Study on the Poverty Reduction Effect of Inclusive Financial Development in Fujian Province

Meijun Yu, Fengqin Chen, Yueling Zhang *

Fuzhou University of International Studies and Trade, Fuzhou, Fujian, 350202, China
* Corresponding author: Yueling Zhang

Abstract: This paper first reviews the studies of previous scholars, by studying the related theories of inclusive finance and poverty mitigation, we find that inclusive finance has not only developed, but also promoted the slowdown of poverty. It is found that the coverage of inclusive financial services in Fujian Province is constantly expanding and the poor population is decreasing year by year through preliminary analysis. Therefore, drawing on relevant literature research methods, three dimensional indicators are constructed to measure the inclusive financial index. Further, this paper selects the panel data from 9 prefecture-level cities from 2010 to 2019 in the past 10 years to build a multiple regression measurement model to empirically test whether the development of inclusive finance in Fujian Province can effectively promote the slowdown of poverty. The research shows that the index of inclusive finance, the level of economic growth, cross-item of income distribution and the urbanization level are all negatively correlated to the poverty level, indicating that the development of inclusive finance in Fujian Province does promote the slowdown of poverty. Finally, targeted suggestions are put forward for further developing inclusive finance to help in poverty reduction combined with the current development of Fujian Province.

Keywords: inclusive finance; poverty alleviation and poverty reduction; panel regression model

1. Literature Review

1.1. Study on the Relationship between Financial Development and Poverty Reduction

First, financial development is positively correlated to poverty reduction. Goldsmith (1969) first proposed the theory of financial development, proposing the idea that financial development can slow poverty through economic growth [1]. Boukhatem's (2016) empirical tests using panel data from 67 different countries yielded a positive correlation between financial development and poverty reduction [2]. Using the econometric research model, the empirical test results show that farmers' production enthusiasm is affected by Islamic small investment plans, and the poverty problem of farmers is constantly decreasing [3]. Jieyi Huang (2019) verified that the efficient development of inclusive finance in Guangdong Province had an obvious promoting effect on the alleviation of rural poverty [4].

Second, financial development and poverty reduction are negatively correlated. Both foreign scholars Zingales and Ranjan (2003) both believe that in a closed financial market environment, financial development is only beneficial to high income groups and not conducive to low income groups, so it cannot improve the poverty situation [5]. Hashim and Piatti (2018) were validated based on data from other countries. The research results show that financial development will be affected by financial fluctuations, and the poor population will also suffer losses due to financial fluctuations, which will have an adverse impact on rural poverty reduction [6]. Domestic scholar Ke Li (2016) applied Pearson correlation test to analyze the correlation. From the inspection and analysis, the negative correlation between the development level of inclusive finance and the multi-dimensional rural poverty index [7].

Third, financial development and poverty reduction are nonlinear. This relationship refers to the different mechanisms of financial development in the long and short term, potentially widening the gap between the rich and the poor is not conducive to poverty reduction, and the long term is conducive to poverty alleviation. Jovanovic and Greenwood (1990) first proposed an inverted "type U" relationship between the level of development of finance and the level of poverty [8]. Later, domestic scholars Gang Sun and Yanjuan Cui (2012) also believe that the G-J effect between financial development and poverty alleviation will strike the poor and is not conducive to poverty reduction [9]. Shutong Jiang (2020) through the binomial regression analysis of inclusive finance index, the empirical analysis test results have non-linear characteristics of inclusive finance and poverty reduction effect [10].

1.2. Study on the Effect of Inclusive Finance on Poverty Reduction

There are many factors affecting the development of inclusive finance on poverty reduction, among which most scholars at home and abroad use the economic growth level, financial services, income distribution and other influencing factors to analyze the direct or indirect

impact of the development of inclusive finance on poverty reduction.

Dhrifi (2014) established a joint equation through statistics from various countries 1990-2010, and the equation data shows that the development of financial services favors economic growth and slows poverty in the more developed countries [11]. Audil and Sangmi (2017) found that inclusive finance could guide poor groups excluded from the financial system to create wealth by applying their innovative awareness and labor skills to reduce poverty [12]. Qiongqiong Yue (2019) through the empirical study of the poverty reduction effect of inclusive finance development, we concluded that the development of inclusive finance is conducive to the mitigation and elimination of poverty [13]. Zhejing Bi (2019) used the data in the 7 years of 31 provinces (cities) in China from 2011 to 2017 to build a dynamic model.

The results show that in addition to inclusive finance can promote poverty reduction, economic growth and income distribution also have an effective effect in promoting poverty [14].

2. Index Selection

This paper refers to the method of how to construct inclusive finance index system studied by previous scholars, and then according to the current financial development status of Fujian Province and the availability of relevant data, select specific dimension index to calculate inclusive finance index, which is then conducive to the index to measure the development of inclusive finance in Fujian Province. Specific indicators of each dimension are shown in Table 1.

Table 1. Fujian Provincial inclusive financial index system

Measure dimensions	Quantity	Indicator meaning	Indicator nature
recover of inclusive financial services	X1	the number of financial institutions per ten thousand square kilometers	+
	X2	number of financial institutions per 10 thousand people owned	+
use of inclusive financial services	X3	the ratio of deposit balance at the end of GDP	+
	X4	the ratio of loan balance at the end of GDP	+
	X5	premium income ratio to GDP	+
penetration of inclusive financial services	X6	the per capital deposit level	+
	X7	the per capital loan level	+
	X8	the per capital premium income	+

2.1 Recover of Inclusive Financial Services

The coverage of inclusive financial services can be explained as the scope of the services provided by financial institutions in Fujian Province. The level of its coverage rate is directly related to whether the surrounding people can effectively obtain the financial services they need. If it is difficult for surrounding people to obtain financial services, it can indicate that the coverage rate of financial services in the region is low, but it is high. Therefore, the specific dimension indicators of the coverage surface of inclusive financial services in Fujian Province are shown in Table 1.

2.2 Use of Inclusive Financial Services

The use of inclusive financial services can be specifically manifested as the use of financial products by people who have needed services for inclusive finance. The use of inclusive financial services can reflect the development of inclusive finance in this region, while the demand of financial services of the poor population is only three aspects: deposit, loan and insurance. Therefore, this paper mainly adopts three specific indicators in Table 1 to represent the use of inclusive financial services in Fujian Province.

2.3 Penetration of Inclusive Financial Services

The penetration of inclusive financial services refers to the depth of residents in the region participating in inclusive financial services. The more the number of people participating in inclusive financial services, the higher is the penetration, the lower the number of people participating in inclusive finance, the lower the penetration. Therefore, the penetration of inclusive financial services in Fujian Province is represented by the three specific indicators in Table 1.

3. Methodology

When calculating the inclusive finance development index in 9 prefecture-level cities in Fujian Province, this paper mainly draws from the Sarma method of calculating the Human Development Index (HDI) according to the United Nations Development Programme.

3.1. Specific Calculation Method

3.1.1. Calculation method of index weight of each dimension

The coefficient of variation formula is:

$$V_i = \frac{S_i}{X_i} \quad (1)$$

Where S_i is the standard deviation and X_i is the mean.

The weight calculation method is:

$$W_i = \frac{V_i}{\sum_1^n V_i} \quad (2)$$

Where V_i represents the coefficient of variation of each dimension.

If the inclusive financial development index has n indicators D_i (i= 1, 2,..., n), the weight W_i of each dimension, the maximum value is M_i, the minimum value is mi, and the actual value of the ith indicator is A_i. This paper also makes standardized calculation for each index, and the calculation formula is:

$$D_i = W_i \frac{A_i - m_i}{M_i - m_i} \quad (3)$$

Among them, D_i should meet $0 \leq D_i \leq 1$.The greater D_i is, the higher the calculated inclusive degree is.

3.1.2. Calculation of inclusive financial development index

It can be seen from the above that the value range of the weight of each dimension index is: $0 \leq W_i \geq 1$, the most ideal inclusive financial development level state, that is, when $D_n = (W_1, W_2,..., W_3)$. Therefore, the formula for constructing inclusive financial development index is as follows:

$$IFI = 1 - \frac{\sqrt{(W_1 - D_1)^2 + (W_2 - D_2)^2 + ... + (W_n - D_n)^2}}{\sqrt{W_1^2 + W_2^2 + ... + W_n^2}} \quad (4)$$

Table 2. Descriptive statistical analysis of various indicators of inclusive financial index (IFI)

Index	Maximum	Minimum	Standard deviation	Average value	Coefficient of variation	Weight
number of financial institutions per 10000 square kilometers	3.8939	0.2044	1.0304	0.872	1.1816	0.1624
number of financial institutions per 10000 people	17.0315	6.6125	6.3556	17.0315	0.3732	0.0513
proportion of deposit balance in GDP at the end of the year	2.3932	0.6706	0.4626	1.1025	0.4196	0.0577
proportion of loan balance in GDP at the end of the year	19.2208	0.5701	1.9684	1.1846	1.6617	0.2283
proportion of premium income in GDP	0.046	0.0172	0.007	0.0269	0.2592	0.0356
per capital deposit level	25.6087	2.3022	5.4707	7.646	0.7155	0.0983
per capital loan level	172.5903	1.7385	18.2092	8.6727	2.0996	0.2885
per capital premium income	0.5284	0.0601	0.1042	0.1837	0.5674	0.078

Data source: operation report of Fuzhou central sub branch of the people's Bank of China and Fujian statistical yearbook

As can be seen from Table 2, the maximum weight of 0.2885 is the per capita loan balance, and the minimum weight of 0.0356 is the proportion of premium income in GDP. The difference between the maximum and minimum weights is 0.2529, indicating that the inclusive financial index is most affected by the per capita loan balance, and the effect is least affected by the proportion of premium income in GDP.

3.2. Analysis of Calculation Results

This paper collects the relevant data of each dimension index of 9 prefecture level cities in Fujian Province from 2010 to 2019 through the statistical yearbook of cities in Fujian Province, the operation report of Fuzhou Central Branch of the People's Bank of China and the statistical yearbook of Fujian Province. The above formula is used to calculate the inclusive financial development index of all prefecture level cities in Fujian Province in the past 10 years. The calculation results are shown in Table 3.

Table 3. Inclusive financial development index (IFI) of 9 prefecture level cities in Fujian Province from 2010 to 2019

Area	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Fuzhou	0.0198	0.1733	0.2926	0.3968	0.5032	0.4684	0.3741	0.2272	0.1190	0.0732
Xiamen	0.0223	0.1602	0.2597	0.3242	0.3143	0.3963	0.4149	0.4102	0.3871	0.1241
Putian	0.0177	0.0494	0.1289	0.1753	0.2374	0.4015	0.4743	0.5296	0.3436	0.3558

Sanming	0.0270	0.1020	0.2058	0.2750	0.3100	0.3389	0.3543	0.3524	0.3436	0.3558
Quanzhou	0.0139	0.1030	0.1816	0.2218	0.3228	0.3689	0.4300	0.4711	0.4849	0.4815
Zhangzhou	0.0187	0.0826	0.1925	0.2257	0.2905	0.3479	0.4001	0.4328	0.4486	0.4473
Nanping	0.0165	0.0762	0.1525	0.2336	0.2865	0.3295	0.3462	0.3669	0.3690	0.4650
Longyan	0.0165	0.0929	0.2053	0.2808	0.3384	0.3586	0.3579	0.4140	0.4460	0.4650
Ningde	0.0246	0.0991	0.1811	0.2542	0.3099	0.3561	0.3863	0.4043	0.4114	0.4261
average value	0.0197	0.1043	0.2000	0.2653	0.3236	0.3740	0.3931	0.4009	0.3726	0.3543

Data source: Fuzhou Central Sub-branch of the People's Bank of China, statistical Yearbook of various prefecture-level cities

According to the measurement standard of international inclusive finance development level: if $0.5 \leq IFI < 1$, inclusive finance development is at a high level; If $0.2 \leq IFI < 0.5$, it is a medium level; If $IFI < 0.2$, it is a low level. According to the data in Table 3, the inclusive financial development of Fuzhou and Xiamen is earlier than that of other prefecture level cities, but the development speed of the two prefecture level cities slowed down after 2017. Among them, Fuzhou in 2014 and Putian in 2017 both reached the high level standard and then dropped to the medium level standard. The development level of Inclusive Finance in Sanming City and Longyan city was less than 0.2 from 2010 to 2011, but the development level of inclusive finance reached more than 0.2 but less than 0.5 from 2012 to 2019. The development level of Inclusive Finance in Quanzhou, Zhangzhou, Nanping and Ningde was also lower than 0.2 in 2010-2012 and reached the standard level of 0.2-0.5 in 2013-2019. On the whole, development level of inclusive finance in Fujian Province has been steadily improving year by year. In 2011, the development level of inclusive finance reached the standard of medium level and increased year by year. In short, from 2010 to 2019, the development level of inclusive finance in nine prefecture level cities in Fujian Province gradually increased from low level to medium level. The overall level showed a steady growth trend, and there is still much room for improvement.

4. Empirical Analysis

4.1. Panel Model Construction

This paper constructs an empirical model and uses Eviwes8.0 software to test. Based on the calculation of the inclusive finance index of cities in Fujian Province from 2010 to 2019, this paper empirically analyzes the poverty reduction effect of inclusive finance in Fujian Province based on the panel data of 9 prefecture level cities in Fujian Province. The construction model is as follows:

$$pov = a_0 + a_1 IFI + a_2 dev*ins + a_3 ur + \varepsilon \quad (5)$$

Where pov represents the poverty level, IFI represents the development level of inclusive finance, dev*ins represents the cross term between economic growth level and income distribution, ur represents the urbanization level, ε represents the random error term.

4.2. Variable Selection

4.2.1. Explained variable

Poverty level (pov): in the existing relevant studies, poverty incidence, per capital income and other indicators can be used as indicators to measure the poverty level. In this paper, the incidence of poverty is used as the measurement index of poverty level. The incidence of poverty is the ratio of the poor population in this area to the total population in this area.

4.2.2. Explanatory variable

Inclusive financial development level (IFI): This paper mainly uses the Inclusive Financial index calculated above to express the inclusive financial development level, that is, the inclusive financial development index of 9 prefecture level cities in Fujian Province from 2010 to 2019.

4.2.3. Control variable

Cross item of economic growth and income distribution (dev*ins): considering that reasonable income distribution can effectively narrow the gap between urban and rural areas and promote poverty reduction, while unreasonable income distribution will hinder poverty reduction. However, economic growth sometimes does not necessarily promote poverty reduction, because whether it can achieve good results depends on the speed of economic growth on the one hand and the extent to which the poor benefit from economic growth on the other. In other words, there is a certain correlation between the level of economic growth and income distribution, which can jointly play a certain role in alleviating poverty. Therefore, this paper selects the cross term dev*ins of economic development and income distribution as the control variable to capture their interactive effects on poverty alleviation. Among them, economic growth level (dev): scholars agree in previous studies that sustainable economic growth can provide more employment opportunities for the poor, improve their living standards, and alleviate poverty. GDP growth rate and per capita GDP are often used to measure economic growth. Therefore, this paper selects per capita GDP as the measurement index of economic growth level. Income distribution (ins): at present, the poor population in China is mainly concentrated in rural areas, resulting in the continuous expansion of urban and rural income. The larger the income distribution gap

between urban and rural areas, the deeper the poverty situation in rural areas. Therefore, improving the unreasonable income distribution between urban and rural areas can improve the poverty situation. This paper uses the ratio of urban per capital income to rural per capital income in various cities to represent the income distribution in this area.

Urbanization level (ur): the urbanization level of a region can be indicated by the population transfer trend

Table 4. Description of corresponding variable indicators

from rural population to urban population. The trend of rural population turning to cities is large, indicating that the higher the level of urbanization is, the lower the reverse is. Therefore, this paper mainly uses the ratio of the urban population of each prefecture level city to the total population of Fujian Province to represent the urbanization level of the prefecture level city.

The specific calculation of each variable is shown in Table 4:

Variable name	Variable name	Variable symbol	Remarks
Explained variable	Poverty level	pov	Poor / Total population
Explanatory variable	Development level of Inclusive Finance	IFI	Inclusive financial development index
Control variable	Cross item of economic growth level and income distribution	dev*ins	Economic growth level * income distribution
	Urbanization level	ur	Urban population / total population

4.2.4. Data source

According to the 10-year administrative regional planning of Fujian Province from 2010 to 2019, there are 9 prefecture level cities in Fujian Province from 2010 to 2019: Fuzhou, Xiamen, Putian, Sanming, Quanzhou, Zhangzhou, Nanping, Longyan and Ningde. This paper uses the relevant panel data of 9 prefecture level cities in Fujian Province from 2010 to 2019. The data are mainly

from the official websites of financial institutions such as the statistical yearbook of cities in Fujian Province over the years, the statistical yearbook of Fujian Province, the operation report of Fuzhou Central Branch of the People's Bank of China and so on.

4.3. Empirical Analysis Process

4.3.1. Descriptive statistics

Table 5. Descriptive statistics of various variable indicators

Variable	Observed value	Maximum value	Minimum value	Average	Standard deviation
pov	90	0.55	0.11	0.4	0.12
IFI	90	0.53	0.01	0.28	0.15
dev*ins	90	339656.89	68853.6	155270.81	56363.29
ur	90	0.89	0.45	0.6	0.12

From the results in Table 5, the maximum value of urbanization level is 0.89, the minimum value is 0.45, and the average value is 0.60, which clearly indicates that there is a certain gap in the number of urban residents in nine prefecture level cities in Fujian Province. The average of the explanatory variable inclusive finance index is 0.28. Combined with the above analysis, it can be seen from the maximum value of 0.53 and the minimum value of 0.01 that the overall Inclusive Finance in Fujian Province is at a low level, there are great differences among prefecture level cities, and the allocation of financial resources is uneven. Regional per capital GDP measures the level of economic development, and income distribution is measured by the ratio of urban residents' income to rural residents' income. From the data in the table, it can be seen that the maximum value of the cross term between economic development level and income distribution is 339656.89, the minimum value is 68853.60, and there is still a big gap between the maximum value and the minimum value, It shows that there are also great differences in economic development

level and income distribution among 9 prefecture level cities in Fujian Province.

4.3.2. Correlation analysis

In order to judge whether there is a correlation between variables such as inclusive financial development indicators and poverty indicators in Fujian Province, Eviews8.0 software is used to analyze the correlation of all indicators, and the results are shown in the table below:

Table 6. Correlation analysis of indicators

Correlation Probability	LNPOV	LNIFI	LNDEV*INS	LNUR
LNPOV	1.0000			
LNIFI	-0.1298	1.0000		
LNDEV*INS	-0.7218	0.4885	1.0000	
LNUR	-0.3321	0.3373	0.3301	1.0000

According to the correlation analysis results in Table 6, there is a negative correlation between poverty level (pov) and inclusive financial index (IFI), the cross term between economic growth level and income distribution (dev*ins), and urbanization level (ur). It shows that the higher the inclusive financial index, the lower the poverty level. The correlation coefficient between poverty level

(pov) and inclusive finance index (IFI) is -0.129822, the correlation coefficient between poverty level (pov) and the cross term of economic growth level and income distribution (dev*ins) is -0.721872, and the correlation coefficient between poverty level (pov) and urbanization level (ur) is -0.332130.

4.3.3. Regression result analysis

Table 7. Regression test results

Variable	Coefficien	Std. Error	t-Statistic	Prob.
C	0.1719	0.0993	1.7316	0.0874
LNIFI	-0.0056	0.0029	-1.9463	0.0553
LNDEV*LNINS	-0.0033	0.0017	-1.99544	0.0496
LNUR	-0.0506	0.0265	-1.9104	0.0599
LNPOV(-1)	0.9647	0.0096	100.2546	0.0000
R-squared	0.9995	Mean dependent var		-1 011916
Adjusted R-squared	0.9994	S. D. dependent var		0.4428
S. E. of regression	0.0102	Akaike info criterion		-6.2801
Sum squared resid	0.0078	Schwarz criterion		-6.1322
Loq like lihood	259.3439	Hannan-Quinn criter		-6.2201
F-statistic	37947.11	Durbin- W atson stat		1.4922
Prob(F-statistic)	0.0000			

According to the regression test results in Table 7, the regression equation of the model can be expressed as:

$$\ln pov = 0.171931 - 0.005619 \ln IFI - 0.00335 \ln dev * \ln ins - 0.506073 \ln ur \quad (6)$$

As can be seen from the regression estimation results in Table 7. (1) the coefficient of the explanatory variable LNIFI is -0.005619 and the accompanying probability P value is 0.0553, indicating that there is a negative correlation between the development level of Inclusive Finance and the poverty level of Fujian Province at the 10% significant level, that is, every time LNIFI increases, INPOV will decrease by 0.005619. It can be seen that with the improvement of the development level of Inclusive Finance in Fujian Province, the poverty problem in Fujian Province can be effectively alleviated, which proves that the development of Inclusive Finance in Fujian Province can promote the alleviation of poverty. (2) The control variable LNDEV* LNINS passed the significance test, and the coefficient is -0.003350, which is negatively correlated with the poverty level, indicating that the economic growth level and income distribution can jointly promote the poverty alleviation in Fujian Province, that is, the synchronous change of economic growth level and income distribution is conducive to the poverty reduction effect. (3) The correlation coefficient of the control variable LNUR is 0.050673, and there is also a significant negative correlation with the explained variable LNPOV, indicating that the urbanization level of Fujian Province can effectively reduce the poverty level. When the urbanization level increases by 1 unit, the

poverty level will be reduced by 0.050673. It can be seen that promoting the development of urbanization level in Fujian Province is the most effective way to push the poor out of poverty. (4) The regression coefficient of LNPOV (-1) is 0.964778 and the significance p value is 0.0000, indicating that there is a lag in the poverty level, because the initial poverty level gap will have an impact on its own later stage, that is, with the passage of time and the accumulation of the early stage gap, it will have a certain impact on the later gap. It is found that in order to achieve the comprehensive poverty alleviation of all cities in Fujian, we should focus on improving the level of urbanization, promoting economic growth and balanced income distribution, formulate policies according to local conditions and allocate resources reasonably.

5. Conclusions and Suggestions

5.1. Conclusions

First, through the theoretical research of inclusive finance and poverty alleviation, the development of inclusive finance has a positive effect on poverty alleviation. Second, through the study of the development situation and poverty situation of inclusive finance in Fujian Province, Fujian has not only successfully carried out the poverty alleviation work of inclusive finance, but also achieved excellent results. Through the data comparison of 10 years, the development level of inclusive finance in Fujian Province has been continuously improved in recent years, and the status of poverty alleviation is gradually good. Through the comparison between the regions, we can see that there

are great differences between the different regions. Most of the areas with relatively slow development of inclusive finance are underdeveloped areas. Due to the unsound financial infrastructure construction in underdeveloped areas, and the residents have weak financial awareness and conservative concept, it leads to a large gap between them and the developed areas. Third, through the empirical test of the impact of inclusive finance development in Fujian Province on poverty reduction, the development level of inclusive finance in Fujian Province is inversely related to the poverty level, which confirms that the development of inclusive finance has a certain effect in promoting poverty alleviation in poor areas. It shows that both the common role of economic development and income distribution and urbanization can effectively alleviate poverty.

5.2. Suggestions

First of all, improve the inclusive financial system, and actively publicize inclusive finance. We will encourage efforts to expand outlets of financial institutions to rural areas and remote areas with relatively scarce financial resources, and expand outlets of financial institutions. Recruit more financial institution practitioners and professional financial personnel; strengthen the investment in financial technology. Strengthen the publicity of relevant knowledge of inclusive finance and improve the awareness of residents of underdeveloped areas of the demand for financial services.

Second, the common role of economic development, income distribution and urbanization can also play a role in alleviating poverty. Therefore, it should promote sound economic development and reasonable income distribution, and improve the level of urbanization to promote poverty alleviation and contribute to poverty alleviation and rural revitalization in Fujian Province. As a large agricultural province, Fujian Province should give full play to its own advantages, promote agricultural modernization, better serve the rural population, improve its income level, economic development level and urbanization level, so as to promote the development of Fujian's poor and underdeveloped areas.

Finally, improve the laws and regulations system of inclusive finance, and strengthen the supervision of financial institutions. Improving the inclusive financial legal system of regulations must also consider financial risks. At the same time, the government should also strengthen the supervision over financial institutions and improve the regulatory system to ensure the healthy and sustainable development of inclusive finance.

Acknowledgment

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