicators of the three dimensions.

3.2.3. Controlled Variable

The degree of government intervention (GVO: 100 million yuan) : expressed by fiscal expenditure, that is, the general public budget expenditure of local governments;

The degree of openness to the outside world is expressed by the ratio of total imports and exports of goods to GDP;

Human resource level (STU) : ratio of the number of students in universities to GDP;

Foreign Direct investment (FDI) : expressed as the ratio of total foreign investment to GDP;

Social consumption level (CON) : The ratio of total retail sales of social consumption to GDP.

3.2.4. Mediating Variable

Income (PGDP: Yuan) : logarithm of GDP per capita;

Science and Technology Innovation (NEW) : The number of domestic invention patent applications accepted.

3.3. Data Sources

The main source of data is the provincial Statistical Yearbook from 2011 to 2019, in which the Digital financial inclusion index comes from the Digital Finance Research Center of Peking University, which includes the general index of digital financial inclusion, in addition to the coverage breadth, depth of use, and degree of digitalization. Missing data were supplemented by linear interpolation.

3.4. Descriptive Analysis

Table 1. Descriptive Analysis

		sample size	mean value	standard deviation	minimum value	maximum value
Core explained variable	isy	279	2.367	0.127	2.166	2.832
Core explanatory variable	lnindex	279	5.143	0.679	2.786	6.017
	lncover	279	4.979	0.852	0.673	5.952
	Lndeep	279	5.126	0.649	1.911	6.087
	lndigi	279	5.458	0.717	2.026	6.136
Controlled variable	STU	279	0.0193	0.00538	0.00805	0.0389
	FDI	279	0.0191	0.0154	0.000100	0.0796
	OPEN	279	0.265	0.301	0.0127	1.548
	CON	279	0.383	0.0692	0.225	0.538
	GVO	279	0.279	0.195	0.110	1.334
mediating variable	NEW	279	9.381	1.596	4.394	12.29
	LNPGDP	279	9.305	0.463	8.542	10.76

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4. Empirical Analysis

4.1. Correlated Analysis

Table 2. Correlated Analysis

	isy	lnindex	STU	FDI	OPEN	CON	GVO
isy	1	0.650***	0.371***	0.151**	0.355***	0.315***	-0.128**
lnindex	0.476***	1	0.378***	0.022	0.109*	0.383***	-0.014
STU	0.436***	0.311***	1	0.454***	0.300***	0.178***	-0.306***
FDI	0.269***	0.004	0.506***	1	0.546***	0.142**	-0.533***
OPEN	0.689***	0.097	0.283***	0.460***	1	0.174***	-0.524***
CON	0.294***	0.335***	0.063	0.066	0.184***	1	-0.159***
GVO	-0.010	-0.069	-0.457***	-0.406***	-0.269***	-0.022	1

Note: In parentheses are robust standard error values; ***, ** and * are significant at the level of 1%, 5% and 10% respectively. The following table is the same.

As can be seen from the table, there is a positive correlation between the isy of industrial structure upgrading and lnindex of digital inclusive finance, and it is significant at the significant level of 1%, that is, industrial structure upgrading and the development of digital inclusive finance are mutually promoting, which is consistent with the above hypothesis.\

4.2. Reference Regression

Table 3. Reference Regression

	(1)	(2)	(3)	(4)
	isy	isy	isy	isy
lnindex	0.058***			
	(0.007)			
OPEN	0.288***	0.285***	0.286***	0.313***
	(0.015)	(0.015)	(0.015)	(0.015)
CON	0.106*	0.134**	0.101	0.154**
	(0.060)	(0.061)	(0.062)	(0.061)
GVO	0.202***	0.210***	0.208***	0.196***
	(0.023)	(0.024)	(0.023)	(0.024)
STU	7.865***	8.032***	8.463***	8.690***
	(0.942)	(0.973)	(0.947)	(0.944)
FDI	-0.758**	-0.806**	-0.994***	-0.808**
	(0.327)	(0.336)	(0.331)	(0.336)
lncover		0.042***		
		(0.005)		
lndeep			0.056***	
			(0.007)	
lndigi				0.048***
				(0.006)
_cons	1.757***	1.831***	1.761***	1.753***
	(0.035)	(0.032)	(0.036)	(0.037)
N	279	279	279	279
R^2	0.751	0.737	0.740	0.738

Based on H1, the corresponding control variables are added to the fixed effects model, and the above list results are obtained. The data in the first column shows that the coefficient of the

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inclusive finance composite index is 0.058, which is significant at the 1% level. In the data financial inclusion subsystem (2)~ (4), the coefficients are 0.042, 0.056 and 0.048, respectively, and the three research conclusions all reach a significant level of 1%.

According to the data of control variables in the table, the influence of opening-up degree, government intervention and human resource level on industrial structure upgrading is positive and significant at 1% level. A high level of opening-up means more external market opportunities, capital and technology inflow, which will promote the competitiveness of local enterprises and attract foreign investment into high value-added industries. Thus promoting the upgrading of industrial structure to a higher level. At the significance level of 1%, the increase of the degree of opening up has a significant positive impact on the upgrading of industrial structure, indicating that the open economic policy has a very obvious role in promoting industrial upgrading. Government intervention can be reflected in industrial policies, financial subsidies, tax incentives, market access restrictions and other aspects. Moderate government intervention can guide resources to key industries, provide infrastructure support, promote technology research and development and personnel training, and thus promote the optimization of industrial structure. But too much intervention can distort markets and misallocate resources. At the significance level of 1%, the degree of government intervention has a significant impact on the upgrading of industrial structure, which indicates that appropriate policy guidance and market regulation are crucial for industrial upgrading. The level of human resources reflects the quality of the workforce, including the level of education, professional skills and awareness of innovation. High-quality human resources are an important driving force to promote technological innovation and industrial upgrading. At the significance level of 1%, the improvement of human resources has a significant positive impact on the upgrading of industrial structure, indicating that investment in education and training plays an important role in improving industrial level and competitiveness. At the significance level of 10%, although the impact of social consumption level on the upgrading of industrial structure may not be particularly strong, it is still a factor that cannot be ignored. The expansion and development of related industries can be promoted through the demand-pulling effect. The improvement of social consumption level is often accompanied by the change of consumption structure, which promotes the transfer of industrial structure from the traditional manufacturing industry to the service industry and promotes the upgrading of industrial structure. The negative relationship between FDI and industrial structure upgrading is observed, indicating that under certain conditions, the increase of FDI may not always have a positive impact on industrial structure upgrading. Fdi can pose competition to local firms, especially in capital - and technology-intensive sectors. At the same time, due to substitution effect and resource crowding out effect, the upgrading of domestic industrial structure is inhibited.

4.3. Robustness Test

In order to evaluate the reliability and stability of the regression analysis results, the robustness test of the data was carried out to determine whether the regression model was affected by data processing, model selection, sample bias and other factors. In this paper, the robustness test is mainly carried out by replacing the explained variable and the delayed one period explanatory variable.

First, as shown in table 4. A new method to measure the proportion of tertiary industry is constructed by transforming the explained variables, expressed by the ratio of tertiary industry to secondary industry, and its stability is tested. As can be seen from the following table, the model has good explanatory power. Meanwhile, the coefficient symbol in the digital inclusive financial index has not changed, and it is significant at the significance level of 1%, which indicates that the model has a certain stability.

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Table 4. Data of Replacing Explained Variable

	(1)	(2)	(3)	(4)
	isy	isy1	isy1	isy1
lnindex	0.025***			
	(0.006)			
STU	17.909***	17.281***	15.905***	17.935***
	(4.449)	(3.612)	(3.858)	(3.617)
FDI	-0.698*	-0.858**	-0.774**	-0.775**
	(0.400)	(0.384)	(0.372)	(0.371)
OPEN	-0.113***	-0.106***	-0.088***	-0.082***
	(0.032)	(0.029)	(0.028)	(0.027)
CON	0.006	-0.007	-0.017	-0.007
	(0.109)	(0.095)	(0.098)	(0.100)
GVO	0.257	0.311	0.269	0.326
	(0.256)	(0.253)	(0.241)	(0.238)
lncover		0.012**		
		(0.005)		
lndeep			0.023***	
			(0.005)	
lndigi				0.015***
				(0.004)
_cons	1.860***	0.033	0.010	-0.013
	(0.075)	(0.060)	(0.063)	(0.063)
N	279	279	279	279
R^2	0.685	0.706	0.720	0.712

Table 5: Data of Replacing Explained Variable

	(1)	(2)	(3)	(4)
	isy	isy	isy	isy
L.lnindex	0.037***			
	(0.007)			
STU	15.367***	17.904***	16.960***	19.224***
	(4.301)	(4.187)	(4.505)	(4.062)
FDI	-0.597	-0.739*	-0.592	-0.533
	(0.370)	(0.413)	(0.422)	(0.400)
OPEN	-0.075**	-0.109***	-0.099***	-0.062*
	(0.030)	(0.031)	(0.031)	(0.035)
CON	-0.048	-0.026	-0.017	-0.023
	(0.100)	(0.104)	(0.110)	(0.109)
GVO	0.171	0.213	0.195	0.245
	(0.225)	(0.245)	(0.235)	(0.214)
L.lncover		0.022***		
		(0.007)		
L.lndeep			0.034***	
			(0.007)	
L.lndigi				0.027***
				(0.005)
_cons	1.889***	1.911***	1.859***	1.823***
	(0.078)	(0.078)	(0.082)	(0.079)
N	248	248	248	248
R^2	0.694	0.667	0.684	0.681

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Second, as shown in table 5. The explanatory variables are replaced, and the explanatory variables are delayed by one period for robustness test. The following table results are obtained, from which it can be seen that the coefficient of the explanatory variable with a lag of one stage is still obvious at the level of 1%, which means that the baseline regression results of the alternative explanatory variable are still robust.

4.4. Heterogeneity Analysis

China is a big civilized country with vast territory and abundant resources, but its regional development is affected by terrain, terrain and traffic, and there are obvious differences in the speed of economic development. In order to explore the impact of digital inclusive finance on the industrial structure in different regions, this paper divides 31 provinces, municipalities and autonomous regions into three sub-data sets, East, middle and west, and conducts regional heterogeneity analysis. The eastern region includes: Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan 11 provinces, autonomous regions and municipalities directly under the central government; The central region includes: Shanxi, Anhui, Jiangxi, Jilin, Heilongjiang, Henan, Hubei, Hunan 8 provinces and autonomous regions; The western region includes: Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Ningxia, Qinghai, Xinjiang 12 provinces and autonomous regions.

Table 6. Data of Heterogeneity Analysis

	eastern part	middle part	west part
	isy	isy	isy
lnindex	0.030***	0.017	0.012
	(0.006)	(0.013)	(0.009)
STU	14.614**	28.768***	14.608**
	(5.385)	(6.326)	(5.806)
FDI	-0.993***	4.493**	-3.216
	(0.243)	(1.875)	(2.637)
OPEN	-0.084***	-0.266	0.018
	(0.025)	(0.302)	(0.156)
CON	0.028	0.055	0.008
	(0.083)	(0.143)	(0.221)
GVO	0.614**	-0.388	0.386
	(0.229)	(0.337)	(0.330)
_cons	1.932***	1.622***	1.886***
	(0.099)	(0.067)	(0.139)
N	99	72	108
R^2	0.838	0.818	0.618

As can be seen from the table, for every 1% increase in the inclusive financial index in the eastern region, the industrial structure upgrading index increases by 0.03, and it is significant at the 1% level. However, the central and western regions did not pass the 10% significant level requirement. There are three main reasons for the difference. On the one hand, the eastern region has a relatively developed economy, high market maturity, perfect financial infrastructure, and high acceptance and utilization efficiency of digital inclusive finance. Therefore, digital inclusive finance may play a more obvious role in promoting the upgrading of its industrial structure. The central and western regions have relatively backward economies and insufficient financial infrastructure, and the popularization and use of digital financial inclusion may be limited. Secondly, the eastern region usually has better Internet and mobile

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communication network coverage, which provides a physical basis for the widespread application of digital financial inclusion. The Midwest is lacking in infrastructure; Finally, the eastern region has a dense population and large market demand, and digital inclusive finance can quickly respond to and meet diverse needs and promote industrial upgrading. The population density of the central and western regions is lower, the demand is not as large as the eastern region, and the traffic information is blocked accordingly to hinder the development of digital voice trend.

4.5. Mechanism Test

On this basis, the project will take income and technological innovation as moderating variables, explore the mechanism of digital inclusive finance promoting industrial structure upgrading, and explore the intermediary effect in the process.

First, we take income as the intermediary variable and test the existence of this intermediary effect through empirical regression analysis. As can be seen from the following table, the coefficient of this model is obvious, and the three variables have intermediary utility, and digital inclusive finance can promote the optimization of industrial structure by increasing residents' income.

The intermediary effect on income is mainly reflected in the following aspects. First, increase the availability of credit, which helps individuals and businesses expand investment, increase productive capacity, and thus raise incomes. For enterprises, the availability of credit enhances their ability to expand and technological innovation, which contributes to industrial upgrading. Secondly, optimize the consumption structure, with the increase of income, consumers' demand for high-quality products and services rises, which promotes the transformation of enterprises to higher value-added products and services, and promotes the optimization of industrial structure. Finally, to guide the rational allocation of capital, through data analysis and algorithms, digital inclusive finance can more accurately identify and match the demand side and the supply side of funds, guide the capital flow to the industries and enterprises with the most need and development potential, promote the effective use of capital, and accelerate the upgrading of industrial structure.

Table 7. Data of Mechanism Test 1

	(1)	(2)	(3)
	isy	LNPGDP	isy
lnindex	0.025***	0.019**	0.027***
	(0.006)	(0.007)	(0.006)
STU	17.909***	-4.964	17.517***
	(4.449)	(6.400)	(4.341)
FDI	-0.698*	1.808**	-0.555
	(0.400)	(0.819)	(0.349)
OPEN	-0.113***	-0.300***	-0.136***
	(0.032)	(0.076)	(0.035)
CON	0.006	0.173	0.020
	(0.109)	(0.112)	(0.101)
GVO	0.257	-1.505**	0.139
	(0.256)	(0.719)	(0.220)
LNPGDP			-0.079
			(0.071)
_cons	1.860***	9.704***	2.626***
	(0.075)	(0.168)	(0.726)
N	279	279	279
R^2	0.685	0.419	0.689

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Secondly, the intermediary effect of digital inclusive finance on the upgrading of industrial structure is investigated by taking technological innovation as the intermediary variable. It can be concluded from the following table that the coefficient is significant, indicating that there is an intermediary effect among the three, and digital inclusive finance can indirectly promote the upgrading of industrial structure by stimulating scientific and technological innovation.

The mediating effect brought by scientific and technological innovation mainly has the following aspects. First, to improve the availability of capital, digital financial inclusion reduces the cost and threshold of financial services, making it easier for technology-based smes and innovative enterprises to obtain financing. At the same time, when there is a capital rupture, it provides financial support for enterprises and promotes the upgrading of industrial structure as technology-intensive. Second, promote financial service innovation, digital financial inclusion itself is the product of financial technology innovation, it through the introduction of blockchain, artificial intelligence and other new technologies, constantly innovate financial services, improve service quality and efficiency. Finally, to stimulate the passion for innovation and entrepreneurship, the convenience and flexibility of digital financial inclusion has encouraged more people to participate in entrepreneurship and innovation activities. This kind of innovative thinking and practice will also affect other industries, promote cross-industry integration and innovation, and promote the diversification and complexity of industrial structure. It has stimulated the innovative vitality of the whole society and injected fresh blood into the upgrading of industrial structure.

Table 8. Data of Mechanism Test 2

	(1)	(2)	(3)
	isy	NEW	isy
lnindex	0.025***	0.452***	0.014**
	(0.006)	(0.074)	(0.006)
STU	17.909***	39.376*	16.912***
	(4.449)	(20.217)	(4.342)
FDI	-0.698*	3.420*	-0.784*
	(0.400)	(1.954)	(0.396)
OPEN	-0.113***	-0.626*	-0.097***
	(0.032)	(0.347)	(0.034)
CON	0.006	1.963***	-0.043
	(0.109)	(0.576)	(0.105)
GVO	0.257	1.851	0.211
	(0.256)	(1.238)	(0.277)
NEW			0.025*
			(0.012)
_cons	1.860***	5.128***	1.730***
	(0.075)	(0.423)	(0.115)
N	279	279	279
R^2	0.685	0.753	0.695

5. Conclusion

Based on the provincial panel data from 2010 to 2019, this paper examines the impact and internal mechanism of digital inclusive finance on industrial structure upgrading at the provincial level. It is found that the development of digital inclusive finance has a certain impact on the upgrading of industrial structure, and not only has a direct positive impact. It can also be

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carried out through the mechanism of intermediary effect brought by two intermediary variables, income and scientific and technological innovation. Among them, income mainly produces intermediary effects through improving the availability of credit, optimizing the consumption structure and guiding the rational allocation of resources. The intermediary effect of scientific and technological innovation is mainly to improve the availability of capital, promote the innovation of financial services and stimulate the passion of innovation and entrepreneurship. The study also found that the impact of digital inclusive finance on the upgrading of industrial structure had regional heterogeneity, with the most obvious effect in the eastern region, and the effect declining in the middle and western regions. According to the above empirical results, this paper puts forward some suggestions.

First, we will increase the development and popularization of digital financial inclusion. Make full use of the convenience of digital inclusive financial services and the sustainability of development, constantly innovate financial products to meet diversified needs, and expand the service scale and service boundaries of digital inclusive financial services. On this basis, increasing the combination of digital inclusive finance and the Internet will make financial services more convenient and reduce the crisis caused by information inequality. At the same time, since digital inclusive finance mainly serves small and medium-sized enterprises and low-income people, it is necessary to appropriately improve the anti-risk ability of small and medium-sized enterprises. In the face of low-income people, it is necessary to strengthen the popularization of financial knowledge and financial prevention awareness, such as community publicity or online learning. Through the above methods, the development of digital inclusive finance is promoted, and the industrial structure is stably developed and further upgraded.

The second is to provide financing facilities and policy support for SME financing. Since digital inclusive finance benefits smes, smes are the main force of technological innovation and scientific and technological innovation, and most of the income sources of low-income people come from smes, in order to improve the income effect and stimulate scientific and technological innovation to ensure the intermediary effect, support for smes should be strengthened. The government can increase the loan limit and reduce the loan conditions to ensure the capital needs of smes. At the same time, the government can provide policy support such as tax reduction, tax exemption and deferred repayment for the high-tech research and development of smes to ensure the technological innovation and technological innovation of smes.

Third, according to the heterogeneity of digital financial inclusion in the region, provide policy support according to local conditions. Strengthen rural infrastructure construction in the central and western regions, improve network coverage, and ensure that low-income people in the central and western regions enjoy the convenience of digital inclusive finance; At the same time, the government has increased its support for the development of the central and western regions, promoted the development of the central and western regions by guiding the flow of capital, and created diversified financial products according to local conditions to improve the coverage of financial services. For the eastern region with a more mature financial system, we should ensure the rationalization of industrial structure and the stable development of high planning, and coordinate the coordinated development of the tertiary industry.

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