

## Measuring The Effectiveness Of Financial Poverty Alleviation: An Empirical Study Based On CFPS Data

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**Abstract:** Based on the China Household Tracking Survey (CFPS) data, this study uses the difference-in-difference score method and the propensity score matching method to measure the degree of impact of financial poverty alleviation on the poverty alleviation effect of poor households in general and in regional location, respectively. The results of the study show that financial poverty alleviation significantly improves the livelihood level of poor households and increases the rate of poverty alleviation of poor households, and the effect of poverty alleviation is higher in the eastern region than in the central and western regions. Based on this, this study proposes corresponding policy recommendations to improve financial development in poor areas and promote the effective implementation of rural revitalization strategy.

**Keywords:** Financial poverty alleviation; Poverty alleviation effect; Rural revitalization.

### 1. Introduction

Financial poverty alleviation is an important tool to solve the financing problems of poor areas and poor groups and to promote them to get rid of poverty and increase their income. Financial poverty alleviation plays a key role in poverty alleviation, providing poor households with the necessary start-up capital to engage in productive activities, encouraging them to actively face market risks to learn financial knowledge and become familiar with financial policies,

enhancing their endogenous motivation and self-development ability, realizing industrial development and income generation, and also being a powerful support for comprehensive rural revitalization.

Financial poverty alleviation can promote regional economic development and alleviate poverty by increasing the level of economic growth and reducing the degree of credit constraints in poor areas (Cheng Huixia, 2021). The healthy and orderly development of rural finance can

continuously meet the diversified needs of poor groups and farm households for financing, and help them improve their development capacity while establishing a good individual and rural credit system, which is an important fulcrum for poverty alleviation and an effective way to bridge poverty alleviation and comprehensive rural revitalization (Song Zhixiu, 2022). In particular, after 2020, China's poverty governance will take on new characteristics; although the problem of absolute poverty has been eliminated, relative poverty will continue to exist. Therefore, it is necessary to continuously focus and integrate financial resources to promote the financial and industrial development of relatively poor areas. Undoubtedly, there is a need to give full play to the key role of financial power in the process of poverty governance in increasing income and wealth, consolidating the effectiveness of poverty eradication, strengthening financial inclusion and preventing return to poverty, so that it can become an important foundation for realizing rural agricultural modernization and comprehensive rural revitalization strategy.

Therefore, this adopts the relevant data of CFPS in 2014, CFPS in 2016 and CFPS in 2018, selects the logarithm of per capita income and logarithm of transfer income as the explanatory variables, and measures the average treatment effect of financial poverty alleviation on the poverty alleviation effect of poor households based on the difference-in-difference method (DID) and propensity score matching method (PSM), in general and regional location respectively, to measure the degree of financial poverty

alleviation's effect on the poverty exit effect of poor households.

## 2. Literature Review

The poverty reduction effect of financial development and its mechanism of action have been theoretically discussed and empirically tested by domestic and foreign researchers, and the effect of poverty reduction and its mechanism of action can be examined from both direct and indirect effects.

The direct effect of the poverty reduction effect and its mechanism of action can be divided into two levels: at the micro level, financial development reduces the incidence of poverty and poverty vulnerability by providing appropriate credit service supply and support to poor households, giving them the ability to acquire new technologies and improve labor efficiency, which in turn increases their productive returns; at the macro level, financial development raises the income of poor households while also increasing their Burgess and Pande (2005) examine the extent to which financial development contributes to poverty reduction through the direct participation of poor households in financial activities. Their study found that the number of banks in rural areas showed a positive relationship with the income level of rural households and led to a significant reduction in the incidence of poverty in rural areas. Jeanneney and Kpodar (2011) analyzed the poverty reduction effect of financial development using panel data from developing countries, and their study showed

that the direct effect of poverty reduction effect both at the micro and macro levels is evident. Based on the perspective of the difference in poverty levels of poverty alleviation targets and multidimensional poverty, Wu Benjian et al. (2019) found that financial poverty alleviation is conducive to increasing the income of deeply poor households and has long-term effects, which can significantly improve the multidimensional poverty of poor households.

Established research suggests that there are both economic growth and income distribution effects of financial development, both of which can indirectly affect poverty. In terms of the economic growth effect of financial development, its indirect effect is reflected in the fact that economic development improves the livelihoods and productive capacity of poor households through the increase in income generated by economic growth, thus indirectly contributing to poverty reduction (Wang Zhitao and Xu Bingxia, 2020). King and Ross (1993) find that financial development has significant and robust effects on economic growth, capital accumulation, and economic efficiency improvements. Economic growth has a "trickle-down effect" that also indirectly benefits poor farmers and poor groups from economic growth, thereby improving poverty (Dollar and Kraay, 2002). Uddin et al. (2014) show that financial poverty alleviation, including through economic growth and income distribution, can increase the supply of financial resources to poor farmers and prevent them from falling into the "poverty trap" while

increasing their capital accumulation and risk resistance. With regard to the distributional effects of financial development, the following three views are worthy of attention. The first is the "G-J" hypothesis proposed by Greenwood and Jovanovic (1990), which suggests that financial development and income disparity are not linear but show an inverted "U"-shaped relationship, i.e., financial development has a worsening and then improving effect on income disparity. This hypothesis suggests that financial development and income disparity are not linear but show an inverted U-shaped relationship, i.e., financial development has a worsening and then improving effect on income disparity. The second is the "G-Z" hypothesis proposed by Galor and Zeira (1993), which suggests that there is a negative relationship between financial development and income disparity, i.e., financial development can reduce income disparity. Third, it is believed that financial development can have a significant reverse distributional effect on rural residents' income, which in turn increases the degree of differentiation of income distribution.

The above analysis shows that the direct effect of financial development on poverty reduction comes from the degree of redistribution of funds, and the indirect effect of financial development on poverty reduction comes from the fact that finance can promote economic growth and regulate income distribution, and both significantly improve the welfare of poor households. However, there is room for further research on financial poverty alleviation. In the process of implementing financial poverty

alleviation policies, it is necessary to focus on examining the mechanisms and effectiveness of poverty alleviation for poor households and poor groups. In view of this, this study assesses the poverty-removal effects of financial poverty alleviation, which not only helps relatively poor groups and rural residents to connect to the market, accumulate human capital and participate in industrial development, but also helps to further improve the financial poverty alleviation policy system in the future.

### **3. Research Design**

#### **3.1 Data Sources**

The data used in this study come from the China Family Panel Studies (CFPS) database, which is organized by the China Social Science Research Center of Peking University, and is a nationwide large-scale social tracking survey project. CFPS covers micro data at the individual, family, and community levels. To ensure the representativeness of the survey sample, CFPS uses a multi-stage, multi-level probability sampling method (PPS) proportional to the size of the population, and the survey sample covers 95% of the total Chinese population, which is representative.

Based on the research needs and data availability, this study selected three micro-survey data from the 2014 CFPS, 2016 CFPS, and 2018 CFPS for empirical study. We defined the study population as poor households, so households with rural household registration in this database were selected. However, the CFPS database does not directly give the situation of whether

farm households are poor households, and to address this situation, this study follows the criteria for defining poor households in China, and considers farm households with annual net per capita income below the national poverty line standard in that year as poor households. Through data collation, a valid sample of 8260 households meeting the needs of the study was finally obtained.

### **3.2 Variable definition**

#### **3.2.1 Explained variables**

In this study, the log of per capita income and the log of transfer income were selected as the explanatory variables to measure the livelihood level and poverty status of poor households, and then to assess the extent to which the implementation of financial poverty alleviation had an impact on the poverty alleviation status achieved by poor households.

#### **3.2.2 Core explanatory Variables And Control Variables**

In this study, the core explanatory variable is "whether the poor household participates in financial poverty alleviation". Whether a poor household participates in financial poverty alleviation is defined by "whether the poor household has a loan and uses it for industrial production or investment". If the poor household has a bank loan to be repaid or a loan to be repaid to friends or relatives or private borrowers, and the loan or borrowing is used for industrial production or investment, then the poor household has participated in financial poverty alleviation

( $T = 1$ ), and vice versa ( $T = 0$ ).

In this study, control variables were selected from three aspects: household head characteristics, household characteristics, and financial support. First, variables reflecting the basic characteristics of household heads, such as age, gender, marital status, education and health level, medical insurance and pension insurance, were included to avoid the influence of human capital on the analysis results. Then, household characteristics variables were selected. Among them, the household size reflects the demographic status of the household, and households with a larger number of people are more inclined to participate in financial poverty alleviation; whether or not they have low insurance and

whether or not they have major events reflects the basic conditions of poor households, and the local transportation cost indicates the locational conditions of poor households. Finally, financial support variables were added; information availability and work status reflect the skill level of the household head; the preferred borrower and whether borrowing was rejected reflect the financial borrowing availability of poor households; the logarithm of the household per capita bank deposit (10,000 yuan) was chosen to measure savings availability, and the logarithm of household human gift expenditure (10,000 yuan) was used to measure credit availability, reflecting poor households' use of financial savings services and credit (see Table 1 for descriptive statistics of each variable).

Table 1 Descriptive statistics of each variable

Variable Category	Variable Name	Variable Description	Average Value	Standard Deviation
Explained Variables	Logarithm of per capita income	Logarithmic value of annual per capita income of poor households	9.0399	0.9933
	Logarithm of transfer income	Logarithmic values of transfer income of poor households	7.4420	1.5078
Core Explanatory Variables	Whether to participate in financial poverty alleviation	Whether the poor households have loans and used for industrial production or investment	0.5016	0.5001
Household head characteristics variables				
Control Variables	Age	Age of head of household	53.9647	12.1562
	Gender	Gender of head of household	0.6173	0.4861
	Marital status	Married = 1, otherwise = 0	0.8846	0.3195
	Education level	Illiterate or semi-literate = 0,	2.3965	1.3811

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	elementary school = 3, junior high school = 4, high school, junior college or vocational high school = 5, college = 6, bachelor's degree = 7, master's degree = 8, doctorate = 9		
Health level	Very healthy=1, very healthy=2, relatively healthy=3, Fair = 4, Unhealthy = 5	3.2778	1.2465
Working status	Participation = 1, No = 0	0.8553	0.3518
Medical insurance	Yes=1, No=0	0.95794	0.2009
Endowment insurance	Yes=1, No=0	0.5123	0.4999
Household Characteristics Variables			
Family size	Total family size	4.0810	1.9107
Whether or not low income	Yes=1, No=0	0.8469	0.3602
Whether or not major events	Yes=1, No=0	0.1603	0.3669
Local transportation costs	Average monthly local transportation costs	158.3925	333.7692
Financial Support Variables			
Information accessibility	Internet access = 1, no = 0	0.4114	0.4921
Preferred borrowers	Relatives=1, friends=2, banks=3, Non-bank formal financial institutions = 4, private lenders and individuals = 5	2.0527	1.4098
Whether the loan was rejected	Yes=1, No=0	0.2375	0.4256
Savings availability	Logarithmic value of household savings per capita (million yuan)	7.4575	2.7460
Credit availability	Logarithmic value of family gift expenses (million yuan)	7.3833	1.5734

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### 3.3 Model Construction

In assessing the effects of public policy implementation, more attention is paid to the net effect of that policy. However, the existence of fixed effects leads to the inability to measure them accurately. One is the individual effect, the difference between the individuals who participate or do not participate in the policy itself, and if the individuals who participate and do not participate in the policy are compared directly, the results will be biased. Second, the time effect, due to the indirect intervention of other policies, will measure the results with bias, so the impact of the policy being evaluated needs to be separated out. To address this issue, a "quasi-natural experiment" state is generally simulated by setting up a treatment and control group to obtain consistent estimation results. Therefore, this study adopts a "quasi-experimental" approach to measure the difference in the effect of participation in financial poverty alleviation between the two groups by setting up a treatment group and a control group, and then accurately measure the effect of financial poverty alleviation implementation.

#### 3.3.1 Difference-in-difference method (DID)

The difference-in-difference method (DID), which is the difference between the mean change in the treatment group and the mean change in the control group, more accurately reflects the intervention effect of policy implementation on the study population by controlling for ex ante differences among the study subjects and filtering fixed effects such

as time (Ravallion, 2007). This study assesses the effect of financial poverty alleviation by setting up a control group (not participating in financial poverty alleviation,  $T = 0$ ) and a treatment group (participating in financial poverty alleviation,  $T = 1$ ) and measuring the difference in the effect of whether the sample households participate in financial poverty alleviation based on DID.

The set difference-in-difference model is shown in equation (1).

$$Y_{it} = \beta_0 + \alpha_0 P_{it} + \beta_1 T_{it} + \alpha_1 \cdot P_{it} T_{it} + \varepsilon_{it} \quad (1)$$

The difference-in-difference model with the addition of covariates is shown in equation (2).

$$Y_{it} = \beta_0 + \alpha_0 P_{it} + \beta_1 T_{it} + \alpha_1 \cdot P_{it} T_{it} + \theta X_{it} + \varepsilon_{it} \quad (2)$$

Since 2015, each poor contiguous area began to promote and implement the policy of precise poverty alleviation on a large scale, therefore, this study takes 2015 as the cut-off point to analyze the policy effects of financial poverty alleviation before and after the implementation of the policy of precise poverty alleviation. Where  $Y_{it}$  is the explained variable to measure the effect of financial poverty alleviation policy, the following table  $i$  and  $t$  denote different poor households and different periods, respectively.  $T_{it}$  is the treatment variable of whether poor household  $i$  participates in financial poverty alleviation in period  $t$ , 1 if it participates in financial poverty alleviation, 0 otherwise.  $P_{it}$  is the time dummy variable,

the concept of precise poverty alleviation began to be promoted in poverty alleviation work in a large scale in poor areas in 2015, therefore, with 2015 is the cut-off point, 2016 represents the year after the implementation of the precise poverty alleviation policy and takes the value of 1; 2014 represents the year before the implementation of the precise poverty alleviation policy and takes the value of 0. The cross term  $P_{it}T_{it}$  indicates the net effect generated by financial poverty alleviation.  $X_{it}$  represents the covariate of household  $i$  in period  $t$ , indicating the set of variables with a high degree of association with the financial poverty alleviation policy.  $\varepsilon_{it}$  is a random interference term.

### 3.3.2 Propensity score matching method (PSM)

The propensity score matching method (PSM) makes the results of policy evaluation more reasonable by controlling for differences between groups and matching based on propensity values to exclude sample selection bias and endogeneity problems to some extent (Rosenbaum and Rubin, 1983). In this study, we select household head characteristics variables, household characteristics variables, and financial support variables that affect the poverty status of poor households, and analyze the degree of influence of financial poverty alleviation on the explanatory variables based on the propensity score matching method to measure the policy implementation effect of financial poverty alleviation. As in equation 3, the average

treatment effect of financial poverty alleviation is expressed. Where, the propensity score value is  $P(X_i) = \Pr(T = 1|X_i)$ ,  $T = 1$  indicates that poor households participated in financial poverty alleviation, and  $X_i$  indicates the covariates.

$$ATT = E_{P(X)|T=1} \{E[Y^T|T=1, P(X)] - E[Y^C|T=0, P(X)]\} \quad (3)$$

## 4. Analysis of the Effect of Financial Poverty Alleviation on Poverty Alleviation for Poor Households

### 4.1 The effect of financial poverty alleviation on poverty alleviation based on DID

This study evaluates the poverty alleviation effect of financial poverty reduction based on DID, as shown in Table 2, model (1) and model (2) denote the logarithm of per capita income as the explanatory variable, model (3) and model (4) denote the logarithm of transfer income as the explanatory variable, model (1) and model (3) denote the difference-in-difference model before adding covariates, model (2) and model (4) denote the difference-in-difference model after adding the covariates. The difference-in-difference results show that the average treatment effects of log per capita income and log transfer income are 0.1776 and 0.0460 before adding the covariates, and 0.3202 and 0.3833 after adding the covariates, both of which are greater than 0 and both of which are significant at the 1% level, indicating that



the effective implementation of financial precise poverty alleviation.  
poverty alleviation significantly promotes

Table 2 Regression results of DID

Variable Name	Logarithm of per capita income		Logarithm of transfer income	
	Model (1)	Model (2)	Model (3)	Model (4)
P×T	0.1776*** (0.0510)	0.3202*** (0.0335)	0.0460** (0.0503)	0.3883*** (0.0491)
Age		0.0003* (0.0011)		0.0191*** (0.0016)
Gender		-0.0496** (0.0215)		0.2457*** (0.0333)
Marital status		0.0199* (0.0331)		0.1214** (0.0503)
Education level		0.1165*** (0.0076)		0.0492*** (0.0125)
Health level		-0.0225*** (0.0083)		-0.0181* (0.0012)
Working status		0.0116* (0.0318)		-0.5064*** (0.0505)
Medical insurance		-0.0025* (0.0514)		0.0305* (0.0065)
Endowment insurance		0.0936*** (0.0233)		-0.0425*** (0.0770)
Family size		-0.0574*** (0.0053)		0.057* (0.0083)
Whether or not low income		-0.2229*** (0.0295)		-0.6761*** (0.0488)
Whether or not major events		0.0379* (0.0269)		-0.0418* (0.0433)
Local transportation costs		0.0020*** (0.0001)		0.0011* (0.0016)
Information accessibility		0.1273*** (0.0209)		0.2194*** (0.0345)
Preferred borrowers		-0.0036* (0.0072)		0.0299*** (0.0111)
Whether the		-0.0113* (0.0072)		0.0383* (0.0111)

loan was rejected		(0.0236)		(0.0366)
Savings availability		0.0762***		0.0334***
Credit availability		(0.0038)		(0.0064)
		0.1405***		0.0792***
		(0.0087)		(0.0118)
Constant term	8.8367***	7.4664***	7.3154***	6.1732***
	(0.0323)	(0.1191)	(0.0225)	(0.1770)
R2	0.1387	0.3174	0.1140	0.3616
N	8260	8260	8260	8260

Note: \*, \*\* and \*\*\* indicate significant at the 10%, 5% and 1% levels, with standard errors in parentheses. Same below.

## 4.2 The effect of financial poverty alleviation and poverty alleviation based on PSM

### 4.2.1 Balance test

This study combines the Probit probability model to calculate the propensity score value. To further verify the impact of financial poverty alleviation on the effect of poverty alleviation on poor households, a balance test

is required to exclude sample selection bias, as shown in Table 3. The vast majority of variables were significantly different before matching, and after matching, there was no significant difference, and the standardized bias rates of the matched covariates were all below 10%, which proved the test results were good (Rosenbaum et al., 1985). Therefore, the sample matching passed the equilibrium test.

Table 3 Balance test

Covariates	Sample Category	Average Value		Deviation Rate (%)	Rate of change of deviation (%)	T-test	
		Experimental group	Control group			t-value	P> t
Age	U	56.522	51.391	43.2	95.7	19.62	0.000
	M	56.507	56.283	1.9		0.85	0.397
Gender	U	0.6142	0.6204	-1.2	73.8	-0.57	0.071
	M	0.6143	0.6158	-0.3		-0.15	0.882
Marital status	U	0.8747	0.8946	-6.2	87.0	-2.83	0.005
	M	0.8746	0.8772	-0.8		-0.36	0.722
Education level	U	2.3753	2.4178	-3.1	96.9	-1.40	0.163
	M	2.3751	2.3764	-0.1		-0.04	0.965

Health level	U	3.2556	3.3002	-3.6	69.2	-1.63	0.104
	M	3.2556	3.2418	1.1		0.50	0.616
Working status	U	0.8260	0.8849	-16.8	89.8	-7.63	0.000
	M	0.8261	0.8321	-1.7		-0.73	0.466
Medical insurance	U	0.9578	0.9580	-0.1	-86.6.8	-1.05	0.060
	M	0.9577	0.9611	-1.7		-0.79	0.432
Endowment insurance	U	0.4354	0.5898	-31.2	99.8	-14.20	0.000
	M	0.4358	0.4361	-0.1		-0.03	0.976
Family size	U	3.8173	4.3464	-28.0	85.5	-12.70	0.000
	M	3.8176	3.8941	-4.0		-1.85	0.065
Whether or not low income	U	0.8170	0.8769	-16.7	95.3	-7.57	0.000
	M	0.8174	0.8202	-0.8		-0.33	0.742
Whether or not major events	U	0.1301	0.1907	-16.6	94.4	-7.53	0.000
	M	0.1302	0.1336	-0.9		-0.46	0.648
Local transportation costs	U	125.13	191.87	-20.1	89.0	-9.13	0.000
	M	125.19	132.56	-2.2		-1.30	0.193
Information accessibility	U	0.3765	0.4464	-14.2	95.9	-6.47	0.000
	M	0.3768	0.3797	-0.6		-0.27	0.789
Preferred borrowers	U	2.2525	1.8516	28.7	83.0	13.05	0.000
	M	2.2505	2.1823	4.9		2.05	0.040
Whether the loan was rejected	U	0.1542	0.3214	-40.0	98.8	-18.20	0.000
	M	0.1544	0.1524	-0.5		0.25	0.801
Savings availability	U	7.8683	7.0545	30.5	92.4	13.86	0.000
	M	7.8662	7.9277	-2.3		-1.03	0.304
Credit availability	U	7.3318	7.6212	-20.9	99.9	-9.5	0.000
	M	7.3343	7.3345	-0.0		-0.01	0.996
Joint testing		Ps R2		LR chi2		p>chi2	
U		0.100		1142.84		0.000	
M		0.001		10.96		0.859	

Note: U means unmatched, M means matched.

#### 4.2.1 Mean treatment effect analysis

The effect of financial poverty alleviation on poverty eradication was tested using k-nearest neighbor matching (1:1), k-nearest

neighbor matching (1:4), radius matching, and kernel matching methods, and the treatment effect of financial poverty alleviation implementation on the livelihood

level of poor households was measured using the logarithm of per capita income and the logarithm of transferable income as explanatory variables, as shown in Table 4. the results of PSM analysis showed that under the four different matching methods, the logarithm of values and logarithm of transfer income passed the significance test, indicating that the implementation of financial poverty alleviation policies significantly increased the poverty alleviation rate of poor households and had a certain degree of positive promotion effect on precise poverty alleviation. Specifically, in the full sample case, using the k-nearest neighbor matching (1:1), k-nearest neighbor matching (1:4), radius matching and kernel matching methods, the results of the effect of financial poverty alleviation policies on the logarithm of per capita income of poor households are 0.1066, 0.0971, 0.0958 and 0.0993, respectively, and all are significant at the 1% level. the mean of the treatment effects under the four matching methods is The mean treatment effect of financial

poverty alleviation on the logarithm of transfer income of poor households was 0.1451, 0.1042, 0.0674 and 0.0872, and all were significant at the 1% level. the mean value of ATT under the four methods was 0.1010, indicating that the implementation of financial poverty alleviation was able to increase the logarithm of per capita income of poor households by an average of 0.0997. It indicates that the implementation of financial poverty alleviation can improve the logarithm of transfer income of poor households by 0.1010 on average. in summary, under different estimation methods, the implementation of financial poverty alleviation policies shows a significant positive effect on the logarithm of per capita income ( $ATT > 0$ ,  $p < 0.01$ ) and logarithm of transfer income ( $ATT > 0$ ,  $p < 0.01$ ) of poor households, i.e., financial poverty alleviation has a improvement in the livelihood level of poor households has a significant contribution to increase the poverty exit rate of poor households.

Table 4 Average treatment effect of PSM based on poverty proxy indicators (ATT)

Indicators	Matching methods	Full sample	Eastern	Middle	Western
Logarithm of per capita income	K-Nearest Neighbor Matching (1:1)	0.1066*** (0.0352)	0.0782 (0.0722)	0.0693* (0.0558)	0.0348 (0.0633)
	K-Nearest Neighbor Matching (1:4)	0.0971*** (0.0292)	0.1069* (0.0595)	0.0772* (0.0437)	0.0376 (0.0504)
	Radius Matching (Radius=0.01)	0.0958*** (0.0263)	0.1048* (0.0549)	0.0736* (0.0397)	0.0373 (0.0460)
	Nuclear matching (Window width=0.06 kernel function=normal)	0.0993*** (0.0258)	0.1206** (0.0513)	0.0695* (0.0386)	0.0346 (0.0447)

	Average value	0.0997	0.1026	0.0724	0.0361
	K-Nearest Neighbor Matching (1:1)	0.1451*** (0.0505)	0.1768* (0.1098)	0.0443 (0.0865)	0.0292 (0.0765)
	K-Nearest Neighbor Matching (1:4)	0.1042*** (0.0422)	0.2059** (0.0901)	0.0662 (0.0705)	0.0520 (0.0618)
Logarithm of transfer income	Radius Matching (Radius=0.01)	0.0674*** (0.0387)	0.1541* (0.0843)	0.0960* (0.0656)	0.0196 (0.0570)
	Nuclear matching (Window width=0.06 kernel function=normal)	0.0872*** (0.0380)	0.1878** (0.0795)	0.0829* (0.0639)	0.0084 (0.0557)
	Average value	0.1010	0.1812	0.0724	0.0273

In order to examine the effect of financial poverty alleviation in different regions, this study examined the effect of financial poverty alleviation by region, and the results are shown in Table 4. using k-nearest neighbor matching (1:1), k-nearest neighbor matching (1:4), radius matching, and kernel matching methods, the results of the effect of financial poverty alleviation policies on the eastern region, using the logarithm of per capita income of poor households as the standard, were 0.0782, 0.1069, The average value of the treatment effect under the four matching methods is 0.1026, indicating that the implementation of financial poverty alleviation can increase the logarithm of per capita income of poor households in the eastern region by 0.1026 on average. the implementation of financial poverty alleviation can increase the logarithm of per capita income of poor households in the central and western regions by 0.0724 and 0.0361 on average. similarly, using This also indicates that the implementation of financial poverty

alleviation policies has the greatest impact on poverty eradication in the eastern region, followed by the central region, and the western region. The effect is relatively small.

#### 4.3 Robustness test

By measuring the average treatment effect (ATT) of the implementation of financial poverty alleviation policies on the effect of poverty eradication, as shown in Table 4, the test results of the four different matching methods are similar and all show a significant positive effect ( $ATT > 0$ ,  $p < 0.01$ ), indicating that the average treatment effect of financial poverty alleviation on the effect of poverty eradication of poor households is robust.

In addition, to further test the robustness of the above findings, this study also used the propensity score matching-double difference method (PSM-DID) to conduct an auxiliary test, and the results are listed in Table 5. the direction and trend of the average treatment effect of log per capita income and log transfer income are consistent with the test

results in Table 4, both showing a significant positive effect ( $ATT > 0$ ,  $p < 0.01$ ), indicating

that the financial effect assessment of poverty alleviation policies remains robust.

Table 5 Robustness tests based on PSM-DID

Indicators	Before Diff (T-C)	After Diff (T-C)	DID
Logarithm of per capita income	0.022** (0.045)	0.118*** (0.085)	0.096*** (0.172)
Logarithm of transfer income	0.020* (0.081)	0.103*** (0.121)	0.083*** (0.146)

### 5 Research conclusions and policy recommendations

Based on the 2014, 2016 and 2018 China Household Tracking Survey (CFPS) data, this study selects the logarithm of per capita income and logarithm of transfer income to measure the livelihood level of poor households, and measures the degree of impact of financial poverty alleviation on the poverty alleviation effect of poor households in general and in regional location, respectively. The results show that, in general, the effect of financial poverty alleviation on poverty alleviation is significant, significantly improving the livelihood level of poor households, increasing the poverty alleviation rate of poor households and poor regions, and having a significant positive contribution to precise poverty alleviation. In terms of regional location, the implementation of financial poverty alleviation policies has a higher degree of impact on the effect of poverty eradication in eastern China than in the central and western regions of China.

In order to promote the effective implementation of rural revitalization

strategy, it is necessary to further improve the level of rural financial development in China and realize the income enrichment of rural households. Therefore, combining with the above research findings, this study puts forward the following policy recommendations: first, construct a precise mechanism for financial poverty alleviation. In the process of precise poverty alleviation, the dynamic identification ability of poverty is strengthened, and focused and precise financial support policies are carried out according to the characteristics and differences of poverty-causing reasons and credit needs of poor households. In particular, the effective implementation of financial poverty alleviation policies should not only focus on the livelihood level and poverty characteristics of poor households, but also pay special attention to poor households with high poverty vulnerability, continuously improve their ability to resist various risks, reduce the possibility of increased poverty vulnerability of these households in the future, and thus avoid the occurrence of poverty return. Second, strengthen the regional differentiated governance strategy for financial poverty alleviation. In the

process of implementing financial poverty alleviation policies, we should pay attention to the balance and coordination among regions, and the rural financial poverty alleviation systems, such as policy finance, commercial finance, and private finance, should be appropriately tilted toward poor households in the central and western regions, and through increasing the breadth and depth of financial poverty alleviation (Wang Ren et al., 2021), we should promote the rapid development of the integration of the three rural industries, attract various talents to return to their hometowns for employment and entrepreneurship, and continuously broaden income increasing channels for poor households (Yu Chunmiao and Ren Changqing, 2021). Third, continuously strengthen the innovation of financial poverty alleviation mode. Relevant financial institutions in each region are encouraged to enhance the effectiveness of financial poverty alleviation in relative poverty governance based on their resource advantages (Liu, Xia et al., 2022). In addition, financial institutions should continue to innovate financial products and services, explore a variety of collateral financing methods, promote the combination of financial poverty alleviation and property rights reform, and then promote the reform of "resources into assets", "capital into shares", and "farmers into shareholders", and explore such reforms as Fourth, strengthen the scientific and technological support capacity for rural financial poverty alleviation. Fourth, strengthen the application of rural financial technology, strengthen online and offline resource management, build digital

agricultural finance, rural e-commerce finance and other related platforms, and strengthen the "Internet + financial" rural financial technology services. The deep integration of financial poverty alleviation and "Internet + finance", the establishment of a big data monitoring and management platform to prevent the return of poverty, so that financial policies, credit resources and the financial needs of rural households are effectively matched, constantly expanding the coverage of rural finance, and promoting the convenience, efficiency and universality of financial poverty alleviation.

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