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Investigation into the Influence of Digital Financial Inclusion on Rural Renewal

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Abstract: This research examines the pathways through which digital inclusive finance impacts rural renewal, utilizing panel data collected from various Chinese provinces and cities between 2015 and 2020. The study utilizes panel individual fixed effects and mediation effect models for analysis. Findings reveal that digital inclusive finance markedly advances rural revitalization by mitigating the credit constraints faced by the "three rural" sectors (rural areas, farmers, and agriculture), thereby creating a comprehensive framework for rural development. Furthermore, digital inclusive finance fosters agricultural modernization, enhances the construction of picturesque rural areas, and contributes to common prosperity. Although regional disparities exist, with the western and eastern regions experiencing a more substantial impact compared to the central region, no significant differences were observed between the northern and southern regions.

Keywords: Digital Financial Inclusion, Agricultural Income, Rural Development, Financing of Rural Industries

1. Introduction

The 20th National Congress of the Communist Party of China underscored the crucial need for all-encompassing rural revitalization, highlighting that the toughest challenges in building a modern socialist nation are based in rural settings. Within the strategic goals of the 14th Five-Year Plan, digital inclusive finance has emerged as a powerful financial model with significant advantages for rural renewal. This research intends to explore how digital inclusive finance can energize rural renewal, fostering the comprehensive development of agriculture, rural areas, and the farming community. By examining these factors, it seeks to provide valuable insights for policy formulation and practical applications.

In the realm of the third technological revolution, the evolution of digital finance has greatly accelerated the advancement of inclusive finance [1]. This innovative financial model lowers the barriers and costs of accessing financial services, improves the reach and efficiency of conventional financial systems, and alleviates financing challenges faced by low-income groups and small to medium-sized enterprises [2]. It creates new opportunities for household economic activities [3], corporate economic ventures [4], and monetary policy implementations [5].

Research on the effects of inclusive finance on rural renewal generally focuses on two main areas. First, the growth of inclusive finance increases the accessibility of financial services in rural regions.

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Digital inclusive finance is believed to enhance the growth of internet-based credit systems, thereby improving financial accessibility in rural areas [6]. The advancement of digitalization in rural finance is considered a major driver of rural renewal [7]. Second, inclusive finance aids rural renewal by fostering rural entrepreneurship [8] and integrating rural industries [9].

Existing studies have primarily focused on defining and interpreting the concepts and implications of inclusive finance and rural renewal. These studies confirm the positive impact of digital inclusive finance on promoting rural economic development. However, a comprehensive theoretical framework that examines the interactions and underlying mechanisms between inclusive finance and rural revitalization remains undeveloped.

To address this gap in current research landscape, this study aims to build a model to analyze the effect of the inclusive finance index on rural renewal. Furthermore, it employs a mediation effect model to investigate the transmission pathways and mechanisms associated with credit constraints in agriculture, rural areas, and the farming sector. Through this approach, the study seeks to clarify how inclusive finance can positively impact rural renewal by improving credit availability for agricultural activities, rural communities, and farmers.

2. Research Hypotheses

Existing studies have thoroughly examined how digital inclusive finance contributes to rural economic growth. Utilizing digital inclusive finance, digital technology significantly reduces the barriers to financial services [10], thereby improving the access of rural areas to these services and effectively revitalizing rural market economies [11].

In addition to providing financial services, digital inclusive finance aids in optimizing the rural industrial structure and supports the transition to modernized agriculture [12].

From this analysis, we derive our first hypothesis:

H1: Digital inclusive finance can significantly enhance the progress of rural renewal.

The digital inclusive finance index is thought to boost rural revitalization by broadening the financing avenues available to agriculture, rural regions, and farmers, overcoming service limitations, and improving financial accessibility and efficiency [13]. Consequently, this paper presents the second hypothesis:

H2: The digital inclusive finance index facilitates rural renewal by expanding financing channels for agriculture, rural regions, and farmers.

3. Research Design

3.1. Data Sources and Variable Selection

This research focuses on 31 municipalities, autonomous regions, and provinces in China, with Taiwan, Macau, and Hong Kong excluded, spanning the period from 2015 to 2020. The primary data sources utilized are the Digital Inclusive Finance Index from Peking University, the National Bureau of Statistics, the "China Rural Statistical Yearbook," the "China Statistical Yearbook," and the Wind database.

3.1.1. Explained Variable

Rural Revitalization Index: This study constructs a system to evaluate rural revitalization based on three secondary indicators: agriculture, rural areas, and farmers, as illustrated in Table 1. The entropy method is used to determine the weights and calculate the rural revitalization index.

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Table 1: Construction of Rural Revitalization Indicators

Primary	Secondary	Tertiary	Specific Definition of Indicators
Rural Revitalization Index	Agriculture	Agricultural Disaster Resistance	Effective Irrigated Area
		Degree of Agricultural Mechanization	Total Agricultural Machinery Power
		Agricultural Production Capacity	Total Value of Agricultural Output
	Rural	Forest Coverage Rate	Forest Coverage Rate
		Internet Usage Rate	Number of Rural Broadband Access Users
		Rural Healthcare Availability	Number of Rural Health Workers per 10,000 People
	Farmers	Rural Residents' Income Level	Per Capita Disposable Income of Rural Residents
		Income Balance	Income Ratio between Rural and Urban Residents
		Proportion of Private Vehicles	Number of Household Cars per 100 Rural Households

3.1.2. Variable Descriptive Statistics

Table 2 shows the descriptive statistics for each variable. The data reveal significant variability in the rural revitalization index across different provinces, cities, and autonomous regions. The minimum index value is only 16.3% of the mean, which is substantially lower than the ratio of the mean to the maximum value. This highlights considerable disparities in the rural revitalization index among the various provinces and regions.

Table 2: Descriptive Statistics

Variable Type	Variable	Mean	Standard Deviation	Minimum	Maximum	Sample Size
Explained Variable	Rural Revitalization Index	0.48	0.157	0.076	0.812	186
	Agriculture	0.907	0.295	0.187	1.359	186
	Rural	0.287	0.118	0.03	0.553	186
	Farmers	1.083	0.541	0.253	2.823	186
Explanatory Variable	Digital Inclusive Finance Index	281.261	53.029	186.38	431.93	186
	Depth of Use Index	270.168	71.098	125.25	488.68	186
	Breadth of Coverage Index	260.244	56.834	139.87	397	186

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Table 2: (continued).

Mediating Variables	Farmers' Loans	0.607	0.119	0.315	0.892	186
	Rural Loans	0.158	0.026	0.107	0.205	186
	Agricultural Loans	0.094	0.052	0.003	0.241	186
	Loans Related to Agriculture	0.302	0.209	0.12	1.325	186
Control Variables	Urbanization Rate	27865.928	23047.424	1043	111151.6	186
	Level of Education Development	0.48	0.157	0.076	0.812	186
	Economic Structure	0.907	0.295	0.187	1.359	186
	Government Intervention	0.287	0.118	0.03	0.553	186
	Level of Economic Development	1.083	0.541	0.253	2.823	186

3.2. Model Construction

3.2.1. Baseline Setting

$$Rural_{i,t} = \alpha_0 + Dfi_{i,t} + \alpha_2 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

In this equation, $Rural_{i,t}$ denotes the rural revitalization index of province i in year t, $Dfi_{i,t}$ stands for the digital inclusive finance index of province i in year t, and $X_{i,t}$ denotes control variables. μ_i indicates individual fixed effects, accounting for region-specific factors that remain constant over time, while δ_t signifies time fixed effects, which control for economic development differences in the same region due to different periods. $\varepsilon_{i,t}$ is the random error term, and α_0, α_1, α_2 are coefficients of the variables.

3.2.2. Construction of Mediation Effect Model

Mediation effect models are established for four mediating variables to test the hypotheses. The dependent variable from equation (1), the rural revitalization index, is replaced sequentially by the variables in equations (2), (3), and (4), which are farmers' financing, agricultural financing, and agricultural-related financing. For the dependent variable in equation (4), the tests are conducted separately using loans related to agriculture and loans for agriculture, forestry, fishery, and animal husbandry.

Transmission Mechanism:

$$Iffe_{i,t} = \omega_0 + \omega_1 Df_{i,t} + \omega_2 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

$$Fegf_{i,t} = \varphi_0 + \varphi_1 Df_{i,t} + \varphi_2 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (3)$$

$$Feai_{i,t} = \emptyset_0 + \emptyset_1 Df_{i,t} + \emptyset_2 X_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (4)$$

4. Empirical Results and Analysis

4.1. Baseline Regression Findings and Examination

Prior to choosing the appropriate model and performing regression analyses, a multicollinearity test was carried out to verify the reliability of the results. The average Variance Inflation Factor (VIF)

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value was significantly below the threshold of 10, confirming that multicollinearity is not a serious concern in the model. Furthermore, the Hausman test confirmed that a fixed effects model is the most suitable choice. As a result, this study employs an individual fixed effects regression model. The baseline regression results for the primary indicator, the Rural Revitalization Index, and the secondary indicators, namely Agriculture, Rural Areas, and Farmers, are presented in Table 3.

The analysis in column (1) highlights a significant positive association between the Rural Revitalization Index and the Digital Inclusive Finance Index. Specifically, an increase of 1 percentage point in the Digital Inclusive Finance Index corresponds to a 0.342% increase in the Rural Revitalization Index. This indicates that the advancement of digital finance, through mechanisms such as digitalization, can effectively compensate for the limitations of traditional financial services in rural areas, thereby promoting broader rural revitalization.

To delve deeper into the specific impacts of the Digital Inclusive Finance Index on the three secondary indicators, separate fixed effects model regression analyses were conducted for rural areas, farmers, and agriculture, as shown in columns (2), (3), and (4) of Table 3. The findings reveal that the Digital Inclusive Finance Index positively correlates with all three areas, indicating its crucial role in fostering agricultural modernization, enhancing the development of rural areas, and achieving common prosperity.

The results demonstrate statistical significance at the 1% level for the influence of the Digital Inclusive Finance Index on both rural areas and farmers. However, the impact on agriculture is comparatively weaker. This discrepancy may be attributed to the unique characteristics of agricultural products, which have long production cycles and short sales periods, leading to a high price elasticity coefficient. These factors make it challenging to implement digital inclusive financial policies, such as loans, mortgages, and guarantees, effectively within the agricultural sector.

Additionally, the study incorporates several control variables, such as the level of economic development, government intervention, urbanization rate, economic structure, and the level of education development. The findings indicate that the proportion of the primary industry significantly influences the various indicators of the "three rural" areas, underscoring the importance of considering these factors in the analysis.

Table 3: Baseline Regression Results

Explanatory Variable	(1) Rural Revitalization Index	(2) Agriculture	(3) Rural	(4) Farmers
Digital Inclusive Finance Index	0.342***	0.135	0.249***	1.172***
	(6.248)	(1.570)	(3.063)	(4.001)
Control Variables	Controlled	Controlled	Controlled	Controlled
Sample Size	186	186	186	186
R^2	0.914	0.593	0.752	0.910

Note: T-values are in parentheses. *, **, *** indicate significance at the 10%, 5%, and 1% levels, respectively. Same below.

4.2. Mediation Effect Regression Results and Analysis

Farmers' Financing Status: The analysis presented in column (1) of Table 4 investigates the impact of digital inclusive finance on micro-level inclusive finance specifically for farmers. The results indicate a significant positive effect, suggesting that the development of digital inclusive finance significantly improves the efficiency of farmers' access to financing. By easing the challenges associated with obtaining loans, digital inclusive finance helps to bridge the income gap between

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urban and rural areas. This improvement in financial accessibility allows farmers to invest more effectively in their agricultural activities, contributing to overall economic stability and growth in rural regions.

Rural Industry Financing Status: Similarly, column (2) of Table 4 explores the direct impact of digital inclusive finance on rural revitalization efforts. The findings reveal a significant positive effect at the 1% level, indicating that digital inclusive finance plays a crucial role in supporting the financial needs of rural industries. By providing better access to financial resources, digital inclusive finance enables rural businesses to expand and innovate, thereby fostering economic development and enhancing the quality of life in rural communities.

Agricultural Industry Financing Status: The analysis also examines the relationship between the Digital Inclusive Finance Index and loans allocated to various sectors within agriculture, including forestry, fishery, and animal husbandry. The results show a significant positive correlation, confirming the existence of mediation effects. This indicates that the advancement of digital inclusive finance facilitates the growth of the agricultural industry by increasing access to essential loans. These loans provide the necessary financial support for farmers to invest in modern agricultural practices, improve productivity, and sustain their operations, ultimately contributing to the overall development and modernization of the agricultural sector.

Table 4: Mediation Effect Regression Results

Explanatory Variable	(1) Farmers' Loans	(2) Rural Loans	(3) Agriculture, Forestry, Fishery, and Animal Husbandry Loans	(4) Agriculture-related Loans
Digital Inclusive Finance Index	7.764**	11.371***	6.417**	13.670***
	(2.610)	(2.931)	(2.680)	(3.153)
Control Variables	Controlled	Controlled	Controlled	Controlled
Sample Size	186	186	186	186
R^2	0.227	0.208	0.202	0.222

4.3. Robustness Test

4.3.1. Variable Substitution

In this study, the Digital Inclusive Finance Index is replaced with its sub-indices: coverage breadth and usage depth. The coverage breadth indicates the extent of population engagement in digital inclusive finance, offering a clearer picture of its development in the examined regions. Consequently, it is incorporated into the subsequent robustness tests.

The table demonstrates that substituting the explanatory variable maintains a significant positive correlation with the Rural Revitalization Index, irrespective of the inclusion of control variables, thereby confirming the robustness of the results after variable substitution.

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Table 5: Robustness Test

Explanatory Variable	(1)	(2)
	Rural Revitalization Index	Rural Revitalization Index
Coverage Breadth Index	0.290***	
	(5.306)	
Usage Depth Index		0.070**
		(2.430)
Control Variables	Controlled	Controlled
Sample Size	186	186
R^2	0.905	0.890

4.3.2. Truncation Processing

The descriptive statistics of the variables show significant differences in the explanatory and explained variables across different provinces (cities, autonomous regions). Therefore, we used a 10% truncation method to remove outliers and conducted the test again. The results still show a significant positive correlation at the 1% level, proving that the robustness test can be passed with truncation processing.

Table 6: Robustness Test – Truncation Processing

Explanatory Variable	(1)	(2)
	Rural Revitalization Index	Rural Revitalization Index
Coverage Breadth Index	0.290***	
	(5.306)	
Usage Depth Index		0.070**
		(2.390)
Control Variables	Controlled	Controlled
Sample Size	186	186
R^2	0.905	0.890

4.4. Heterogeneity Analysis

4.4.1. Heterogeneity in Eastern, Western, and Central Regions

Given the differences in economic development across China's eastern, western, and central regions, we study the impact of digital inclusive finance on rural renewal within each region separately. According to the findings presented in Table 7, the positive effect of digital inclusive finance on rural renewal diminishes progressively from the eastern region to the central and western regions.

This outcome might be due to the more advanced level of agricultural modernization in the eastern region, which is more sensitive to the financing efficiency represented by the digital inclusive finance index. In contrast, the economically less developed western region exhibits a higher marginal output from digital inclusive finance investment, resulting in more significant regression results. The central region is China's grain production base, with a significantly higher proportion of the primary industry than the eastern region. The modernization level is lower, and the problems of uneven and inadequate development are still prominent. Promoting rural revitalization in the central region requires greater policy support and the construction of digital inclusive finance.

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4.4.2. Heterogeneity in Southern and Northern Regions

Considering the differences in climate, agricultural crops, and economic conditions between the south and north, this paper divides the southern and northern regions using the Qinling-Huaihe line for heterogeneity analysis. Both the northern and southern regions show significant results at the 1% level, with little difference in results, validating the inclusive characteristics of digital inclusive finance and its good regional penetration.

Table 7: Heterogeneity Analysis

Explanatory Variable	(1) Eastern Region	(2) Western Region	(3) Central Region	(4) Northern Region	(5) Southern Region
Digital Inclusive Finance Index	0.396***	0.287**	0.257	0.318***	0.423***
	(8.139)	(2.476)	(1.630)	(4.308)	(4.898)
Control Variables	Controlled	Controlled	Controlled	Controlled	Controlled
Sample Size	66	54	60	96	84
R^2	0.936	0.896	0.933	0.913	0.917

5. Conclusions and Policy Recommendations

5.1. Research Conclusions

The rapid and expansive growth of the Internet has played a crucial role in enhancing digital inclusive finance, which in turn has significantly strengthened financial support mechanisms for rural revitalization by addressing the limitations of conventional financial systems in rural contexts. This study constructs and utilizes specific indicators to evaluate rural revitalization levels across various provinces, municipalities, and autonomous regions across China from 2015 to 2020. By measuring rural revitalization progress across different regions, the study employs a panel individual fixed effects model to empirically investigate the impact of the Digital Inclusive Finance Index on rural revitalization efforts. Additionally, four mediation effect models are employed to dissect and explain the influence mechanisms of various mediating variables. The analysis further delves into regional differences by categorizing areas into east, central, west, north, and south to assess the varying impacts of inclusive finance on the Rural Revitalization Index. The key conclusions drawn from this study are as follows:

First, digital inclusive finance significantly promotes rural revitalization. It alleviates the credit constraints that are commonly associated with the agricultural sector, rural areas, and farmers. By establishing effective transmission pathways, digital inclusive finance creates a multi-faceted mechanism that facilitates rural revitalization. This comprehensive approach enables rural communities to overcome financial barriers and access necessary resources, thereby fostering sustainable development and growth.

Second, digital inclusive finance has a notable positive effect on various aspects of rural development, including agricultural modernization, the creation of beautiful and sustainable rural environments, and the achievement of common prosperity throughout the nation. However, the impact of digital inclusive finance is not uniform across all regions. The influence is more pronounced in the eastern and western regions compared to the central region. This disparity suggests that regional characteristics and existing infrastructural differences may play a role in how digital inclusive finance affects rural revitalization. In contrast, the study finds no significant difference in the impact between

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the northern and southern regions, indicating a more uniform effect of digital inclusive finance in these areas.

5.2. Policy Recommendations

Based on these conclusions, the following policy recommendations are suggested:

1. Enhance Investment in Digital Inclusive Finance in Remote and Underdeveloped Areas: Efforts should focus on expanding the reach and effectiveness of digital inclusive finance in these regions. Government agencies at all levels and related enterprises should carefully plan to improve information infrastructure in remote areas. Leveraging big data, cloud computing, and other information processing technologies can improve the efficiency and quality of digital inclusive finance services.

2. Lower the Barriers to Financial Services: Agricultural development, compared to rural areas and farmers, requires more financial investment and government support. Measures should be implemented to make financial services more accessible and affordable.

3. Align Digital Inclusive Finance with Practical Needs of Rural Revitalization: Governments and financial institutions should establish more efficient data exchange platforms with rural areas to provide tailored services for different target groups.

4. Enhance Training of Digital Financial Talent in Rural Areas: Developing local digital financial expertise can reduce dependency on government policies and services, enabling these regions to independently foster local economic growth. This will pave the way for sustainable digital development and rural revitalization.

5. Support the Development of Digital Infrastructure: Efforts should aim to achieve balanced development of digital technology across various regions, reducing internet usage costs between regions and between rural and urban areas. This will provide the essential infrastructure support for the role of digital inclusive finance in promoting rural renewal.

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