

## An Empirical Study on the Impact of Inclusive Finance on Innovation Ability in the Yangtze River Delta

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*Abstract: In recent years, the integrated construction of urban agglomeration has been regarded as an important starting point for the coordinated development and common progress of regional economy. Pursuing high-quality economic development and improving regional competitiveness has become an important goal of regional economic integration. Seeking a development path to effectively enhance regional innovation has been regarded by the Yangtze River Delta as an important breakthrough to achieve the goal of high-quality economic development. Based on the data of 26 prefecture level cities in the Yangtze River Delta from 2015 to 2019, this paper studies the impact mechanism of regional inclusive financial development on regional innovation. Firstly, with the help of factor analysis method, the development level of Inclusive Finance in the Yangtze River Delta is evaluated, and the comprehensive score of the development level of Inclusive Finance in three provinces and one city in the Yangtze River Delta is calculated. The results of factor analysis show that Shanghai has the best development level of Inclusive Finance, followed by Jiangsu and Zhejiang, and Anhui has the lowest development level of Inclusive Finance. Then, it uses correlation analysis and regression analysis to study the impact of Inclusive Financial Development on regional innovation. The results show that there is a strong positive correlation between inclusive financial development and regional innovation, and the correlation coefficient is 0.746. Finally, some policy suggestions are put forward for the development of regional Inclusive Finance and the improvement of regional innovation.*

*Keywords: Inclusive Finance; Regional innovation; Factor analysis; Multiple regression.*

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### 1. INTRODUCTION

Under the background of vigorously promoting the supply side structural reform and the transformation of the economy from pursuing high-speed development to paying attention to high-quality development, improving innovation has increasingly become an important driver of scientific and technological progress and high-quality economic development. Adhering to innovation driven economic development has been listed as the first priority in the key areas of the 14th five year plan

and the long-term goal of 2035. China attaches unprecedented importance to innovation. The number of regional patents is one of the core indicators to evaluate regional innovation. From the number of patents in China's Yangtze River Delta region from 2016 to 2020, Jiangsu Province has always been the first in the past five years. The number of patents in Anhui Province has increased rapidly in recent years, with a growth rate of 45.05% in 2020. The innovation level of three provinces and one city in the Yangtze River delta still has great regional differences from the index of the number of regional patents. This argument is still worth exploring through coordinated development and seeking development plans to effectively improve regional innovation, so as to improve regional innovation and promote high-quality regional economic development.

The financial industry helps to promote the sustainable development of the real economy. A well functioning financial system can provide sufficient financial support and efficient financial services for the real economy, and the region can not improve its innovation through the development of high-tech industries without sufficient financial support. However, under the background of market economy, the phenomenon of difficult financing and high cost appears frequently. Especially for small and medium-sized enterprises, it has become a common problem for the development of small and medium-sized enterprises to hinder enterprises from seeking technological innovation and then affect their growth and progress. In this context, the concept of Inclusive Finance has become popular. The development of Inclusive Finance is of great significance for regional innovation and promoting high-quality regional economic development.

Reviewing the existing literature on Inclusive Finance and regional innovation, scholars' research directions can be summarized into three aspects. The first direction takes the theoretical construction of Inclusive Finance as the core. The interpretation of the concept of Inclusive Finance is after practice. Practice needs theory as the guiding direction. After the world bank put forward the term concept of Inclusive Finance, domestic and foreign scholars began to continuously improve the theoretical framework of Inclusive Finance. The second direction focuses on the output mechanism of regional innovation. The purpose of paying attention to the improvement of regional innovation is to activate the regional economy. How regional innovation affects the regional economy, whether there are spatial differences and how spines improve regional innovation have become the research focus of scholars at home and abroad.

(1) Research on Inclusive Finance. Throughout the world, the practice of Inclusive Finance precedes the theory. In the construction of Inclusive Finance has been in full swing, many scholars have put forward their theoretical opinions on Inclusive Finance. In the basic theoretical framework of Inclusive Finance proposed by Yan Haiyun (2013), the "5 + 1" definition method is used - a financial service can be defined as inclusive finance only if it meets one of the five elements of Inclusive Finance and serves specific groups [1]. Wu Xiaoying (2019) regards Inclusive Finance as a philosophy and humanistic development concept, which can promote the sustainable development of Finance and serve the economy and society most widely [2]. Ni Yao (2020) stressed the importance of building an inclusive financial system, which can expand financial coverage and eliminate discrimination and unfairness in financial services [3]. Helms (2006) believes that inclusive finance should not ignore all risks and should ensure to serve vulnerable groups on the premise of controllable

risks [4]. According to Ivatury (2006), inclusive finance should serve the whole people, especially special groups such as small and micro enterprises [5].

(2) Research on regional innovation. In terms of the impact mechanism of regional innovation on regional economy, Li Biao et al. (2016) confirmed that innovation is an important factor to promote the expansion of economic scale and narrow the development gap between regions on the basis of China's provincial panel data and using the traditional solo growth model [6]. In terms of the promotion path of regional innovation, Yang Haochang (2016) proposed that the development of high-tech industry is conducive to the progress of technological innovation activities [7]. In terms of the spatial differences of regional innovation and the impact between regions, Li Shenghui and Zhu Shaotang (2021) confirmed that China's cities with high innovation are mainly located in coastal areas and inland central cities. With the change of time, there is a spatial spillover effect of innovation, and there is an interactive relationship between adjacent cities in terms of innovation [8].

(3) Research on the relationship between Inclusive Finance and regional innovation. Inclusive Finance and regional innovation are two different important driving forces that can promote the high-quality development of regional economy. Many scholars use different models to study the relationship between Inclusive Finance and regional innovation. Liang bang and Zhang Jianhua (2019) used Tobit model to prove that the development of Inclusive Finance in different dimensions can effectively promote technological innovation both at the macro level and at the micro level [9]. Zheng Yaxin (2020) used the regression model to prove that digital inclusive finance plays an obvious role in promoting the innovation of the East, central and west regions, and there are obvious differences in the role of digital Inclusive Finance in different regions. At the same time, it proves that digital inclusive finance can improve the level of regional higher education, Improving infrastructure construction and increasing the average wage of residents indirectly promote innovative output [10]. Xu ziyao, Zhang Lisha and Liu Yizhi (2020) finally confirmed that inclusive finance can significantly promote the improvement of regional innovation by using the GMM estimation method of dynamic panel system and combined with China's urban panel data, and there are obvious differences due to urban geographical location, administrative level and initial innovation level [11]. Zhang Lili (2017) evaluated the impact of Inclusive Finance on regional technological innovation activities by using multiple regression fixed effect model, and concluded that inclusive finance can have an obvious positive impact on regional technological innovation. At the same time, increasing the investment of researchers and testers and reducing the government's intervention in enterprise innovation are also conducive to regional technological innovation activities [12]. Sun Jiguo, Hu Jinyan and Yang Lu (2020) took small and medium-sized board listed enterprises as the research object with the help of double difference model, and finally concluded that the development of Inclusive Finance can promote the development of invention patents, utility model patents and design patents for small and medium-sized board listed enterprises [13]. Xu Xin (2020) further studied the correlation between Inclusive Finance and regional innovation development based on the grey correlation theory, and concluded that Inclusive Finance has a high correlation with regional innovation in most regions of China, especially in the eastern region. At present, most existing studies show that inclusive financial development has a positive effect on the improvement of innovation, both directly and indirectly, and there are large regional differences [14].

## 2. ANALYSIS ON THE CURRENT SITUATION OF INCLUSIVE FINANCE AND REGIONAL INNOVATION

### 2.1 Development status of Inclusive Finance

Since the development status of regional Inclusive Finance is difficult to be measured by a qualitative index, this paper first uses the method of combining theoretical analysis and cluster analysis to construct the evaluation system, collects the data of three provinces and one city in the Yangtze River Delta from 2015 to 2019 according to the relevant indicators of the evaluation system, and evaluates the development status of Inclusive Finance in three provinces and one city based on the data with the help of factor analysis method.

#### 2.1.1. Construction of evaluation index system

Take the development level of Inclusive Finance as the target layer, and the availability, efficiency, service and development of Inclusive Finance as the criterion layer. Select indicators according to the criterion layer while ensuring easy access and high accuracy of data. The accessibility criterion of Inclusive Finance extends to four indicator layers: the average number of employees in the regional financial industry, the average number of regional financial institutions, the number of financial services per capita and the number of financial institutions per capita; The value of Inclusive Finance extends to four indicators: the balance of domestic and foreign currency loans of regional financial institutions at the end of the year, the balance of domestic and foreign currency deposits of regional financial institutions at the end of the year, the breadth of regional insurance and the depth of regional insurance; Inclusive financial services extended to two indicators: the annual loan balance of small and medium-sized enterprises and the average non-performing loan rate of banks in the region; Inclusive Finance expanded the local financial freedom (fiscal expenditure / GDP) and local economic activity (including the number of listed companies and economic growth rate), and finally established the evaluation index system, as shown in Table 1:

Table 1. Inclusive financial development evaluation index system

Target layer	Criterion layer	Index layer
Inclusive financial development	Availability of Inclusive Finance	Regional average number of employees in the financial industry
		Regional average number of financial institutions
		Number of financial services per capita
		Number of financial institution services per capita
	Inclusive financial value	Balance of domestic and foreign currency loans of regional financial institutions at the end of the year
		Balance of domestic and foreign currency deposits of regional financial institutions at the end of the year
		Regional premium income
	Inclusive financial services	Annual loan balance of small and medium-sized enterprises in the region
		Average non-performing loan ratio of banks
	Inclusive financial development	Fiscal expenditure / GDP
		Number of small and medium-sized enterprises listed in the region
		Economic growth rate

In the process of constructing the regional evaluation inclusive financial development index system, the indexes with strong correlation can be deleted appropriately. Firstly, the correlation analysis is carried out with the help of data analysis software. Where X1 represents the average number of employees in the financial industry in the region, X2 represents the average number of financial institutions in the region, X3 represents the number of financial services per capita, X4 represents the number of services per capita, X5 represents the balance of domestic and foreign currency loans of regional financial institutions at the end of the year, X6 represents the balance of domestic and foreign currency deposits of regional financial institutions at the end of the year, and X7 represents the regional premium income, X8 represents the annual loan balance of small and medium-sized enterprises in the region, X9 represents the average non-performing loan rate of banks, X10 represents the degree of financial freedom, X11 represents the number of small and medium-sized enterprises in the region, and X12 represents the economic growth rate.

The correlation analysis shows that the correlation between the number of regional average financial institutions and the number of employees in the regional average financial industry is 0.998, which is significant at the level of 0.01. The correlation between the number of regional average financial institutions and the number of financial services per capita is also 0.998, which is significant at the level of 0.01. There is a strong positive correlation between the number of regional inclusive financial services and the number of financial institutions, which is practical and reasonable. It shows that the indicators related to the availability of Inclusive Finance can be appropriately deleted, and 1-2 indicators can be selected. The correlation between the number of small and medium-sized enterprises listed in the region and the balance of domestic and foreign currency loans of regional financial institutions at the end of the year is 0.974, which is significant at the level of 0.05. The correlation between regional premium income and financial freedom is -0.955, which is significant at the level of 0.05, and the correlation with the regional annual loan balance of small and medium-sized enterprises is 0.951, which is significant at the level of 0.05.

Through correlation analysis, it can be roughly observed that some indicators have high correlation, which can be deleted and replaced, but cluster analysis is still needed for further analysis. The similarity between indicators can be obtained by software. It is not difficult to see that X3 and x9 were first merged into one category; Then X5 and X6 are merged, and X2 and X8 are merged. Finally, X3, X9, X12, X10, X4, X1, X2 and X11 can be merged.

Combined with the results of correlation analysis and cluster analysis, as well as deleting some variables that are highly correlated with other variables, have little difference and can be replaced, and combined with expert opinions, finally, the evaluation of the development level of regional Inclusive Finance is divided into four aspects. The first aspect is the availability of Inclusive Finance, which expands two indicators: the average number of regional financial institutions and the number of financial institutions per capita; The second aspect is the value of Inclusive Finance, including two indicators: the sum of local and foreign currency deposits and loan balances of regional financial institutions at the end of the year, and regional premium income; The third aspect is inclusive financial services, which has one indicator: the annual loan balance of small and medium-sized enterprises in the region; The fourth aspect is the development of Inclusive Finance. There is one indicator: the

number of regional small and medium-sized enterprises listed. The reconstructed evaluation system is shown in Table 2:

Table 2. Reconstructed inclusive financial development evaluation index system

Target layer	Criterion layer	Index layer
Inclusive financial development	Availability of Inclusive Finance	Regional average number of financial institutions
		Number of financial services per capita
	Value of Inclusive Finance	Sum of domestic and foreign currency deposits and loans of regional financial institutions at the end of the year
	Service of Inclusive Finance	Annual loan balance of small and medium-sized enterprises in the region
	Development of Inclusive Finance	Number of small and medium-sized enterprises listed in the region

The results of cluster analysis show that the development level of Inclusive Finance needs to be evaluated from many aspects. On the whole, it can be summarized into four aspects: the availability of Inclusive Finance, the service of Inclusive Finance, the value type of Inclusive Finance and the development of Inclusive Finance.

The availability of Inclusive Finance reflects the service ability of Inclusive Finance. Convenient and efficient financial services help small and medium-sized enterprises to easily obtain financial support and avoid the influence of capital constraints on their own development. One of the important indicators to measure inclusive financial services is the loan amount of small and medium-sized enterprises. Because the development of small and medium-sized enterprises is often in the initial stage, they are prone to problems such as insufficient capital and high risk compared with large enterprises, so it is more difficult to obtain loans from banks. The significance of developing Inclusive Finance includes reducing the loan threshold for small and medium-sized enterprises. Therefore, the loan amount of small and medium-sized enterprises is more reasonable to judge the development of regional Inclusive Finance. From the perspective of regional economic activity, this study takes the number of regional small and medium-sized enterprises listed as one of the evaluation criteria of Inclusive Finance.

#### 2.1.2. Evaluation of regional inclusive financial development level based on factor analysis

When the amount of original information is large, it can be reflected by extracting several comprehensive factors that can reflect the original information, so as to achieve the purpose of dimension reduction. In the evaluation research on the development level of Inclusive Finance in Anhui Province, the factor score calculated by factor analysis and the proportion of the variance contribution rate of each factor in the total variance contribution rate of the four factors are weighted and summarized, and finally the inclusive financial development index of three provinces and one city in the Yangtze River Delta region can be calculated.

When the correlation coefficient of index data is high, it is suitable for factor analysis. The correlation analysis can be easily realized by using SPSS statistical software. It is not difficult to see that most correlation coefficient values are greater than 0.3, which is suitable for factor analysis and factor extraction in the next step. The response degree of the extracted factors to the original information

must be ideal, which can be tested by the index value of commonality, which reflects the influence degree of common factors on variables.

Table 3 reflects the common variance of each variable before and after common factor extraction. The values of common variance in the initial column are all 1, indicating that the interpretation degree of each variable for the original information before factor extraction is 100%; The value of the common variance in the extracted column is in the range of 0.9-1, indicating that the interpretation effect of the original information is still good after extracting the factor.

Table 3. Extraction of common factors

Index	Initial	Extract
Regional average number of financial institutions	1.000	1.000
Number of financial services per capita	1.000	.998
Sum of domestic and foreign currency deposits and loans of regional financial institutions at the end of the year	1.000	.992
Annual loan balance of small and medium-sized enterprises in the region	1.000	.975
Number of small and medium-sized enterprises listed in the region	1.000	.994

The number of factors to be extracted can be determined from the variance interpretation degree table of factors for the original information. The variance interpretation degree table shows that the variance interpretation degree of the original information can reach about 99% by extracting two factors.

When the eigenvalue is greater than 0.9, the common factor is extracted, and finally the rotated factor load matrix is obtained, as shown in Table 4:

Table 4. Composition matrix after rotation

Index	Component	
	1	2
Regional average number of financial institutions	.160	.987
Number of financial services per capita	-.096	.994
Sum of domestic and foreign currency deposits and loans of regional financial institutions at the end of the year	.881	-.465
Annual loan balance of small and medium-sized enterprises in the region	.970	.186
Number of small and medium-sized enterprises listed in the region	.990	.116

It can be seen from the table that factor 1 consists of the annual loan balance of small and medium-sized enterprises in the region, the number of Listed Small and medium-sized enterprises in the region, and the total balance of deposits and loans in local and foreign currencies of financial institutions at the end of the year. Factor 2 consists of the average number of regional financial institutions and the number of financial services per capita. Factor 1 represents the effect of financial services in the development of Inclusive Finance in a region, Factor 2 represents the financial service capacity in the development process of Inclusive Finance in a region.

Calculate the comprehensive score of inclusive financial development in Shanghai, Jiangsu Province, Zhejiang Province and Anhui Province by using the following formula:

$$F = (54.747 \times F_1 + 44.418 \times F_2) / 99.165 \quad (1)$$

Among them, F1 is the score of factor 1, F2 is the score of factor 1, which is calculated and generated by SPSS software.

The final relevant data and calculation results are shown in Table 5:

Table 5. Development level of Inclusive Finance in three provinces and one city in 2019

Province	F1 effect of inclusive financial services	Ranking	F2 inclusive financial services capability	Ranking	Comprehensive score	Ranking
Shanghai	-0.3637	3	1.3994	1	0.3532	2
Jiangsu	1.1173	1	-0.4939	3	0.4622	1
Zhejiang	0.4403	2	-0.0125	2	0.2562	3
Anhui	-1.1939	4	-0.8931	4	-1.0716	4

The comprehensive score shows that Shanghai has the best development level of Inclusive Finance, followed by Jiangsu Province, followed by Zhejiang, and Anhui Province has a negative score. This result is more consistent with the actual situation. With this method, the development level of Inclusive Finance in three provinces and one city in the Yangtze River Delta from 2015 to 2018 can be calculated (the calculation results are omitted).

From the relevant results of factor analysis, it is not difficult to see that the effect of inclusive financial services in Jiangsu Province has always been the first in the Yangtze River Delta in recent five years. Meanwhile, Shanghai's inclusive financial service capacity has always ranked first in the Yangtze River Delta in recent five years. The effect and service capacity of inclusive financial services in Anhui Province have always been at the bottom in recent five years.

It is concluded that there are obvious regional differences in the development status of Inclusive Finance in the Yangtze River Delta. In the past five years, the development of Inclusive Finance in Jiangsu Province in the Yangtze River Delta is the best, which is reflected in the service effect of Inclusive Finance. In recent years, with the help of big data technology, commercial banks in Jiangsu have integrated various types of data to accurately portray enterprises that originally lacked credit information, so as to solve the problem that these enterprises did not obtain credit due to credit and other problems. At the same time, it has launched a number of characteristic microfinance products specially serving medium, small and micro enterprises to help different types of enterprises obtain financial support most directly and conveniently. The data of recent five years show that the number of small and medium-sized enterprises listed in Jiangsu Province has always remained at more than 160, and the amount of microfinance is also the first in three provinces and one city. The development, growth and listing of small and medium-sized enterprises are closely related to an efficient financing mechanism. The provinces with outstanding inclusive financial service capacity in the Yangtze River Delta include Shanghai and Zhejiang Province. There are a large number of employees in the financial institutions and financial industry under the jurisdiction of Shanghai and Zhejiang Province. Taking the data of 2019 as an example, the number of employees in the financial industry within the jurisdiction of Zhejiang Province has reached 532200, and the number of employees in the financial industry in Shanghai has reached more than 360000, ranking first and second in the Yangtze River Delta region. The increase in the number of employees in financial institutions and the financial industry can make inclusive financial services more easily available. Anhui Province is still lagging behind in the development of Inclusive Finance. Limited by the regional economy, Anhui Province

has the lowest number of regional financial institutions and financial service personnel, and the number of microfinance in the region has also been the lowest in recent five years. Both the effect of inclusive financial services and the ability of inclusive financial services need to be improved.

**2.2 Current situation of regional innovation**

Referring to Zhang Lili, this paper uses the index of regional per capita patent authorization to measure regional innovation capacity. The data from 2015 to 2019 are shown in the table.

Table 6. Number of patent authorizations per capita in the region from 2015 to 2019 (Unit: Piece / 10000 people)

Year	Shanghai	Jiangsu	Zhejiang	Anhui
2015	25.10	31.38	48.22	8.50
2016	26.55	28.88	45.10	8.68
2017	30.11	28.29	43.13	8.25
2018	38.16	38.13	56.92	11.26
2019	41.43	38.96	56.62	11.59

In 2015-2019, Zhejiang Province and Shanghai are the top provinces in regional innovation. Taking Hangzhou, Zhejiang Province as an example, it has a number of innovation driven enterprises represented by Alibaba, Xinhua and other large technology companies, which has improved the regional innovation ability as a whole. At the same time, Zhejiang Province has always respected the concept of innovation and encouraged the people to be brave in Entrepreneurship with the thinking concept of innovation and development. Zhejiang businessmen have gradually become a group of representatives of businessmen who are proactive, pioneering and innovative and have the courage to try. In the past five years, Shanghai's regional innovation has grown rapidly. Shanghai has gathered many well-known universities such as Fudan University and Jiaotong University, and the region has formulated preferential policies for talent introduction, reserving many talents for the improvement of regional innovation. At the same time, in recent years, Shanghai has always paid attention to creating an excellent innovation and entrepreneurship environment for sustainable development. Starting from various aspects such as system model, fiscal policy and financial support, Shanghai has gradually established platforms such as high-tech industrial park and science and Innovation Center for various types of enterprises, and issued policies to encourage enterprises to settle in and devote themselves to the field of innovation. Although Anhui's regional innovation ranks at the bottom, it has also benefited in recent years under the background that the State encourages the coordinated development of the Yangtze River Delta. In particular, relying on higher education institutions, Hefei has deeply integrated industry, University and research, and gathered a number of talents in the field of artificial intelligence. IFLYTEK, headquartered in Hefei, has won the first prize in the field of international intelligent speech recognition for many times. Taking the enterprise as the center, it has built China sound Valley, further cultivated the field of intelligent speech recognition, and built an industry driven by scientific and technological innovation.

**3. RESEARCH ON THE IMPACT OF INCLUSIVE FINANCIAL DEVELOPMENT ON REGIONAL INNOVATION**

This study uses the combination of correlation analysis and regression analysis to study the development of Inclusive Finance and regional innovation. Firstly, correlation analysis is used to

preliminarily judge the relationship between inclusive financial development and regional innovation, and to judge whether the data have multicollinearity. Then, a multiple regression model is established to further study the impact of Inclusive Financial Development on regional innovation; Finally, the results are analyzed to explore the role path of inclusive financial development for regional innovation.

### 3.1 Index description and regression model construction

This paper takes regional innovation as the explanatory variable, the development level of Inclusive Finance as the explanatory variable, and the investment intensity of regional research and experimental development (R & D), regional scientific and technological financial investment and the number of scientific research institutions as the control variables. Construct multiple regression model:

$$\hat{y} = \alpha_0 + \alpha_1 FIN + \alpha_2 RDI + \alpha_3 SIN + \alpha_4 RIN \quad (2)$$

Among them,  $\hat{y}$  is the explanatory variable, representing regional innovation, this paper uses the number of regional per capita patent licenses to measure; FIN is the explanatory variable, representing the development level of Inclusive Finance, based on the calculation results of factor analysis in Chapter 2; RDI is the control variable, which represents the investment intensity of regional research and experimental development (R & D); SIN is the control variable, representing the regional financial investment in science and technology; RIN is the control variable and represents the number of scientific research institutions.

### 3.2 Data multicollinearity diagnosis

Before regression analysis, multicollinearity diagnosis must be carried out for the data. The data samples used in this study are the index data of Shanghai, Jiangsu Province, Zhejiang Province and Anhui Province from 2015 to 2019. Firstly, the correlation analysis of the data is carried out. The results show that the correlation coefficient between the control variables is high and fluctuates between 0.9-1, while the correlation with the explanatory variable inclusive financial development index is low, mostly in the range of 0.3-0.5. It is necessary to further judge whether there is a multicollinearity problem. The multicollinearity diagnosis results can be easily obtained by using SPSS software,. The severity of multicollinearity can be judged by observing the condition index column. If the value of the data condition index used in this analysis is below 10, it can be judged that the multicollinearity is not serious, and the next analysis can be carried out.

### 3.3 Regression analysis

Since the regression analysis method used in this study is multiple regression analysis, the quality of fitting effect needs to be judged by the adjusted R-square value. The adjusted R-square value is 0.874, indicating that the effect of regression analysis is good. The sig value of F is 0.000, which is less than the significance level of 0.05 or 0.10. It is considered that each regression coefficient is zero when it is different, and the linear relationship of the model is significantly established. The final model is:

$$\hat{y} = 0.571FIN + 1.555RDI - 2.056SIN + 0.493RIN \quad (3)$$

Use formula (7) for regression analysis, and the results are shown in Table 7.

Table 7. Results of regression analysis

Variable	Non standardized coefficient		Standardized coefficient
	B		Beta
Constant	-8.635E-16	.079	
Inclusive financial development index	.571	.094	.571
Investment intensity of regional research and experimental development (R & D)	1.555	.281	1.555
Number of scientific research institutions	-2.056	.341	-2.056
Regional financial investment in science and technology	.493	.358	.493

The regression analysis results show that the coefficient of *fin*, the inclusive financial development index, is 0.571, which is significant at the level of 0.01, indicating that the inclusive financial development index has a strong positive output effect on the improvement of regional innovation. The control variable, the investment intensity of regional research and experimental development funds and the increase of regional financial investment in science and technology, can also improve regional innovation. The regression coefficient of the number of scientific research institutions is -2.056, which is inconsistent with relevant theoretical research. By observing the original data, it can be found that the statistical data of the number of scientific research institutions in Zhejiang Province and Jiangsu Province have decreased slightly in recent years, which may lead to some deviation due to the change of statistical caliber; At the same time, considering that in recent years, major scientific and technological enterprises led by Huawei, Tencent and Alibaba have established independent scientific research institutions, which have not been counted, the statistical value of the number of scientific research institutions is lower than the actual value, resulting in errors in the final results. The results of regression analysis show that there is a strong positive correlation between inclusive financial development and regional innovation, with a correlation coefficient of 0.746, while the coefficient of the explanatory variable of the multiple regression model inclusive financial development index is 0.571, which is consistent with the results of correlation analysis. It shows that the improvement of the development level of inclusive finance plays a strong positive role in improving regional innovation, which is consistent with the theoretical expectation. One of the beneficiaries of Inclusive Finance is small and medium-sized enterprises. Under the background of vigorously promoting the transformation of economic development mode and the transformation and upgrading of industrial structure, some small and medium-sized enterprises have far-reaching development potential and good innovation ability, which will help the country get rid of the rough development model of high energy consumption and high pollution. Inclusive finance can enable small and medium-sized enterprises that are difficult to obtain financing due to business risks, capital scale and other reasons to obtain financial support, broaden the channels for small and medium-sized enterprises to obtain funds, and empower the development of small and medium-sized enterprises. Therefore, inclusive financial services for small and medium-sized enterprises and

encouraging small and medium-sized enterprises to carry out technological innovation directly enable and revitalize the improvement of regional innovation.

Another beneficiary of Inclusive Finance is the population in rural and poor areas in China. By providing support for education funds, inclusive finance can promote the improvement of regional education level and help regions reduce the acquisition cost of high-quality labor force. Through the help of vulnerable groups, it can reduce the regional labor cost and promote the original labor force to improve the labor value. The development of Inclusive Finance helps to promote the rational distribution of financial funds and the fair allocation of social welfare, broaden the scope of financial services, alleviate the imbalance of financial services, and indirectly enhance regional innovation.

## **4. CONCLUSIONS AND RECOMMENDATIONS**

### **4.1 Conclusions**

Firstly, this paper evaluates the development level of Inclusive Finance in three provinces and one city in the Yangtze River Delta with the help of factor analysis. The result of factor analysis shows that there is a large gap in the development level of Inclusive Finance in three provinces and one city in the Yangtze River Delta. The development of three provinces and one city in the Yangtze River Delta is different. For example, one of the development problems faced by Anhui is the small number of large listed enterprises and the lack of leading enterprises to drive regional economic growth. One of the development problems faced by Jiangsu and Zhejiang is the small number of regional average financial institutions and per capita financial services, The availability of financial services is low. Correlation analysis and regression analysis show that inclusive financial development has a strong positive output effect on the promotion of inclusive financial development index for regional innovation. Increasing the investment intensity of regional research and experimental development funds and increasing regional scientific and technological financial investment can also improve regional innovation to varying degrees. Inclusive finance can fill the gap of traditional financial services and enable small and medium-sized enterprises that are easy to be excluded from the traditional financial industry and are not easy to obtain financing through financial means, but have strong innovation potential to obtain financial support for technological innovation activities; At the same time, inclusive finance can also help low-income groups, so that people of all classes in society can benefit from financial welfare and promote the rational distribution of financial funds.

### **4.2 Recommendations**

First of all, three provinces and one city should formulate policies to improve the development level of Inclusive Finance in combination with the development characteristics of various regions. For example, Jiangsu Province and Zhejiang Province can appropriately increase the number of regional financial institutions and the number of financial services in order to enable more small and medium-sized enterprises to easily access financial services; Anhui Province should strengthen the support of small and medium-sized enterprises, encourage small and medium-sized enterprises to carry out technological innovation activities, and make them grow towards large enterprises. Secondly, all localities should formulate risk control mechanisms, improve risk control capabilities, expand the scale of inclusive financial services and optimize the quality of inclusive financial services according

to local conditions, so as to enable more and more regional small and medium-sized enterprises to benefit from inclusive finance, reduce financing costs and avoid financial constraints for small and medium-sized enterprises in technological innovation activities.

Secondly, while expanding the scale of inclusive financial services and improving the quality of inclusive financial services, all regions should also increase the intensity of financial investment in high-tech industries, help enterprises and industries with innovation potential obtain financial support, and further improve regional innovation. At the same time, local governments should formulate preferential policies to encourage all kinds of enterprises to develop high-tech, so as to encourage more and more enterprises to change from resource consuming enterprises to science and technology driven enterprises.

Finally, small and medium-sized enterprises should grasp the external opportunities. Under the background of the development of regional economic integration, enterprises in different regions should develop together, strengthen innovation ability, complete technological progress, and then improve regional innovation as a whole. For example, the Nanjing metropolitan area was officially approved in 2021. The metropolitan area spans Jiangsu and Anhui provinces. Some enterprises in Anhui province close to Nanjing, the central city of Jiangsu Province, can actively attract investment with the help of some resources in Nanjing to alleviate the financial pressure of enterprises to carry out production and technological innovation activities.

## **ACKNOWLEDGMENTS**

This work is supported by the project of National College Students' innovation and Entrepreneurship Training Program " Research on the promoting effect of scientific and technological innovation on the upgrading of industrial structure based on the intermediary effect of financial development" (Grant No.: 202110378060).

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