Digital Inclusive Finance, Digital Availability and the Relative Poverty Vulnerability of Farmers

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Abstract

Digital financial finance uses digital technology to greatly increase the inclusion and accessibility of financial finance. Based on the data of CHFS and DFIIC, the effect and mechanism of mathematical inclusive finance on the relative vulnerability of peasant household poverty were explored. The results show that digital inclusive finance can effectively reduce the relative poverty vulnerability of rural residents, and its primary indicators and secondary indicators all have a significant mitigation effect, among which the scope of coverage and digitalization are the most obvious utility. The digital availability of farmers can enhance the role of digital inclusive finance in alleviating the relative poverty vulnerability of farmers. Digital inclusive finance effectively reduces the relative poverty vulnerability of farmers by improving the financial literacy of farmers. Therefore, vigorously developing rural digital inclusive finance and improving rural digital infrastructure and relevant legal systems are of great significance to consolidate the achievements of poverty alleviation and boost common prosperity.

Keywords

Digital Financial Inclusion; Digital Availability; Farmer Relative Poverty Vulnerability; Financial Literacy; VEP.

1. Introduction

On February 25,2021, General Secretary Xi Jinping solemnly declared to the world that China's overall victory in the battle against poverty was a[1] at the National Poverty Alleviation summary and commendation Conference. The historic solution of the problem of absolute poverty shows that people's basic living needs have been met, but it does not mean the end of poverty reduction. According to statistics from the State Council, nearly two million people who have been lifted out of poverty are in danger of returning to poverty, and the relative poverty problem we face is also a long-term and complex one. In order to achieve common prosperity, it is also necessary to greatly alleviate relative poverty, strengthen the ability of relatively poor families to cope with risk shocks, and strive to narrow the gap between regions, urban and rural areas, income, and public services.

Traditional poverty measures and related poverty alleviation policies are more of a post-hoc intervention, and more research has been focused on the vulnerability of relative poverty. Relative poverty vulnerability is a dynamic, forward-looking indicator of whether a family will fall into relative poverty in the future. Testing the vulnerability of relative poverty can identify and help relatively poor and vulnerable families in advance, so as to reduce the cost of promoting common prosperity and better consolidate the achievements of poverty alleviation.

Financial support is an important means to improve poverty, and the poverty alleviation practice of inclusive finance has benefited many backward areas and poor people. In 2021, the No.1 central document of 2021 first explicitly proposed the specific term "digital inclusive rural finance". Digital inclusive finance combines digital technology with the inclusive inclusion of inclusive finance, and significantly improves the coverage, accessibility and customer

satisfaction of financial services. Meanwhile, it also expands the source of capital, reduces transaction costs and improves the financing efficiency of[2]. However, at present, most of the families with relatively poor poverty and the risk of returning to poverty are distributed in the underdeveloped rural areas, and the digitalization and informatization are relatively backward, facing the "digital divide" problem, which cannot fully benefit from the development of digital inclusive finance, and is not conducive to the consolidation of poverty alleviation achievements.

Therefore, it is particularly important to explore the relationship between digital inclusive finance and digital availability and the relative poverty vulnerability of farmers, which is of great significance to prevent the return to poverty and promote common prosperity.

2. Literature Review

2.1. Studies on the Vulnerability to Relative Poverty

2.1.1. On the Vulnerability of Relative Poverty

"Relatively poor poverty" mainly studies the problem of inequality, or the relative poverty of welfare levels due to unbalanced development, the[3]. Relative poverty is always an objective existence, which is characterized by a large population base, a wide poverty dimension, and a high[4] risk of poverty. Li Shi[5] research found that: the relative poverty population is still mainly rural, and the scale and structure of the relative poverty have not changed fundamentally.

Traditional poverty measurement method is more post-intervention, and dynamic "poverty vulnerability" has been widely used in research by scholars in years because of its prospective nature in recent years."Vulnerability" is first used in the field of natural disasters in[6], in 2000, the world bank introduced vulnerability into poverty research, for the first time proposed "poverty vulnerability", made a deeper interpretation of poverty: poverty is not only refers to the lack of material aspects, and low level of education and health, in addition, poverty also includes risk and risk vulnerability and cannot express their needs, lack of participation opportunities such as[7]. Han Zheng[8] believes that "vulnerability" is an important feature of poverty and a major factor leading to the return to poverty.

In the related study of farmer poverty vulnerability, there are three main[9], which is the possibility of farmers in poverty in the future, that is, the difference between the certain level of balanced consumption utility and the expected consumption utility, that is, the vulnerability due to the risk impact, that is, the vulnerability of risk exposure poverty. Relatively poor farmers are relatively less able to withstand the same impact, and are more likely to fall into relative poverty in the future. According to different definitions, there are different measures of vulnerability, mainly VEP method[10] for the first definition mentioned above, VEU method[11] for the second definition, and VER method[12] for the third definition. The VEP method is an effective measure of dynamic method, prospective method and the advantage to overcome the lack of cross-sectional data. Most scholars at home and abroad use the VEP method to measure poverty vulnerability.

2.1.2. Measures of Relative Poverty Vulnerability

In the poverty research field, vulnerability is mainly measured by the livelihood capital of individuals or families and the ability to eliminate poverty. According to the sustainable livelihood framework of the International Development Programme (DIFI), livelihood capital is defined as five types, namely human capital, natural capital, financial capital, material capital and social capital, and noted that in the context of specific vulnerability, farmers can adopt multiple survival strategies, such as asset portfolio and capital distribution, to improve people's livelihood, to achieve livelihood purposes[14][15][16].

Li Li and Bai Xuemei[17] used CHNS panel data and found that poor families were more vulnerable, groups over 65 and primary schools were the most vulnerable, and rural families were more vulnerable. Yang Long and Wang Sangui[18] used the VEP method to find that the impact events such as house buying, marriage, school and drought are the main factors affecting the vulnerability of farmers in different regions, and the family size, human capital and housing price also have a certain impact on the vulnerability of farmers. Wu Yan[19] survey results show that there are a variety of livelihood capital lacking farmers, its vulnerability is higher. Specifically, the vulnerability rate of farmers with lack of financial capital, lack of human capital and social capital with lack of farmers will be higher than the average vulnerability level of farmers. Xu Ge et al.[20] found that social capital has a significant positive impact on income diversification and a significant negative impact on poverty vulnerability. It can be seen that the diverse lack of livelihood capital is the root cause of the long-term poverty of farmers in poor areas.

2.2. Research on the Impact of Digital Financial Inclusion on the Vulnerability to Relative Poverty

In the study of digital financial inclusion and poverty vulnerability, many scholars have empirically demonstrated the positive role of digital financial inclusion in alleviating poverty vulnerability and preventing poverty. The[21] study by Zhang Donghao and Yin Zhichao found that the inclusive finance has a significant negative impact on the poverty vulnerability of farmers, and improving the inclusive financial inclusion situation can effectively alleviate the poverty vulnerability of farmers. Savings, micro-commercial insurance and microfinance in inclusive finance can all reduce the poverty vulnerability of farmers in[22]. Huang Qian and other[23] used China's interprovincial panel data to find that digital inclusive finance makes up for the disadvantages of traditional finance that "dislike the poor and love the rich", and provides convenient and safe financial services and financial products for farmers, thus promoting the development of economically backward areas and improving the income distribution of urban and rural residents.

Some scholars also believe that the "digital divide" will restrict the role of digital financial inclusion in alleviating the vulnerability of relative poverty.[24] believes that the development of digital finance brings convenience and opportunities to those who can use the Internet, but occupies the resources of those residents who cannot use the Internet. The existence of this "digital divide" may make the gap between rich and poor get worse. The[25] empirical research of Shen Yun and Li Jingrong found that the impact of digital inclusive finance on the relative poverty vulnerability of farmers has both "digital dividend" and "digital divide". The two show a "U" inverted relationship. The best value range of digital inclusive finance is 108~160. Star Yan[26] pointed out that because the rural digital infrastructure construction behind cities, information service quality and personal terminal equipment coverage, and there is a "digital gap", there are financial "ecological gap" and financial literacy "behind the education gap", the future need to fill the "triple gap" between urban and rural areas, to realize the rural digital pratt & whitney the integration of financial and digital economy development.

Combining the above literature, the impact effect and mechanism of digital financial finance on the relative poverty vulnerability of farmers, as well as the effect of digital availability in the impact of digital financial finance on the relative poverty vulnerability of farmers are explored.

3. The Impact Mechanism of Digital Inclusive Finance on the Vulnerability of the Relative Poverty of Farmers

3.1. The Direct Impact of Digital Inclusive Finance on the Vulnerability of the Relative Poverty of Farmers

Digital inclusive finance can improve financial accessibility and reduce financial transaction costs, thus directly alleviating the relative poverty vulnerability of rural households. Specific performance is: digital pratt & whitney financial can improve the availability of financial resources, accessibility and convenience of payment,[27], the use of digital technology effectively reduce transaction costs, alleviate information asymmetry[28], can also alleviate the credit constraints, increase the credit availability of low-income groups[29], thus directly alleviate the relative poverty of farmers vulnerability.

H1: Digital inclusive finance directly alleviates the relative poverty vulnerability of farmers by improving financial availability and reducing financial transaction costs.

3.2. Indirect Impact of Digital Inclusive Finance on the Vulnerability of Farmers' Relative Poverty

Digital inclusive finance can improve farmers' financial literacy and improve the financial environment, thus indirectly alleviating the relative poverty vulnerability of farmers. The development of digital inclusive finance can optimize asset allocation, improve financial literacy, strengthen trust, reduce risk impact, and reduce family poverty vulnerability[30]; inclusive finance serves ecological environment construction, agricultural infrastructure construction, support regional industrial development, create favorable external environment for low-income people, eliminate potential risk factors, promote regional economic development, improve employment and income, and thus reduce peasant household poverty vulnerability[31].

H2: Digital inclusive finance indirectly alleviates the relative poverty vulnerability of farmers by improving farmers' financial literacy and improving the financial environment.

4. Study Design

4.1. Data Source

Data sources are: data from the Peking University Inclusive Finance Inclusion Index (DFIIC), and the China Family Finance Survey (CHFS) for 2017 and 2019. Screening of the data: (1) eliminate the non-agricultural hukou and other registered population; (2) propose the samples with the household head under 18 years old; and (3) eliminate the samples with abnormal or missing data. Finally, 6,451 samples were used.

4.2. Measures of Relative Poverty Vulnerability

4.2.1. Calculation Process and Measures of Relative Poverty Vulnerability

According to the VEP method proposed by Chaudhuri et al. [10], the basic equation for measuring poverty vulnerability is:

$$PRV_{it}=Pr(C_{i,t+1}<Z_t)$$

RPV_{it} indicates the relative poverty vulnerability of i farmers in period t, namely the possibility of farmers falling into relative poverty in the future. $C_{i,t+1}$ represents the future consumption of farmer i, and Z_t represents the relative poverty line in the t-th period.

First, the per capita consumption function is estimated:

$$\ln C_{it} = \alpha_0 + \alpha_i X_{it} + \sigma_{e,i}$$

C_{it} represents the per capita household consumption expenditure of farmer i in t, and X_{it} is some characteristic variables of farmer i in in t, as shown in Table 1. $\sigma_{e,i}$ is the residual term, and α_i is the parameter to be estimated. Using this formula, the variance $X_{it}\hat{\theta}_{FGLS}$ of the logarithm of per capita consumption is obtained by FGLS method, and from this, the expected $X_{it}\hat{\beta}_{FGLS}$ of the logarithm of per capita consumption in the next period is estimated:

$$\widehat{Var}[\ln C_{i,t+1} | X_{it}] = X_{it}\hat{\theta}_{FGLS}$$
$$\hat{E}[\ln C_{i,t+1}| X_{it}] = X_{it}\hat{\beta}_{FGLS}$$

Finally, under the assumption that the logarithm of per capita consumption expenditure follows the normal distribution, the relative poverty vulnerability of peasant households is obtained:

$$\widehat{RPV}_{it} = \varphi((\ln Z_t - X_{it}\hat{\beta}_{FGLS})/\sqrt{X_{it}\hat{\theta}_{FGLS}})$$

Table 1. Measures of relative poverty

Capital dimension	Capital indicators	Specific meaning	2017	2019
natural capital	Per capita land assets	The logarithm of land assets per household	5.7351	7.688
finance capital	Per capita financial assets	Logarithm of financial assets per household	7.720	7.746
human capital	age	Head of the household age	52.405	54.856
	sex	Head of sex	0.924	0.875
	degree of education	1~9. The higher the education level is, the higher the education level is	2.653	2.688
	marital status	Married =1; Unmarried =0	0.944	0.923
	health condition	Very good =1; good =2; generally =3; bad =4; very bad =5	2.820	2.825
material capital	Home assets per capita	The logarithm of household housing assets per capita	10.500	10.397
	Non-financial assets per capita	The logarithm of non-financial assets per household	11.121	11.053
social capital	Human relations expenditure	The logarithm of expenses for festivals, happy events, etc	4.320	3.522
Impact events	Due to college, marry, buy a car and other major events cost	Logarithm of significant event costs	2.211	1.285
Other characteristic variables	Whether to be engaged in industrial and commercial production and operation	Yes =1; No =0	0.193	0.112
	Total income per capita	Logarithm of total per capita household income	8.195	8.476
	Total per capita consumption	The logarithm of the total household consumption per capita	9.385	9.455
	Total per capita debt	The logarithm of the total household debt per capita	4.558	3.531

4.2.2. Relative Poverty Line

For the setting of the relative poverty line, according to the research[5][32][33] of several scholars, a certain proportion of 40%, 50% (50%, 60%) of the median rural per capita disposable income is used as the relative poverty line. The specific values are shown in Table 2.

Table 2. Relative poverty line

Relative poverty line standard	2017	2019
0.4 Standard	5372.96	6408.28
0.5 Standard	6716.20	8010.35
0.6 Standard	8059.44	9612.42

4.2.3. Vulnerability Threshold (VT)

After calculating the relative poverty vulnerability of farmers by using the VEP method, the expected relative poverty vulnerability threshold is set below 0.3[34], the low relative poverty vulnerability is $0.3 \leq VT < 0.5$, and $0.5 \leq VT < 0.8$ is moderate. When the expected relative poverty vulnerability exceeds 0.8, the proportion of farmers in each threshold range under different standards is shown in the following table.

Table 3. Relative poverty vulnerability rates under different criteria

		2017			2019		
		0.4 Standard	0.5 Standard	0.6 Standard	0.4 Standard	0.5 Standard	0.6 Standard
VT < 0.3	Not fragile	0	0	0	54.03%	46.68%	40.41%
$0.3 \leq$ VT < 0.5	Mild fragile	0	0	0	8.21%	7.66%	7.45%
$0.5 \leq$ VT < 0.8	Moderate vulnerability	45.13%	36.98%	30.99%	13.80%	15.89%	16.48%
VT $\geq$ 0.8	Heavy fragile	54.87%	63.02%	69.01%	23.96%	29.77%	35.66%

As can be seen from the above table: under the three standards in 2017, the sample farmers all had moderate and severe relative poverty vulnerability, and the proportion of farmers in severe vulnerability accounted for more than 50%, indicating that farmers are very likely to fall into poverty. Compared with 2017, the relative poverty vulnerability of rural households in 2019 has decreased significantly, with more than 50% of rural households being less than 0.5, which is inseparable from the government's efforts to promote targeted poverty alleviation and rural revitalization policies in recent years. But at the same time, nearly 50% of our rural households are still facing a moderate and severely vulnerable situation, which cannot be ignored, and is also a key and difficult point in promoting common prosperity.

4.3. Model Design

The regression model of multiple variables was used to verify the effect of digital financial inclusion on the relative poverty vulnerability of farmers, as follows:

$$RPV = \alpha + \beta_1 DFIIC + \beta_i X_i + \varepsilon \qquad (1)$$

(1) Formula, PRV represents the relative poverty vulnerability of families, DFIIC represents the development of digital inclusive finance, and X i is the control variable, which includes individual, family and interprovincial characteristic variables.

In addition, in order to deeply explore the regulatory effect of digital availability and the action mechanism of digital inclusive finance on the poverty of farmers, the following empirical model is adopted:

$$RPV = \alpha_1 + \beta_1 DFIIC + \beta_i X_i + \varepsilon_1 \tag{2}$$

$$M = \alpha_2 + \beta_2 DFIIC + \beta_i X_i + \varepsilon_2 \tag{3}$$

$$RPV = \alpha_3 + \beta_3 DFIIC + \beta_i X_i + \beta_4 M + \varepsilon_3 \tag{4}$$

$$RPV = \alpha_3 + \beta_3 DFIIC + \beta_i X_i + \beta_4 M + \beta_5 M * DFIIC + \varepsilon_3 \tag{5}$$

(3) (4) (5) Formula M refers to regulatory variables and intermediary variables, in this paper refers to digital availability and financial literacy, intermediary variables used for (3) (4), and instrumental variables used for (4) (5).

Table 4. Variables and their implications

type of variable			Variable name	variable symbol	Variable processing
explained variable	Farmers' relative poverty and vulnerability		Farmers' relative poverty and vulnerability	RPV	Calculated by the VEP method
kernel variable	The Digital Financial Inclusion Index	Level 1 indicators	Digital Financial inclusion General Index	DIFI	Peking University Digital Financial Inclusion Index, taking a log of the number
			Coverage breadth index	DCB	ditto
			The depth index was used	DUD	ditto
			Digital degree index	DSS	ditto
		Secondary indicators	Pay index	Pay	ditto
			Insurance index	Insurance	ditto
			investment index number	Invest	ditto
			Credit index	Credit	ditto
controlled variable	Head of household characteristic variable		sex	Gender	Male =1; female =0
			age	Age	age
			degree of education	Edu	1-9, The larger the value, the higher the education level
			marital status	Married	Yes =1; No =0
			health condition	Health	Very good =1; good =2; generally =3; bad =4; very bad =5
			s it a party member or a probationary party member	Pm	Yes =1; No =0
	Family feature variables		Total income per capita	Income	Logarithm of total per capita household income
			Total assets per capita	Asset	Logarithm of total household assets per capita
			Engel coefficient	Engel	The province or region of the family is corresponding year GDP, logarithmic processing
	Regional feature variables		region GDP	GDP	Household food consumption / Total household consumption
regulated variable	Digital availability		Digital availability index	Da	The calculation is obtained by using the factor analysis method
metavariable	Financial literacy		Financial Knowledge Index	FL	ditto

Table 5. Descriptive statistics of the variables

variable symbol		2017		2019	
		mean value	standard deviation	mean value	standard deviation
RPV	0.4 Standard	0.811	0.073	0.368	0.385
	0.5 Standard	0.822	0.072	0.435	0.397
	0.6 Standard	0.831	0.071	0.497	0.401
DIFI		5.610	0.072	5.764	0.080
DCB		5.487	0.076	5.711	0.076
DUD		5.667	0.025	5.725	0.127
DSS		5.762	7.918	5.977	0.048
Pay		5.483	0.148	5.607	0.126
Insurance		6.425	0.088	6.524	0.114
Invest		5.622	0.104	5.636	0.196
Credit		5.165	0.123	5.316	0.123
Gender		0.923	0.265	0.875	0.330
Age		52.405	10.459	54.856	10.274
Edu		2.652	0.965	2.687	0.934
Married		0.944	0.230	0.923	0.266
Health		2.819	1.051	2.825	1.007
Pm		0.079	0.269	0.127	0.333
Income		8.194	3.352	8.475	3.527
Asset		12.214	1.406	11.186	1.323
Engel		0.444	0.202	0.411	0.195
GDP		10.231	0.780	10.161	0.798
Da		0.203	1.035	-0.095	0.944
FL		0.022	0.153	0.382	0.648

5. Analysis of Measurement Results

5.1. Benchmark Regression

Table 6 is the benchmark regression result of digital financial inclusion to relative poverty. RPV0.4 represents the relative poverty vulnerability of households below the 0.4 standard relative poverty line. Similarly, RPV0.5 and RPV0.6 are the relative poverty vulnerability of households below the 0.5 and 0.6 standard relative poverty line, respectively.

(1) (3) (5) Exploring the impact of DIFI on the vulnerability of farmers' relative poverty separately, it can be seen that the coefficient of offline digital inclusive finance under different standards is significantly negative, showing an obvious inhibitory effect on the relative poverty of farmers.(2) (4) (6) It is the regression result after the addition of the control variables. Regardless of whether the control variables are increased, the development of digital inclusive finance has an obvious relief effect on the relative poverty vulnerability of farmers.

(4) The coefficient of DIFI is-1.6819, indicating that every unit more logarithm of the general index can reduce the possibility of farmers falling in relative poverty in the future by 168%, which has a significant effect. The development of digital inclusive finance will help reduce the problem of relative poverty in China.

The results of the regression analysis of the control variables showed that the higher the household educated, healthier and is a party member or probationary party member, the more favorable it is to alleviate the relative poverty vulnerability of the family. Moreover, families with higher total income and total assets and lower the Engel coefficient are less likely to fall into relative poverty in the future.

Table 6. Benchmark regression results

variable	RPV0.4		RPV0.5		RPV0.6	
	(1)	(2)	(3)	(4)	(5)	(6)
DIFI	-1.6381*** (0.0370)	-1.8307*** (0.0383)	-1.4905*** (0.0368)	-1.6819*** (0.0384)	-1.3489*** (0.0362)	-1.5329*** (0.0379)
Gender		0.0260** (0.0123)		0.0277** (0.0123)		0.0317*** (0.0121)
Age		0.0005 (0.0004)		0.0007* (0.0004)		0.0008** (0.0004)
Edu		-0.0266*** (0.0042)		-0.0275*** (0.0042)		-0.0270*** (0.0042)
Married		-0.0093 (0.0149)		-0.0095 (0.0149)		-0.0058 (0.0147)
Health		0.0323*** (0.0037)		0.0333*** (0.0038)		0.0322*** (0.0037)
Pm		-0.0341*** (0.0120)		-0.0336*** (0.0120)		-0.0335*** (0.0118)
Lnincome		-0.0296*** (0.0011)		-0.0273*** (0.0011)		-0.0249*** (0.0010)
Lnasset		-0.0075*** (0.0028)		-0.0180*** (0.0028)		-0.0267*** (0.0027)
Engel		0.1244*** (0.0185)		0.1100*** (0.0185)		0.0936*** (0.0183)
Lngdp		0.0870*** (0.0052)		0.0775*** (0.0052)		0.0675*** (0.0051)
R^2	0.2332	0.3774	0.2025	0.3454	0.1771	0.3187
N	6451	6451	6451	6451	6451	6451

Note: * * *, * *, and * indicate that the estimated results are significant at the 0.01,0.05, and 0.1 levels, respectively, and the numbers in parentheses are the robustness standard error. The following table is the same.

5.2. Analysis of the Regulatory Effects

Referring to the method of[35] of Yin Zhichao and others, select the "accessibility" index: whether to have a smartphone, and the "usage" index: whether to use electronic payment and online shopping cost, and use factor analysis to generate a digital availability index. In order to avoid multicollinearity after adding the crossover items, the digital financial inclusion index and the digital availability index were centralized, and then the crossover items were added for regression. The results are shown in Table 7.

Table 7. Results of the regulatory effect regression

variable	RPV0.4		RPV0.5		RPV0.6	
	(1)	(2)	(3)	(4)	(5)	(6)
DIFI	-1.5726***	-1.7796***	-1.4255***	-1.6419***	-1.2848***	-1.4988***
	(0.0366)	(0.0390)	(0.0365)	(0.0391)	(0.0358)	(0.0386)
Da	-0.0588***	-0.0269***	-0.0582***	-0.0219***	-0.0572***	-0.0193***
	(0.0040)	(0.0041)	(0.0040)	(0.0041)	(0.0039)	(0.0041)
Da*DIFI	-0.1130***	-0.1711***	-0.1530***	-0.2146***	-0.1812***	-0.2424***
	(0.0368)	(0.0337)	(0.0366)	(0.0337)	(0.0366)	(0.0333)
Gender		0.0250**		0.0267**		0.0306**
		(0.0122)		(0.0122)		(0.0121)
Age		-0.0001		0.0002		0.0003***
		(0.0004)		(0.0004)		(0.0004)
Edu		-0.0235***		-0.0250***		-0.0249***
		(0.0042)		(0.0148)		(0.0042)
Married		-0.0113		-0.0112		-0.0074
		(0.0148)		(0.0144)		(0.0146)
Health		0.0316***		0.0332***		0.0001***
		(0.0119)		(0.0037)		(0.0000)
Pm		-0.0319***		-0.0321***		-0.0323***
		(0.0115)		(0.0119)		(0.0037)
Lnincome		-0.0293***		-0.0270***		-0.0246***
		(0.0011)		(0.0011)		(0.0010)
Lnasset		-0.0050*		-0.0161***		-0.0251***
		(0.0028)		(0.0028)		(0.0028)
Engel		0.1196***		0.1071***		0.0918***
		(0.0185)		(0.0185)		(0.0182)
Lngdp		0.0837***		0.0753***		0.0658***
		(0.0052)		(0.0052)		(0.0051)
R^2	0.2589	0.3838	0.2296	0.3521	0.2058	0.3265
N	6451	6451	6451	6451	6451	6451

Table 7 shows that after the addition of the interaction term da * DIFI, the coefficient of the interaction term is significantly negative, which is the same as the coefficient of the digital financial inclusion index, indicating that the digital availability has an obvious regulatory role between the digital financial inclusion and the relative poverty vulnerability of farmers. The greater the digital availability of farmers, the more the benefit of digital financial inclusion, which will also enhance its role in reducing the vulnerability of farmers to relative poverty.

5.3. Robustness Test

Digital financial inclusion is a multidimensional index. Considering other factors, we examine the impact of its primary and secondary indicators on the relative poverty vulnerability of farmers, respectively. The estimated results are shown in Table 8.

Table 8 (1) (2) (3) indicates the coverage, use depth and digital degree index of digital financial inclusion in financial inclusion, and (4) to (7) are the secondary indicators: payment index, insurance index, investment index and credit index.

Table 8. Results of the robustness test

variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	DCB	DUD	DSS	Pay	Insurance	Invest	Credit
The DFIIC different index	- 1.2944*** (0.0283)	- 0.7061*** (0.0382)	- 1.8259*** (0.0323)	- 0.6894*** (0.0282)	- 1.0578*** (0.0380)	- 0.2544*** (0.0287)	- 0.9188*** (0.0295)
controlled variable	yes	yes	yes	yes	yes	yes	yes
R^2	0.3585	0.1927	0.4316	0.2190	0.2412	0.1601	0.2613
N	6451	6451	6451	6451	6451	6451	6451

The regression results of the above table show that both the first-level indicators and the second-level indicators of digital inclusive finance have a significant effect on alleviating the relative poverty vulnerability of farmers, among which the coverage breadth index and the digital degree index have the most obvious role. The wider the coverage of digital inclusive finance, the more farmers can benefit, provide more financial support and help them get rich; the more extensive the digitalization, the more convenience, reduce transaction costs, alleviate information asymmetry, and thus effectively alleviate the relative poverty vulnerability of farmers.

Therefore, by promoting the development of digital inclusive finance and promoting its coverage breadth, digitalization degree and various other dimensions, it can effectively alleviate the relative poverty problem of farmers, narrow the income gap, and move towards common prosperity.

5.4. Heterogeneity Analysis

In order to examine the regional heterogeneity of digital financial inclusion, this paper examines the impact of digital financial inclusion development on the vulnerability of farmers' relative poverty in the eastern, central, western and northeastern regions, respectively. The test results are shown in Table 9.

Table 9. Results of the regional heterogeneity tests

Provinces and regions	east	middle	west	northeast
DIFI	-1.5568*** (0.0541)	-2.1221*** (0.0876)	-2.2750*** (0.0891)	-2.9625*** (0.1657)
controlled variable	yes	yes	yes	yes
R^2	0.3860	0.4213	0.3551	0.4250
N	2221	1402	2080	748

In the above table, in the eastern, central, western and northeast China, the development of digital inclusive finance has an increasing role in alleviating the relative poverty and vulnerability of rural residents, which shows that the development of digital inclusive finance has greater advantages for underdeveloped areas. It can be explained as: the degree of digitalization, information availability and financial availability of more developed areas have all developed to a certain extent, and the benefit from the development of digital inclusive finance is less flexible than that in underdeveloped areas.

5.5. Analysis of the Mediation Effects

Digital inclusive finance can reduce the financial vulnerability[36] of peasant households, by improving farmers' financial knowledge. Referring to the practice of Zhou Yuqing and He

Guangwen[37], three objective financial knowledge problems in CHFS were selected. The respondents scored 1 point for each correct answer and 0 point for each incorrect answer, and the financial literacy index was calculated by factor analysis.

Table 10. Results of Financial Literacy

variable	(1)	(2)	(3)
	PRV	FL	PRV
DIFI	-1.6819***	1.5556***	-1.5434***
	(0.0384)	(0.0662)	(0.0395)
FL			-0.0890***
			(0.0071)
controlled variable	yes	yes	yes
R^2	0.3454	0.1121	0.3608
N	6451	6451	6451

As can be seen from the above table, (2) the coefficient of DIFI is significantly positive, indicating that digital financial inclusion can significantly improve the financial literacy of farmers.(3) The coefficient of digital financial finance (DIFI) and financial literacy (FL) is significantly negative, and the results of (1) (2) are combined, indicating that the development of digital financial finance can improve farmers' financial literacy and achieve a positive effect of alleviating the vulnerability of relative poverty of farmers.

6. Conclusions and Recommendations

6.1. Conclusion

This paper from the perspective of farmers relative poverty vulnerability, using CHFS and DFIIC data, explore the digital pratt & Whitney financial development for farmers relative poverty vulnerability effect and mechanism, and the digital availability in digital pratt & Whitney financial and farmers relative poverty vulnerability adjustment effect, and to the robustness test and intermediary effect research, draw the following conclusions:

First, the development of digital inclusive finance can significantly reduce the risk of rural families falling into relative poverty in the future. The primary indicators and secondary indicators of digital inclusive finance were applied to the study of the relative poverty vulnerability of farmers, respectively, which both showed significant mitigation effects, among which the breadth of coverage and digitalization played the most obvious role.

Second, the digital availability of farmers has a significant positive adjustment effect in the impact of digital inclusive finance on the vulnerability of the relative poverty of farmers, that is, the greater the digital availability of farmers, the more effective the digital inclusive finance will alleviate the vulnerability of the relative poverty of farmers.

Third, the research results of the intermediary effect show that the digital inclusive finance can reduce the possibility of farmers falling in relative poverty by improving their financial literacy.

6.2. Suggestions

Based on the above research results, the following suggestions are made:

First, fill the "digital divide" and improve the digital infrastructure in rural areas. The government should strengthen the coverage of optical fiber and 5 G network and signal intensity in rural areas, and improve the service scope and network scale of digital inclusive finance.

Second, fill the "ecological gap" and improve the availability of financial services. Financial institutions should increase their branches, increase their employees, innovate financial products, service models and financing channels, and use scientific and technological means to improve the financial environment, so that enterprises can develop themselves and benefit farmers.

Third, fill the "educational gap" and improve the financial literacy of farmers. The government, financial institutions and enterprises can jointly publicize the application of financial knowledge and Internet technology in daily life, so as to popularize the relevant knowledge of credit, financial management, electronic payment and living payment for farmers, so that farmers can better manage their wealth and reduce the possibility of relative poverty in the future.

Fourth, we will improve relevant laws and regulations. A good legal environment is fundamental to the establishment of the trust mechanism between farmers and the government, financial institutions and enterprises, which is conducive to the development of digital inclusive finance.

Acknowledgments

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