The Impact of Digital Inclusive Finance on Rural Poverty Reduction: Empirical Evidence from Rural Areas in China

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Abstract:

China achieved comprehensive poverty eradication in 2020 and has now entered a new phase focused on addressing relative poverty. Harnessing the power of Digital Inclusive Finance to alleviate relative poverty is of paramount importance. Based on field research conducted in several rural regions of China, this paper delves into the effects and underlying mechanisms of Digital Inclusive Finance on rural poverty reduction, and proposes corresponding policy recommendations. Utilizing the Logit model and mediation effect model, the study calculates the Digital Inclusive Finance Index, identifies multidimensionally relative poor households, and analyzes the impact of Digital Inclusive Finance on multidimensional relative poverty among rural households, further exploring its influence mechanisms. The results indicate that Digital Inclusive Finance significantly mitigates rural relative poverty by enhancing farmers' willingness to engage in e-commerce and bolstering health awareness. Drawing on these findings, the paper presents policy suggestions for the development of rural Digital Inclusive Finance from various perspectives.

Keywords:

Digital Inclusive Finance, Relative Poverty, Rural Poverty Reduction

1.Introduction

As a large developing country with a vast population, expansive territory, and a certain disparity in urban-rural development, China has long grappled with the issue of rural poverty. By the end of 2020, China successfully met its target of eradicating poverty in the new era, lifting 98.99 million rural residents out of poverty under the current standards, resolving regional poverty as a whole, and accomplishing the arduous task of eliminating absolute poverty. This remarkable achievement has made a significant and outstanding contribution to global poverty reduction efforts. However, it cannot be overlooked that with the basic resolution of absolute poverty, relative poverty has emerged as a new challenge for rural development in China. Relative poverty not only pertains to income levels but also manifests in disparities between rural and urban

residents in access to education, healthcare, employment, and other public services, as well as imbalances in development opportunities and resource allocation. This form of poverty is more concealed, complex, and challenging to address, necessitating innovative approaches.

Financial poverty alleviation has played a pivotal role in China's poverty reduction efforts in the past. With the shift in the focus of poverty alleviation work and advancements in financial technology, "digital" and "inclusive" finance are poised to play a crucial role in addressing relative poverty and revitalizing rural China. Digital Inclusive Finance represents a novel financial model that promotes universal, equitable, and progressive access to financial services. Leveraging advanced technologies such as big data, cloud computing, and mobile internet, it facilitates the extension of financial services to a broader consumer base, small and micro-enterprises, and disadvantaged groups. The aim of Digital Inclusive Finance is to harness digital technology to overcome the constraints of cost and geography in traditional inclusive finance, thereby enhancing social welfare from a financial perspective and narrowing the disparities in financial support between urban and rural areas, as well as among different regions.

Based on this backdrop, this paper utilizes field survey data from several rural regions in China to quantify and analyze Digital Inclusive Finance and relative poverty levels at the household level. Employing the Logit model and mediation effect model, it delves into the relationship between Digital Inclusive Finance and relative poverty in rural China, as well as the pathways through which it exerts its influence. The objective is to provide valuable insights and references for addressing relative poverty and enhancing rural governance.

2.Theoretical Analysis

2.1. The Impact of Digital Inclusive Finance on Rural Relative Poverty

Compared to traditional financial institutions that conduct or provide financial services through offline branches, digital inclusive finance leverages modern digital technologies such as internet technology, artificial intelligence, big data analytics, and cloud computing in the financial sector. This reduces transaction and time costs for financial institutions, enhances the coverage and accessibility of financial services, and includes previously excluded low-income and remote populations, offering high-quality, low-cost financial services to rural households. Concurrently, current efforts to address relative poverty in rural areas emphasize sustainability and multidimensionality, focusing on enhancing rural households' self-development capabilities and improving various aspects of their lives. Digital inclusive finance can significantly aid the self-development of rural populations by providing convenient access to financial services such as credit, insurance, and savings. This meets the financial needs of rural households, alleviates their credit constraints, and diversifies their investment channels, thereby contributing to poverty reduction among rural households. Based on this, the following hypothesis is proposed:

H1: Digital inclusive finance promotes the alleviation of relative poverty in rural areas.

2.2. Mechanisms of Digital Inclusive Finance's Impact on Rural Relative Poverty

With the widespread adoption of information technology, e-commerce has emerged as a significant driver in alleviating relative poverty in rural areas. Digital inclusive finance, in turn, can bolster the development

of rural e-commerce. Firstly, by providing convenient credit and payment services, digital inclusive finance lowers the financial barriers to e-commerce entrepreneurship, enabling rural households to more easily access startup and operational funds, thereby enhancing their willingness to engage in e-commerce. Secondly, leveraging big data and credit assessment technologies, digital inclusive finance offers more personalized and precise financial services to rural households, helping them better manage risks associated with e-commerce operations. Lastly, the proliferation of digital inclusive finance also improves rural households' financial literacy and digital skills, making them more proficient in the operation and management of e-commerce platforms, further promoting the development of their e-commerce activities. Therefore, the following hypothesis is proposed:

H2: Digital inclusive finance alleviates relative poverty by increasing rural households' willingness to engage in e-commerce.

As China advances its "Healthy China" strategy, the health industry is booming, and rural households now have access to a wider range of channels for obtaining health information, leading to an enhancement of their health awareness. Insurance companies, as key players in the financial sector, are actively utilizing digital means to expand the reach of financial inclusion. Through online information platforms, they disseminate knowledge on health management and insurance, effectively improving rural households' ability to prevent health risks. This, in turn, reduces the risk of sudden illnesses or chronic diseases among family members, contributing to the mitigation of poverty caused by illness. Furthermore, the rise of digital inclusive finance has lowered the barriers for rural households to purchase commercial insurance, significantly reducing both transaction and time costs, thereby greatly stimulating their enthusiasm for buying health insurance. As a result, when diseases strike, the economic burden on rural households is alleviated, and their vulnerability to poverty is correspondingly reduced. Therefore, the following hypothesis is proposed:

H3: Digital inclusive finance alleviates relative poverty by enhancing rural households' health awareness.

3.Research Design

3.1. Data Source

The data utilized in this paper are derived from field surveys conducted by our research team among rural households across various provinces in China. The survey employed a combination of stratified and random sampling methods, and was carried out through a mix of questionnaires and interviews. A total of 130 questionnaires were distributed, and after excluding cases with missing or abnormal values for key variables, 119 valid samples were ultimately obtained.

Drawing on relevant research, this paper defines multidimensional relative poverty as the dependent variable, with the digital inclusive finance index serving as the core independent variable. Control variables were selected primarily based on household head characteristics and family characteristics, including political affiliation, age of the household head, past status as a poverty-stricken household, social capital, family size, and family dependency ratio. Based on theoretical analysis, the intermediary variables include e-commerce willingness and health awareness.

3.2. Index Construction

3.2.1. Digital Inclusive Finance Index

Taking into account the actual demand for financial services among rural households and aligning with China's plans and goals for promoting inclusive finance development, this paper constructs a digital inclusive finance index system from three aspects: coverage breadth, usage depth, and satisfaction level. Within the satisfaction level, evaluations of financial services were conducted using a Likert five-point scale. Reasonable weights were assigned to each indicator, as shown in Table 1. The digital inclusive finance index value for each surveyed household was calculated based on these weights. A higher index value indicates a higher level of digital inclusive finance usage and satisfaction among the surveyed households.

Table 1. Construction of the Digital Inclusive Finance Index.

Dimension	Indicator Definition	Weight
Coverage Breadth	Whether family members possess third-party payment accounts	0.08
	Whether third-party payment accounts of family members are linked to bank accounts	0.08
	Whether family members have ever held online financial products	0.08
	Whether family members have ever obtained online credit	0.08
	Whether family members have ever held online commercial insurance	0.08
Usage Depth	The maximum number of years family members have used third-party payment accounts	0.08
	The frequency of family members using third-party payment accounts for payments	0.08
	The number of online financial investments made by the family since 2021	0.08
	The number of online credit transactions conducted by the family since 2021	0.08
	The number of online commercial insurance policies purchased by the family since 2021	0.08
Satisfaction Level	Family's evaluation of financial services	0.2

3.2.2. Identification of Multidimensional Relative Poverty

This paper constructs a multidimensional relative poverty index system for rural households from three aspects: economic status, capability development, and living standards. Equal weighting is applied to these three dimensions, assigning each a weight of 1/3, while indicators within each dimension are also assigned weights using the equal weighting method. The specific indicators and their weights are presented in Table 2.

Regarding threshold setting, in order to align with the transition from absolute poverty eradication to relative poverty governance and to take into account the economic development levels of the surveyed regions, the threshold for multidimensional relative poverty in this study is set to be neither too high nor too low.

Therefore, within the economic status dimension, this paper considers four indicators: income, employment, assets, and housing. Additionally, emphasizing individual capability development, this paper includes key factors such as education and health that impact capability development. The remaining indicators also generally reflect the actual needs and development requirements of the rural households surveyed. After calculating the multidimensional relative poverty index for the survey respondents, this paper defines households with an index below the average as relatively poor among the survey respondents, denoted as "1", while the remaining households are denoted as "0".

Table 2. Construction of Multidimensional Relative Poverty Indicators.

Dimension	Indicator	Threshold	Weight
Economic Status	Income	Whether the annual per capita income of the household is less than the survey mean	1/12
	Employment	Whether all adults in the household are unemployed	1/12
	Assets	Whether the number of assets owned by the household is less than 3	1/12
	Housing	Whether the per capita housing area of the household is less than 15 square meters	1/12
Capability Development	Education	Whether there is anyone aged 15 or above who is illiterate in the household	1/12
	Health	Whether there are members with sudden illnesses, chronic diseases, or disabilities in the household	1/12
	Social Security	Whether there are family members without social security coverage	1/12
	Information	Whether the number of assets for information access owned by the household is less than 3	1/12
Living Standards	Drinking Water	Whether the household does not have access to safe drinking water	1/9
	Sanitation	Whether the household does not have a hygienic toilet	1/9
	Fuel	Whether the household uses firewood, straw, cow/sheep dung, coal gas, biogas, etc. for cooking	1/9

3.3. Model Specification

This paper employs a Logit model to investigate the mitigating effect of digital inclusive finance on relative poverty. Given that whether a household is relatively poor is a binary variable, a binary Logit model is established for effective estimation. The specific model is shown in Equation (1).

$$\begin{aligned} \text{Logit}(P_i) &= Ln\frac{P(Y_i=1)}{1-P(Y_i=1)} \\ &= \alpha + \beta DIF_i + \gamma X_i + \varepsilon_i \end{aligned} \tag{1}$$

In the model, P_i represents the probability that household i is relatively poor, Y_i is the dependent variable indicating the relative poverty status of household i, DIF_i denotes the digital inclusive finance index of household i, X_i represents other control variables that affect the relative poverty of the household, α is the constant term, β and γ are parameters to be estimated, and ε_i is the random error term.

3.4. Descriptive Statistics

Table 3 presents the descriptive statistics for the main variables. The descriptive statistics reveal that the surveyed households include both those that were previously registered as poor households and non-poor households, which enhances the representativeness of the sample. In terms of financial service usage, the average number of third-party accounts owned by households is approximately 1.98, indicating that a majority of households possess third-party payment accounts such as Alipay or WeChat Pay. This demonstrates the high penetration of modern financial services among rural households in China. However, compared to online payments, the adoption of online wealth management, credit, and commercial insurance among rural households in China is relatively low. The average satisfaction with financial services is around 3.34, suggesting that most households rate their satisfaction with financial services as "average." This may indicate that financial services meet basic needs but do not exceed expectations.

Table 3. Descriptive Statistics of Key Variables.

Variable	Obs.	Mean	Std. dev.	Min	Max
Highest Educational Level	119	3.277311	1.199748	1	5
Previously Poverty-Stricken	119	1.798319	0.4029517	1	2
Family Size	119	4.92437	1.397089	2	10
Possession of Online Payment	119	1.983193	0.1290903	1	2
Experience with Online Financial Management	119	1.252101	0.4360549	1	2
Experience with Online Credit	119	1.193277	0.3965382	1	2
Experience with Online Commercial Insurance	119	1.243697	0.4311275	1	2
Satisfaction with Financial Services	119	3.344538	0.6819336	1	5
Annual Household Income	119	99042.02	75422.13	10000	500000
Housing Area	119	132.0588	76.6718	30	700
Willingness to Engage in E-commerce	119	1.361345	0.4824214	1	2
Health Awareness	119	1.277311	0.4495642	1	2

4.Empirical Results Analysis

4.1. Baseline Regression Analysis

The baseline regression results are presented in Table 4. Column (1) shows the regression relationship between the Digital Inclusive Finance Index (DIFI) and rural multidimensional relative poverty without controlling for any other variables. A significant negative correlation is observed between the two, indicating that as the DIFI increases, the incidence or severity of relative poverty decreases notably.

After further controlling for variables such as ethnicity, highest educational level, previous status as a registered poor household, family size, and family dependency ratio, as shown in Column (2) of the table, the coefficient of the DIFI is -4.259, and it maintains a significant linear relationship. This result not only

reaffirms Hypothesis H1, which posits a negative correlation between the DIFI and relative poverty, but also demonstrates that even when considering other factors that may influence relative poverty, the development of digital inclusive finance still has a significant and enhanced effect on reducing relative poverty.

Table 4. Baseline Regression Analysis.

Variable	(1) Multidimensional Relative Poverty	(2) Multidimensional Relative Poverty
Digital Inclusive Finance Index	-3.325*** (0.965)	-4.259*** (1.193)
Ethnicity		-2.029*** (0.774)
Highest Educational Background		-0.0672 (0.189)
Previously Poverty-Stricken		-1.267** (0.618)
Family Size		0.366** (0.164)
Family Dependency Ratio		1.103 (0.885)
Constant	6.682*** (1.976)	12.67*** (3.308)
Control Variables	None	Controlled
Observation Samples	119	119

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively. Standard errors are in parentheses. The same applies below.

4.2. Mechanism Analysis

To validate Hypotheses H2 and H3, this paper employs e-commerce intention and health awareness as variables. In the survey, "1" represents a willingness to sell products online, engage in e-commerce transactions, and consciously learn about health and wellness knowledge, while "2" indicates a lack of e-commerce intention and no conscious effort to learn about health and wellness. The regression results of the mechanism analysis are presented in Table 5.

Table 5. Regression Results of Mechanism Analysis.

Variables	(1) E-commerce Intention	(2) E-commerce Intention	(3) Health Awareness	(4) Health Awareness	(5) Multidimensional Relative Poverty
Digital Inclusive Finance Index	-0.490*** (0.174)	-0.486*** (0.181)	-0.551*** (0.160)	-0.496*** (0.169)	-3.954** (1.238)

Ethnicity		-0.286** (0.133)		-0.0330* (0.125)	-1.682** (0.785)
Highest Educational Background		-0.0286 (0.0371)		-0.0520 (0.0346)	-0.0304 (0.194)
Previously Poverty-Stricken		-0.105** (0.113)		-0.0214* (0.105)	-1.183** (0.635)
Family Size		0.00581 (0.0309)		-0.00921 (0.0289)	0.364** (0.165)
Family Dependency Ratio		-0.0508 (0.170)		-0.166 (0.159)	1.244 (0.905)
E-commerce Intention					0.816** (0.484)
Health Awareness					0.195* (0.516)
Constant	2.366*** (0.360)	3.170*** (0.512)	2.407*** (0.330)	2.680*** (0.478)	9.724*** (3.719)
Control Variables	None	Controlled	None	Controlled	Controlled
Observation Samples	119	119	119	119	119
R-squared	0.122	0.202	0.152	0.219	0.239

Column (1) demonstrates that with the development of digital inclusive finance, rural households' willingness to participate in e-commerce significantly increases. Column (2) shows that this conclusion remains valid even after controlling for relevant variables. Columns (3) and (4), with health awareness as the dependent variable, indicate that digital inclusive finance can significantly enhance rural households' health awareness, and this conclusion persists after controlling for relevant variables.

After considering the variables of e-commerce intention and health awareness, this paper re-examines the impact of digital inclusive finance on rural households' multidimensional relative poverty. The regression results are shown in Column (5). The impact of the digital inclusive finance index on relative poverty remains significant, with a coefficient of -3.954, confirming that the development of digital inclusive finance has a positive effect on reducing rural households' multidimensional relative poverty. Simultaneously, Hypotheses H2 and H3 are validated.

5.Conclusions and Recommendations

5.1. Conclusions

Digital inclusive finance in China has played a positive and pivotal role in the rural poverty reduction process. On one hand, it enhances farmers' willingness to engage in e-commerce, promotes e-commerce transactions in rural areas, and increases farmers' income sources, thereby contributing to rural poverty reduction.

On the other hand, through the promotion of online commercial insurance, digital inclusive finance raises farmers' health awareness, strengthens their risk resilience, and further facilitates rural poverty reduction. To validate this conclusion, this paper collects questionnaire data from different regions in China, constructs indices for digital inclusive finance and multidimensional relative poverty, and conducts an empirical analysis. The results of the empirical analysis confirm the validity of this conclusion. This finding holds significant practical implications for consolidating the quality of poverty eradication and promoting rural revitalization in China's rural areas. Based on the research findings, to more effectively address relative poverty and fully leverage the poverty reduction and agricultural assistance benefits of digital inclusive finance, it is necessary to start with relevant policy recommendations.

5.2 Recommendations

5.2.1. Strengthening Digital Infrastructure Construction

Given the heavy reliance of digital inclusive finance on digital infrastructure such as network communication, China should continuously increase investment in rural infrastructure including network communication and broadband. The government can encourage telecommunication operators to actively build base stations in remote rural areas through policy measures such as financial subsidies and tax incentives, further improving rural network coverage and speed to ensure the stable, efficient, and smooth operation of digital inclusive financial services. For example, special funds can be established to reward operators that excel in rural network construction, while guiding social capital to participate in rural digital infrastructure development. This will lay a solid hardware foundation for various digital inclusive finance services such as mobile payments and online credit, bridging the digital divide and enabling rural residents to equally enjoy the conveniences brought by digital inclusive finance.

5.2.2. Enhancing Financial Literacy and Education

In response to the varied levels of financial literacy among rural residents, it is necessary to carry out diverse, practical, and targeted financial literacy activities tailored to rural contexts. Not only should online channels be fully utilized, such as creating engaging and easy-to-understand short videos and illustrated public account articles for widespread dissemination on online platforms, but also financial institution professionals, volunteers, and others should be organized to reach out to rural communities. Through offline methods like face-to-face lectures, establishing consultation service points, and conducting financial knowledge competitions, financial knowledge can be imparted to rural residents in an accessible manner. Particular emphasis should be placed on topics closely related to digital inclusive finance, such as payments, financial management, and credit, to effectively enhance rural residents' financial literacy and ability to use digital inclusive financial tools. This will enable them to correctly utilize digital inclusive financial services based on a thorough understanding, truly benefiting from them and achieving income growth.

5.2.3. Promoting Integrated Rural Industry Development

Leveraging the funding advantages provided by digital inclusive finance, China should further promote the deep integration and development of its primary, secondary, and tertiary industries in rural areas. Local governments should formulate industrial development plans based on local rural resource endowments and

industrial characteristics, guiding and encouraging financial institutions to innovate financial products and service models according to the characteristics and needs of rural industrial integration projects. For instance, specialized credit products targeting new business forms such as agricultural product deep processing and rural leisure tourism should be developed, optimizing capital allocation to ensure that funds flow precisely into key links of rural industrial development. This will inject continuous momentum into rural industrial development, extend the agricultural industry chain, increase the added value of agricultural products, create more job opportunities, drive rural residents' income growth and prosperity, continuously consolidate rural poverty reduction achievements, and promote comprehensive rural revitalization.

5.2.4. Improving the Regulatory System for Digital Inclusive Finance

Given the digital, networked, and cross-regional characteristics of digital inclusive finance, the risks it faces are more complex and diverse compared to traditional finance. Therefore, establishing and improving a regulatory system that is compatible with these characteristics is crucial. China should strengthen the access management of digital inclusive financial institutions, rigorously review their qualification conditions, and regulate their business scope to ensure they have the ability to operate steadily and comply with regulations. Simultaneously, risk prevention and control should be strengthened across the entire process of digital inclusive financial business, establishing a dynamic monitoring mechanism to promptly identify and address potential financial risks, such as preventing illegal fundraising, fraud, and other risky behaviors in online lending, effectively safeguarding the legitimate rights and interests of rural residents. Furthermore, it is necessary to enhance coordination and cooperation among different regulatory departments, forming a synergistic regulatory force to create a healthy, orderly, and standardized development environment for digital inclusive finance, ensuring its sustainable contribution to rural poverty reduction efforts.

Author Contributions

Conceptualization: Zhang W. Chen K.; Methodology: Zhang W.; Formal analysis: Zhang W. Chen K.; Investigation: Zhang W. Chen K.; Resources: Zhang W.; Writing – original draft preparation: Zhang W.; Writing – review and editing: Chen K.; Supervision: Zhang W.; Project administration: Zhang W. Chen K.; Funding acquisition: Zhang W..

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