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Analysis of the Impact of Digital Inclusive Finance on the Well-being of Rural Residents

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Abstract: Improving the sense of well-being, gain, and security among rural residents has become one of the important tasks for promoting high-quality rural economic development and achieving rural revitalization. This paper, based on data from the China Household Finance Survey (CHFS) from 2015 to 2019, constructs an Ordered Probit model to study and analyze the impact and mechanism of digital inclusive finance on the well-being of rural residents. The results indicate that digital inclusive finance can enhance the well-being of rural residents, and the indices of coverage breadth, usage depth, and digitalization all have significant positive effects on the well-being of rural residents. In terms of the mechanism, digital inclusive finance improves the income of rural residents, promotes entrepreneurship among them, and enhances their financial literacy, thereby increasing their well-being. At the same time, digital inclusive finance has a greater impact on the well-being of samples from rural areas in the central and eastern regions, as well as among rural women and middle-aged and elderly groups.

Keywords: Digital Inclusive Finance; Rural Residents; Well-being; Ordered Probit Model.

1. Introduction

In recent years, with the gradual integration of emerging digital technologies such as artificial intelligence, big data, cloud computing, blockchain, and 5G into the traditional financial sector, financial technology has closely combined finance with digital technologies. This has greatly enhanced the inclusiveness of digital finance and reduced the risks and service costs associated with traditional financial services. According to Peking University's Digital Inclusive Finance Index, the average value of the digital inclusive finance index for various provinces was 220 in 2015, 271.98 in 2017, and 323.73 in 2019. This figure reached 379.44 in 2022, indicating the rapid development of digital inclusive finance in China.

Since the reform and opening-up in 1978, the Chinese economy has undergone rapid development. In 1978, China's per capita GDP was $156, and this figure rose to $12,500 in 2023, with its global ranking increasing from 134th to 69th. This indicates that the focus of China's economic development has shifted from solving basic needs to pursuing high-quality development. Against this backdrop, how to enhance residents' sense of well-being and gain has become an important issue of concern across various sectors. According to the United Nations' "World Happiness Report," China's happiness index ranking rose from 112th in 2012 to 60th in 2023. Although residents' sense of happiness has improved amidst fluctuations, in the context of rapid economic growth, how to improve the standard of living and enhance people's sense of happiness and satisfaction with life, allowing them to experience a greater sense of gain, remains an issue worthy of our attention.

In 2017, General Secretary Xi Jinping first proposed the rural revitalization strategy at the 19th National Congress of the Communist Party. The report of the 19th National Congress pointed out that the "three rural issues" (agriculture, rural areas, and farmers) are fundamental issues related to the nation's economy and people's livelihood. It emphasized that addressing the problems of agriculture, rural areas, and farmers must always be a top priority for the entire Party. "For the nation to be rejuvenated, rural areas must be revitalized." Therefore, how to effectively promote inclusive, foundational, and protective social welfare construction while enhancing the well-being, sense of gain, and security of rural residents has become an important topic for promoting high-quality rural economic development and achieving rural revitalization.

With the continuous advancement of digital inclusive finance in rural areas, more and more rural residents can access digital financial services. However, some scholars believe that digital inclusive finance may create a "digital divide," exacerbating income disparities between urban and rural areas. Vulnerable groups may be unable to enjoy the benefits brought by digital finance, leading to an increased sense of unfairness and unhappiness among rural residents, which could negatively impact their overall well-being. Therefore, is digital inclusive finance a "digital dividend" or a "digital divide" for rural residents? Can the development of digital inclusive finance enhance the well-being of rural residents? How can the development of digital inclusive finance improve the well-being of rural residents? Addressing these questions will not only reveal the impact of digital inclusive finance on the well-being of rural residents but also provide relevant policy recommendations for the development of digital inclusive finance in rural areas. This is of great significance for developing digital inclusive finance, promoting the rural revitalization strategy, and enhancing the happiness of rural residents.

Based on the above background, this paper combines data from the China Household Finance Survey (CHFS) and data on China's inclusive finance to construct an Ordered Probit econometric regression model to empirically investigate the impact of digital inclusive finance on the well-being of rural residents. Compared to existing literature, the potential contributions are as follows: First, most existing studies use cross-sectional data and set samples as urban and rural residents. This paper analyzes rural resident data from the CHFS (2015-2019) using the Ordered Probit model, making the relevant policy recommendations more targeted and providing more empirical evidence for enhancing the well-

being of rural residents through digital inclusive finance. Second, existing literature on digital inclusive finance primarily focuses on its direct impacts on income and consumption. In contrast, this paper complements the research on digital inclusive finance from the perspective of rural residents' subjective well-being. Third, in terms of the influencing mechanism, this study distinguishes itself from existing literature by incorporating financial literacy as a mediating variable in evaluating the promotion of digital inclusive finance in rural areas.

2. Theoretical Analysis and Research Hypotheses

2.1. The Impact of Digital Inclusive Finance on the Well-being of Rural Residents

Digital inclusive finance is an emerging industry formed by the integration of digital technology with traditional inclusive financial services. It not only reflects the "high efficiency and wide coverage" of digital technology but also embodies the "inclusiveness and accessibility" of inclusive finance, promoting stable economic development[1]. The promotion of digital inclusive finance has improved the convenience of financial services for rural residents, reduced transaction costs and entry barriers for financial services, thereby enhancing the well-being of rural residents and allowing them to truly benefit from the advantages brought by digital inclusive finance.

First, digital inclusive finance can overcome the geographical limitations faced by traditional finance due to the restrictions of financial outlets, meeting the financial needs of more rural residents in remote areas and providing them with convenient financial services. It compensates for the shortcomings in rural areas, especially in mountainous regions, where financial service outlets are scarce, the coverage is limited, and the service offerings are relatively narrow[2]. Based on the theory of new economic geography, scholars have found that digital inclusive finance can optimize and upgrade the regional industrial structure and promote local economic development[3]. Second, digital inclusive finance can increase the income of rural residents, promote family entrepreneurship, and achieve inclusive economic growth[4]. Meanwhile, digital inclusive finance can alleviate liquidity constraints, reduce the income gap between urban and rural areas, and promote common prosperity[5]. Lastly, the development of digital inclusive finance can provide equal opportunities, enhance residents' sense of social trus[6], and help them realize self-worth. Based on this, Hypothesis 1 is proposed.

Hypothesis 1: The development of digital inclusive finance can enhance the well-being of rural residents.

2.2. The Mechanism of Digital Inclusive Finance's Impact on the Well-being of Rural Residents

The impact of digital inclusive finance development on the income of rural residents is mainly reflected in the following aspects: First, digital inclusive finance helps financial products serve customers more conveniently and efficiently[7], alleviating financial exclusion caused by information asymmetry, lowering the barriers to financial access, and easing liquidity constraints[8], enabling vulnerable groups to access financial services and promoting income growth for rural residents. Second, digital inclusive finance exhibits positive spatial spillover effects, significantly reducing poverty rates in related regions[9] and increasing the income of rural residents in neighboring areas. Third, the development of digital inclusive finance can drive economic growth, raise residents' relative income levels, and effectively mitigate the long-tail effects of relative poverty[10]. At the same time, it promotes industrial development to some extent, creating new employment opportunities for rural residents, fostering non-agricultural employment, and facilitating industrial upgrades in rural areas.

Regarding the impact of increased rural residents' income on well-being: existing literature shows a positive correlation between individual income and well-being, with the effect being more pronounced in relatively poor areas[11]. Some studies also suggest that there is an inverted U-shaped relationship between absolute income and residents' well-being[12]. Given that material resources in most rural areas of China are relatively scarce compared to cities, and rural residents' needs are more focused on physiological and safety needs, this paper proposes Hypothesis 2.

Hypothesis 2: Digital inclusive finance can enhance the well-being of rural residents by increasing their income.

The impact of digital inclusive finance on rural residents' entrepreneurship is mainly reflected in the following aspects: On one hand, financial constraints are a major factor limiting residents' entrepreneurship[13]. Digital inclusive finance, leveraging the advantages of the internet, lowers the barriers for rural residents to access loans and increases the availability of financial loans. It also reduces the time and financial costs associated with loans for rural residents, expands the scope of financial services, and alleviates the credit constraints, thereby boosting entrepreneurial activity among residents[14]. On the other hand, the development of digital inclusive finance not only optimizes the industrial structure[15], but also creates new entrepreneurial opportunities for rural residents[16], continuously enhancing their entrepreneurial activity.

Regarding the impact of entrepreneurship on the well-being of rural residents: some scholars argue that entrepreneurship can increase the relative income of rural residents, enhancing their satisfaction with both material and non-material needs, thereby improving their well-being [17]. Other scholars suggest that entrepreneurial activities carry certain risks, which can lead to mental stress for entrepreneurs and potentially result in a series of negative emotions, ultimately decreasing life satisfaction. Considering that entrepreneurship can bring substantial income increases to rural residents, reduce income disparities, and enhance self-worth, thereby improving their trust and satisfaction in society, we propose Hypothesis 3.

Hypothesis 3: Digital inclusive finance can enhance the well-being of rural residents by promoting their entrepreneurship.

Impact of Digital Inclusive Finance on the Financial Literacy of Rural Residents: On one hand, with the development of digital inclusive finance, the infrastructure for digital technology is gradually being improved. Digital inclusive finance relies on big data platforms to provide rural residents with a platform for learning and exchanging financial knowledge [18], effectively alleviating information constraints and helping to enhance their digital and financial literacy. On the other hand, digital inclusive finance broadens the communication scope of rural residents' social networks,

promoting social interactions among them. Through these interactions, they exchange and learn financial knowledge[19], which increases their attention to financial knowledge and, in turn, enhances their financial literacy.

Impact of Financial Literacy of Rural Residents on Happiness: The level of financial literacy reflects the degree of mastery of financial knowledge and skills among residents, which significantly influences their ability to make reasonable financial decisions, avoid investment risks, and accumulate family wealth[20]. This, in turn, has a positive effect on the happiness of rural residents. However, some scholars argue that a higher level of financial literacy may actually reduce the family happiness of rural residents[21]. Considering that improvements in financial literacy can bring greater marginal benefits to rural areas, achieve common prosperity, and enhance the happiness of rural residents[22], we propose Hypothesis 4.

Hypothesis 4:Digital inclusive finance can enhance the happiness of rural residents by improving their financial literacy.

3. Research Design

This paper combines the development index of digital inclusive finance in China with data from the China Household Finance Survey (CHFS) to analyze how digital inclusive finance affects the happiness of rural residents. The relevant research design is as follows.

3.1. Data Sources

The empirical data used in this study primarily comes from the China Household Finance Survey (CHFS) and the Digital Inclusive Finance Index compiled by Peking University's Digital Research Center. Other macroeconomic indicators are sourced from the China Statistical Yearbook and the Wind database, among others. The CHFS data includes surveys conducted in 2015, 2017, and 2019, while the Digital Inclusive Finance Index covers data from 2011 to 2020. Since the CHFS only provides information on the provincial level regarding the households surveyed, the core control variables and regional macro control variables are based on provincial-level data. To explore the impact of digital inclusive finance on rural residents' happiness, this study selects individuals aged 18 to 70 who are heads of households residing in rural areas from the CHFS data. After excluding invalid data due to missing key variables and outliers, a total of 29,627 valid samples are retained.

3.2. Model Specification

Since the dependent variable is ordered discrete data, this study employs an Ordered Probit fixed effects model. The baseline model is constructed as follows:

$$happiness_{i,t} = \beta_0 + \beta_1 index_{i,t} + \gamma X_{i,t} + u_t + v_i + \varepsilon_{i,t} \quad (1)$$

In the model, $happiness_{i,t}$ represents the subjective well-being of respondent i in year t, while $index_{i,t}$ denotes the total index of digital inclusive finance development for respondent i in year t. and $X_{i,t}$ includes the individual characteristic variables, family characteristic variables, and provincial macro variables. The individual characteristic variables comprise the respondent's age, age squared, gender, marital status, education level, health status, and political affiliation. The family characteristic variables include family size and annual household income, while the provincial macro variables consist of per capita GDP and the level of government intervention. u_t and v_t represent time and regional fixed effects, respectively.

3.3. Variable Description

3.3.1. Dependent Variable

The dependent variable in this study is rural residents' happiness. Happiness is measured using a question from the CHFS survey, which asks, "Overall, do you feel happy now?" The response options include "very unhappy," "unhappy," "neutral," "happy," and "very happy." These options are assigned values from 1 to 5, with higher scores indicating stronger feelings of happiness among respondents. Additionally, considering the availability of CHFS data and other core indicators, this study selects continuous cross-sectional data from the years 2015, 2017, and 2019 for the research period.

3.3.2. Core Independent Variable

The core explanatory variable in this study is the Digital Inclusive Finance Development Index, which is primarily measured through the provincial-level Digital Inclusive Finance Development Index. The construction of this index draws on the research of Guo Feng et al. [23]. This index not only includes the overall Digital Inclusive Finance Development Index but also encompasses indicators such as the breadth of digital financial coverage, the depth of digital financial usage, and the degree of digitalization of inclusive finance. These indicators collectively showcase the development status of digital inclusive finance across different regions from multiple dimensions.

3.3.3. Control Variables

According to existing literature, this paper selects control variables from personal, family, and provincial economic perspectives (Zhou Tianyun, 2023). Personal characteristic variables include age, age squared, gender, marital status, education level, health status, and political affiliation. Family characteristic variables include family size and annual family income. Provincial macro characteristic variables include per capita GDP and level of government intervention. The specific definitions of the variables are shown in Table 1, and the descriptive statistical results are shown in Table 2.

4. Empirical Tests and Analysis

4.1. Analysis of Baseline Regression Results

Table 3 presents the baseline regression results of the impact of the digital inclusive finance development index on rural residents' happiness. In regression (1), the effect of the digital inclusive finance total index on rural residents' happiness is analyzed. The results indicate that, after controlling for individual characteristics, family characteristics, and provincial macro variables of rural residents, the digital inclusive finance index is significant at the 1% level, with an estimated coefficient of 0.458. This suggests that a higher digital inclusive finance index is associated with greater happiness among rural residents, indicating that the development of digital inclusive finance significantly enhances the happiness of rural residents.

Columns (2), (3), and (4) of Table 3 report the regression results when using the digital inclusive finance coverage breadth index, usage depth index, and digitalization degree index as core explanatory variables. The regression results indicate that all three sub-indices of digital inclusive finance development have a significant positive effect on the happiness of rural residents. This suggests that digital inclusive finance can enhance rural residents' happiness by

expanding the coverage of financial service institutions, increasing access to electronic accounts that are not limited by geography, and improving the convenience of financial services. At the same time, digital inclusive finance also lowers the entry barriers for financial services by increasing the variety of financial service types, enabling previously marginalized groups excluded by traditional finance to access financial services, thereby boosting rural residents' happiness. The significant effect of digitalization indicates that the development of digital inclusive finance reduces the costs of financial transactions and services, enhancing the convenience of financial transactions for rural residents and, consequently, increasing their happiness.

Table 1. Variable Definitions and Explanations

	Variable Names	definition
Dependent Variable	happiness	"Very unhappy" = 1, "Unhappy" = 2, "Neutral" = 3, "Happy" = 4, "Very happy" = 5
Independent Variable	index	Digital Inclusive Finance Index/100
	breadth	Breadth of Coverage Index/100
	depth	Depth of Usage Index/100
	level	Degree of Digitalization/100
Control Variables	gender	Male=1, Female=0
	age	Age (18-70 years)
	age2	Age Squared
	party	Party Member=1, Non-Party Member=0
	marriage	Married=1, Others=0
	health	Very Poor=1, Poor=2, Average=3, Good=4, Very Good=5
	edu	No Schooling=0, Primary School=1, Junior High School=2, Senior High School/Vocational/Technical School=3, Associate/Bachelor's Degree=4, Master's/Doctorate=5
	Inincome	Total Household Income (log)
	size	Number of Household Members
	Ingdp	Provincial Per Capita GDP (log)
	expenditure	Provincial Government Fiscal Expenditure/Provincial GDP

Table 2. Descriptive Statistics

	N	mean	sd	min	median	max
happy	29627	3.779	0.863	1	4	5
happy_dum	29627	0.647	0.478	0	1	1
index	29627	2.712	0.474	1.933	2.672	4.103
breadth	29627	2.472	0.52	1.596	2.414	3.847
depth	29627	2.599	0.702	1.253	2.759	4.399
level	29627	3.708	0.399	3.01	3.829	4.629
age	29627	53.891	10.031	18	54	70
age2	29627	3004.83	1045.698	324	2916	4900
gender	29627	0.885	0.32	0	1	1
marriage	29627	0.899	0.301	0	1	1
edu	29627	1.559	0.883	0	2	5
health	29627	3.17	1.021	1	3	5
party	29627	0.094	0.292	0	0	1
lnincome	29627	9.868	1.986	0	10.271	15.878
size	29627	3.807	1.783	1	4	19
lngdp	29627	10.891	0.344	10.172	10.841	12.009
expenditure	29627	0.243	0.095	0.12	0.229	0.628

4.2. Endogeneity and Robustness Tests

4.2.1. Endogeneity Issues

When studying the impact of digital inclusive finance on the happiness of rural residents, endogeneity issues may arise due to reverse causality or omitted variables. Since the happiness of rural residents is unlikely to significantly influence the level of digital inclusive finance development in their regions, the reverse causality of the model is greatly minimized (Yin Zhichao et al., 2023). However, the residuals may include some key explanatory variables that affect both the digital inclusive finance index and the happiness of rural residents, leading to biased estimates in this study. To address the endogeneity problem caused by omitted variables, an instrumental variable approach is employed.

Table 3. Baseline Regression Results

	(1)	(2)	(3)	(4)
	happiness	happiness	happiness	happiness
index	0.458***			
	(0.149)			
breadth		1.573***		
		(0.215)		
depth			0.239**	
			(0.096)	
level				0.155***
				(0.046)
age	-0.045***	-0.045***	-0.045***	-0.045***
	(0.005)	(0.005)	(0.005)	(0.005)
age2	0.001***	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)
gender	0.019	0.018	0.020	0.020
	(0.022)	(0.022)	(0.022)	(0.022)
marriage	0.235***	0.235***	0.235***	0.235***
	(0.024)	(0.024)	(0.024)	(0.024)
edu	0.006	0.006	0.006	0.005
	(0.008)	(0.008)	(0.008)	(0.008)
health	0.215***	0.216***	0.215***	0.215***
	(0.007)	(0.007)	(0.007)	(0.007)
party	0.159***	0.159***	0.159***	0.159***
	(0.022)	(0.022)	(0.022)	(0.022)
size	-0.001	-0.001	-0.001	-0.001
	(0.004)	(0.004)	(0.004)	(0.004)
lnincome	0.035***	0.035***	0.035***	0.035***
	(0.003)	(0.003)	(0.003)	(0.003)
lngdp	-0.717***	-1.151***	-0.576***	-0.646***
	(0.209)	(0.211)	(0.198)	(0.201)
expenditure	-3.364***	-4.103***	-3.148***	-3.301***
	(0.838)	(0.840)	(0.834)	(0.837)
_cons	-9.453***	-11.785***	-8.477***	-9.282***
	(2.499)	(2.481)	(2.456)	(2.483)
Year_effect	Yes	Yes	Yes	Yes
prov_effect	Yes	Yes	Yes	Yes
N	29627	29627	29627	29627

Note: *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively; the values in parentheses are robust standard errors; the same applies below.

Table 4. Endogeneity Test: Instrumental Variable Regression

	(1)	(2)
	First Stage	Second Stage
	index	happiness
internet	0.009***	
	(0.001)	
index		1.679***
		(0.190)
control variables	Yes	Yes
prov_effect	Yes	Yes
year_effect	Yes	Yes
N	29627	29627
r2	0.949	0.085
First Stage F-statistic		1655.073
Prob>F		0.000***

The development of the internet is a prerequisite for the growth of digital inclusive finance, as the internet provides the necessary technical support for it. Additionally, the penetration rate of the internet is not directly related to the happiness of rural residents. Based on this, this study considers the "internet penetration rate" to be a suitable instrumental variable. Table 4 presents the regression results using the instrumental variable approach. Column (1) displays the results of the first stage of the regression, where the coefficient for the internet penetration rate is significant at the 1% level and has a positive sign, indicating that a higher internet penetration rate correlates with a higher level of

digital inclusive finance. Column (2) shows the results of the second stage of the regression. After controlling for endogeneity issues, the estimated coefficient for the happiness of rural residents remains significantly positive, suggesting that digital inclusive finance has a notable and robust impact on the happiness of rural residents. Furthermore, the first-stage F-value exceeds the critical value of 10, indicating that the instrumental variable passes the weak instrument test. The p-value of 0.000 leads us to reject the null hypothesis of underidentification, thus confirming that the selection of the instrumental variable in this study is reasonable.

4.2.2. Sample Reduction

Due to the influence of factors such as residents' economic level and age on the impact of digital inclusive finance on rural residents' happiness, students and elderly individuals have relatively weak demand for financial services, resulting in a weaker impact from digital inclusive finance. Therefore, this study retains the sample of individuals aged 18 to 60 and conducts the regression analysis again. The regression results in column (1) of Table 5 indicate that the coefficient for digital inclusive finance on rural residents' happiness remains significantly positive, confirming the robustness of previous research.

4.2.3. Change Regression Model

To further ensure the robustness of the regression results, an ordered logit regression model and an ordinary least squares (OLS) regression model were reselected for verification. The model results are shown in columns (2) and (3) of Table 5. The regression results indicate that, regardless of whether the ordered logit regression model or the OLS regression model is used, the coefficient of the explanatory variable, digital inclusive finance, remains significantly positive. Thus, it can be concluded that digital inclusive finance has a significant positive effect on enhancing the happiness of rural residents.

Table 5. Robustness Test

	(1) Sample Reduction	(2) Ordered Logitt	(2) ols
	(1)	(2)	(3)
	happiness	happiness	happiness
index	0.321*	0.661**	0.341***
	(0.179)	(0.259)	(0.113)
control variables	Yes	Yes	Yes
prov_effect	Yes	Yes	Yes
year_effect	Yes	Yes	Yes
N	20444	29627	29627
r2	0.045	0.046	0.109

4.3. Mechanism Analysis

Digital inclusive finance enhances rural residents' happiness by increasing their income. Since income is one of the important factors affecting the happiness of rural residents, this paper uses the per capita absolute income of respondents' households as a mediating variable, with the regression results shown in Table 6. The results in column (1) indicate that, after controlling for other variables, the coefficient for the impact of the digital inclusive finance index on the happiness of rural residents is positive and significant at the 1% level. The results in column (2) show that the impact of the digital inclusive finance index on household per capita income is significantly positive. In column (3), adding the household per capita income variable to the model, both the coefficients for the digital inclusive finance index and household per capita income remain positive and significant at the 1% level. The results in Table 6 confirm the mediating effect of household per capita income, indicating that digital inclusive finance improves rural residents' happiness by increasing their income, thereby validating Hypothesis 2 of this study.

Table 6. Mechanism Analysis: Income of Rural Residents

	(1)	(2)	(3)
	happiness	lnincome_per	happiness
index	0.458***	0.083***	0.439***
	(0.149)	(0.023)	(0.149)
lnincome_per			0.228***
			(0.038)
control variables	Yes	Yes	Yes
prov_effect	Yes	Yes	Yes
year_effect	Yes	Yes	Yes
N	29627	29627	29627
r2	0.047	0.090	0.047

Digital inclusive finance development enhances the happiness of rural residents by promoting entrepreneurship. To test this hypothesis, this study uses rural residents' entrepreneurial situation as a mediating variable, with the specific results shown in Table 7. The regression result in column (2) indicates that the coefficient for entrepreneurship is 0.418 and is significantly positive, suggesting that the development of digital inclusive finance can promote entrepreneurship among rural residents. The regression results in column (3), which include both the digital inclusive finance index and the entrepreneurship index, demonstrate that both indices significantly and positively affect the happiness of rural residents, thereby validating Hypothesis 3.

Table 7. Mechanism Analysis: Rural Residents' Entrepreneurship

	(1)	(2)	(3)
	happiness	job	happiness
index	0.458***	0.418*	0.451***
	(0.149)	(0.226)	(0.149)
job			0.051***
			(0.020)
control variables	Yes	Yes	Yes
prov_effect	Yes	Yes	Yes
year_effect	Yes	Yes	Yes
N	29627	29627	29627
r2	0.047	0.120	0.047

The development of digital inclusive finance enhances the financial literacy of rural residents, thereby improving their sense of happiness. Digital inclusive finance can increase rural residents' attention to financial-related information and enhance their financial literacy, leading to better financial decision-making and, consequently, improved welfare. This ultimately benefits rural residents' perception of happiness. Therefore, this study introduces a third type of mediating variable: the level of attention rural residents pay to financial markets. The specific results are shown in Table 8. The estimation results indicate that the development of digital inclusive finance significantly improves the financial literacy of rural residents, which in turn enhances their happiness, thus validating Hypothesis 4 of this study.

Table 8. Mechanism Analysis: Financial Literacy of Rural Residents

	(1)	(2)	(3)
	happiness	finit	happiness
index	0.458***	1.690***	0.452***
	(0.149)	(0.154)	(0.149)
finit			0.027***
			(0.007)
control variable	Yes	Yes	Yes
prov_effect	Yes	Yes	Yes
year_effect	Yes	Yes	Yes
N	29627	29627	29627
r2	0.047	0.040	0.047

4.4. Heterogeneity Analysis

After considering the overall impact of digital inclusive finance on the happiness of rural residents, it is necessary to further examine the differences in the impact of digital inclusive finance on the happiness of various types of rural residents. Therefore, this study conducts subsample regressions to test heterogeneity by grouping rural residents based on region, gender, and age, respectively, to investigate the influence of digital inclusive finance on the happiness of different groups of rural residents.

4.4.1. Heterogeneity of the Impact of Digital Inclusive Finance on Different Regions

Considering the regional differences in China's economic development, this study divides the sample areas into three subsamples: East, Central, and West, and examines the differences in the impact of digital inclusive finance on the happiness of rural residents. The results, as shown in Table 9, indicate that the impact coefficient of digital inclusive finance on the happiness of rural residents is significantly positive in the Eastern and Central regions, while it does not pass the significance test in the Western region. This suggests that the enhancement effect of digital inclusive finance on the happiness of rural residents is significant in the Central and Eastern regions. The main reason may be that the economic development in rural areas of the West is relatively lagging, and the relevant facilities, such as the internet, are not sufficiently complete and developed. As a result, the digital inclusive finance services available are limited, leading to a less pronounced effect on the happiness of rural residents.

Table 9. Heterogeneity Analysis: Regional Level

	region==1	region==2	region==3
	(1)	(2)	(3)
	happiness	happiness	happiness
index	0.572*	1.053*	-0.162
	(0.321)	(0.598)	(0.391)
control variables	Yes	Yes	Yes
prov_effect	Yes	Yes	Yes
year_effect	Yes	Yes	Yes
N	10433	10080	9114
r2	0.053	0.041	0.054

4.4.2. Heterogeneity of the Impact of Digital Inclusive Finance by Gender

To explore the differences in how digital inclusive finance enhances the happiness of rural residents across different genders, the total sample is divided into two subsamples: males and females. The results presented in Table 10 indicate that both male and female rural residents experience a significant positive impact on their happiness from digital inclusive finance. However, the coefficient for female happiness is significant at the 1% level, while the coefficient for male happiness is significant at the 5% level. This suggests that the effect of digital inclusive finance on enhancing the happiness of rural women is greater than that for rural men. In rural society, men generally hold a higher financial status than women, and women are more likely to face discrimination in traditional financial services. Digital inclusive finance lowers the barriers to accessing financial services, significantly increasing the likelihood of rural women obtaining loans, thereby enhancing their overall happiness.

Table 10. Heterogeneity Analysis: Gender Perspective

	sex==1	sex==0
	(1)	(2)
	happiness	happiness
index	0.322**	1.338***
	(0.160)	(0.425)
control variables	Yes	Yes
prov_effect	Yes	Yes
year_effect	Yes	Yes
N	26206	3421
r2	0.046	0.053

4.4.3. Heterogeneity of Digital Inclusive Finance's Impact by Age

Table 11. Heterogeneity Analysis: Age Level

	age<45	Age>=45
	(1)	(2)
	happiness	happiness
index	0.156	0.490***
	(0.371)	(0.165)
control variables	Yes	Yes
prov_effect	Yes	Yes
year_effect	Yes	Yes
N	5218	24409
r2	0.054	0.047

There are differences in the adaptability of different age groups to digital finance. To explore the impact of digital

inclusive finance on the happiness of rural residents across various age groups, the total sample was divided into two sub-samples: youth (under 45 years old) and middle-aged and elderly (45 years old and above). As shown in Table 11, digital inclusive finance significantly enhances the happiness of the middle-aged and elderly population in rural areas. In rural areas, middle-aged and elderly farmers often have limited access to information, and savings and borrowing typically require the assistance of rural credit agents. Digital inclusive finance offers a more convenient solution, providing faster and more efficient financial services to rural middle-aged and elderly residents, thereby enhancing their happiness

5. Conclusion and Policy Recommendations

This paper utilizes the Digital Inclusive Finance Development Index and data from the China Household Finance Survey (CHFS) to investigate the impact of digital inclusive finance on the happiness of rural residents and its mechanisms. The main conclusions are as follows:

First, digital inclusive finance can effectively enhance the happiness of rural residents. Among its three dimensions—coverage breadth, usage depth, and digitalization level—each has a positive and significant impact on rural residents' happiness, and this conclusion holds even after addressing endogeneity issues and conducting robustness tests.

Second, digital inclusive finance can improve the happiness of rural residents by increasing their income, promoting entrepreneurship, and enhancing financial literacy.

Third, the heterogeneity analysis indicates that the impact of digital inclusive finance on happiness is greater for rural residents in the eastern and central regions of China, as well as for rural women and middle-aged and older adults, compared to its effect on those in the western rural areas, rural males, and younger rural residents.

Based on the above conclusions, this paper presents the following policy recommendations:

First, accelerate the development of digital inclusive finance and further improve the digital inclusive finance system. In rural areas, the development of digital inclusive finance should be tailored to local conditions by launching financial products suitable for rural residents. At the same time, it is essential to enhance the internet infrastructure in rural areas to expand the breadth and depth of digital inclusive finance, thereby improving accessibility for rural residents and making financial services more convenient and efficient.

Second, promote the modernization of education in rural areas by deeply integrating education with technology. The widespread "digital divide" in rural areas hinders residents from effectively utilizing digital finance. Therefore, combining education with digital technology to enhance the financial literacy of rural residents is crucial for advancing digital inclusive finance initiatives. Given the higher proportion of middle-aged and older individuals in rural areas, the government should allocate more knowledgeable financial professionals to rural regions to promote digital inclusive finance services and increase residents' awareness of digital finance, thereby improving their financial literacy. Simultaneously, attention should be paid to providing technological education to the younger generation in rural areas to narrow the educational gap with urban areas and transform the "digital divide" into a "digital dividend."

Third, improve the financial regulatory system to ensure the healthy and sustainable development of digital inclusive finance. As an emerging financial industry, digital inclusive finance faces challenges such as an incomplete regulatory system and inadequate legal frameworks. To ensure stable and sustainable growth in digital inclusive finance, relevant government departments should introduce appropriate laws and policies to provide a legal basis for financial services. Additionally, it is crucial to strengthen regulatory oversight of financial institutions and establish comprehensive supervision processes to ensure that more rural residents can access safe and reliable digital inclusive finance services.

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