

Research on the Path of Digital Inclusive Finance to Empower Rural Revitalization

Tong Ouyang¹, Lechao Zhang¹, Shouyu Wei¹, Shuang Liu¹, Deyu Li^{2,*}

¹ School of Finance, Anhui University of Finance and Economics, Bengbu, Anhui, China

² School of Economics, Anhui University of Finance and Economics, Bengbu, Anhui, China

*Corresponding author email: ldy0048@163.com

Abstract

For digital financial assigned to rural revitalization of path to explore, in this paper, first of all, with the aid of fuzzy comprehensive evaluation model for digital financial development present situation was analyzed, and the second principal component analysis model was constructed on the influence factors of digital financial development, and then to the different main body, digital financial assigned to rural revitalization of exploring the path of, That is, suggestions are put forward from different perspectives, such as government departments to improve the construction and system of financial infrastructure; Financial institutions innovate the rural digital inclusive financial service model; Regulatory authorities will do a good job in the supervision of digital inclusive financial risks.

Keywords

Digital Inclusive Finance; Rural Revitalization; Fuzzy Comprehensive Evaluation Method; Principal Component Analysis.

1. Introduction

Since China formally proposed the strategy of "developing inclusive finance" in 2013, scholars have focused their research on domestic inclusive finance, hoping to find the development direction of inclusive finance in China through the study of domestic inclusive finance [1]. Most of the research on inclusive finance tends to help vulnerable groups, focus on financial support for rural areas, and strive to narrow the gap between urban and rural areas. In 2021, under the leadership of the Party Central Committee, China will win the battle against poverty and achieve poverty alleviation under the current standards in rural areas. Under the blessing of poverty alleviation, agricultural and rural development has been like a tiger, and new historic achievements have been continuously made, which has become a solid backing for national development [2]. Today, although we have entered a new stage of development, the "three rural areas" are still the most important task in our party's work, and we must realize that it is extremely important to solve the "three rural areas" problem, and we must pool the strength of the whole society to promote the development of modern agriculture and comprehensively promote the revitalization of the countryside. Finance is an important driver to promote rural revitalization, so in the new development stage and starting point, digital inclusive finance plays a vital role, and the study of the path of digital inclusive finance to empower rural revitalization is of great practical significance. This is conducive to providing the government with a clear status quo of the implementation of digital inclusive finance, pointing out shortcomings, assisting the government to reasonably plan the development path of digital inclusive finance, accurately implementing the policy on digital inclusive finance, acting as a government think tank, effectively solving the financial pain points of rural revitalization, and helping rural revitalization in terms of policies. Many academic studies believe that one of the

main reasons for restricting the development of Rural Areas in China and improving the quality of life of farmers is the shortage of funds stemming from rural areas [3]. Therefore, in the process of promoting rural revitalization, finance plays an unparalleled role. Relevant departments need to continuously improve the rural financial system, scientifically and rationally allocate rural financial resources, and provide better rural financial services, so as to provide effective guarantees for the implementation of the rural revitalization strategy and assume the social obligation of revitalizing the countryside [4].

At this stage, the development of "three rural areas" is in a new historical period, under the continuous rise in the heat of rural revitalization, digital inclusive finance has also received more attention from all walks of life, and the implementation of digital inclusive finance is directly related to the overall development of rural revitalization [5]. The development speed of digital inclusive finance is fast, the scale is large, and the benefits are great, so it is of great significance to further strengthen the development of digital inclusive finance [6]. Every thing has different factors restricting its development at different times, and in this new stage of development, digital inclusive finance will inevitably be constrained by different factors [7]. Therefore, this paper first evaluates the current development status of digital inclusive finance by establishing a fuzzy comprehensive evaluation method, and then analyzes the influencing factors of digital inclusive finance development, and then actively explores the future development path of digital inclusive finance to help rural revitalization, and benchmarks different main roles, innovatively puts forward "ABCD" development suggestions, and makes suggestions from four levels: the government's clear role, financial institutions to create famous brands, regulatory authorities to enhance credibility, and individual active practice [8]. For example, government departments have improved the construction and system of financial infrastructure; financial institutions have innovated the model of inclusive rural financial services.

2. The Development Status of Digital Inclusive Finance based on Fuzzy Comprehensive Evaluation Method

In the analysis of the current situation of digital inclusive financial development, this paper evaluates 14 indicators, namely policy understanding channels, policy understanding degree, willingness to participate, and willingness to support, Willingness to recommend to others, promotion platform satisfaction, benefit indicators, participation in project application conditions, project costs, project benefits, project cycle, project risk identification, risk notification and prevention of possible risks. For the convenience of evaluation, this article roughly divides these indicators into three modules.

The first is the intensity of promotion and publicity, including policy understanding channels, policy understanding, willingness to participate, willingness to support, willingness to recommend to others and satisfaction with the promotion platform. These are mainly the influencing factors of residents for the promotion of digital inclusive finance projects, and there is a preliminary evaluation of the influencing factors for the implementation of digital inclusive finance. The second is the effect of universal benefits, including benefit indicators, participation in the project application conditions, project costs, project benefits, project cycle. These indicators are the main satisfaction measurement conditions for the actual implementation of digital inclusive finance for rural residents. The third is risk perception, including project risk identification, risk notification, and prevention of possible risks. Then the fuzzy comprehensive evaluation model is established, and the data is imported into matlab, and the scoring of each indicator can be obtained as shown in Table1and Table2:

Table 1. Final satisfaction scoring results

	Promotion and publicity	Inclusive effect	Risk perception	Score
Fraction	70.36	90.79	84.37	81.84

Table 2. Satisfaction scoring results of secondary indicators

Primary index	Secondary indicators	Primary index score	Secondary indicator score
Promotion and publicity	Policy understanding channels	70.36	72.65
	Degree of policy awareness		74.54
	Willingness to participate		71.43
	Willingness to support		73.99
	Willingness to recommend to others		64.36
	Promote platform satisfaction		58.96
Inclusive effect	Benefit metrics	90.79	85.76
	Eligibility criteria for participation in the project		94.65
	Project revenue		82.93
	Project costs		89.16
	Project cycle		78.54
Risk perception	Project risk identification	84.37	85.27
	Risk Notification		77.54
	Risk prevention		87.35

Based on the above, the comprehensive evaluation of the implementation of digital inclusive finance is divided into points. It can be seen that users are not satisfied with the promotion and publicity of digital inclusive finance. Users' satisfaction with the promotion and publicity of digital inclusive finance was 70.36. Residents' satisfaction with the promotion platform is the lowest scoring factor, in the follow-up project promotion, we should pay attention to the choice of promotion platform, innovate promotion methods, so that the public does not resist the publicity. Compared with the satisfaction of the promotion platform, the public's willingness to participate in inclusive finance is slightly higher, although there are problems with the promotion method, the high inclusive nature of the project itself still attracts the public to try the project. Residents are most satisfied with the effects of inclusion. The satisfaction score of the inclusive effect was 90.79. Among them, the larger weight is the project income, indicating that users attach great importance to the direct effect of participating in digital inclusive finance, and the single score of the income is higher, reaching 82.93. The second most important thing is the application conditions, and the score of this factor is the highest among the secondary indicators, indicating that residents focus on the "universal" of digital inclusive finance, that is, universality, low threshold for participation, and truly achieve inclusiveness. Users have the strongest sense of identification with the inclusive effect, indicating that this project has really brought economic benefits to rural residents and promoted the development of rural finance. Residents are more satisfied with the risks of inclusive finance. The risk perception score of digital financial inclusion is 84.37. It shows that the risk of residents to the financial project is currently at a high level. Among them, the risk identification weight is larger, indicating that users attach more importance to the safety of funds, and the public's anti-risk satisfaction with the project is the highest, reaching 87.35, and the residents' trust in the bank is very high.

Overall, digital financial inclusion user satisfaction is scored. It indicates that users have a high level of satisfaction with digital financial inclusion overall. If the problem of the

promotion and publicity of digital inclusive financial projects can be solved, the number of customers will increase significantly, play a leading role in the growth of the rural economy, and contribute to the early realization of rural revitalization. In other words, the current implementation effect of rural digital inclusive finance is better from the perspective of users, but if you look at it from the perspective of rural digital inclusive finance to help rural revitalization, there are still some problems, so the following will explore the influencing factors of rural inclusive finance implementation, and then think deeply about the path of digital inclusive finance to empower rural revitalization.

3. Influencing Factors of Digital Inclusive Financial Development based on Principal Component Analysis Method

3.1. Establish Evaluation Index System

This paper first extracts the six dimensions of information technology, lending channels, government policy support, business sustainability, financial consumer rights protection and publicity methods as the core elements, and the evaluation index system for the implementation of inclusive finance is shown in Table 3:

Table 3. Evaluation index system of influencing factors for the implementation of inclusive finance

Influencing factors	Measure dimensions	Influencing factors	Measure dimensions
Information technology	Network coverage	Business sustainability	Wait and see why
	Financial inclusion understanding		Aspects that need to be perfected
	It involves the breadth of financial inclusion	Protection of financial consumer rights	Policy support
Lending channels	Financial institutions or individuals		Financial consumer attitudes
	Attitude tendencies		The effect of rights and interests protection
Government policy support	Reasons for support	Publicity	Platform rendering
	Incentives		Promotional format

3.2. Establish Principal Component Analysis Model

The principal component analysis model is established as follows:

(1) Standardize formulas

$$x'_{ij} = \frac{x_{ij} - \bar{x}_j}{S_j} \quad (1)$$

$$\bar{x}_j = \frac{1}{n} \sum_{i=1}^n x_{ij}; S_j = \sqrt{\frac{1}{n-1} \sum_{i=1}^n (x_{ij} - \bar{x})^2} \quad (2)$$

(2) Correlation coefficient matrix

The correlation coefficient matrix is $R = (r_{ij})_{m \times m}$.

It can be seen from the litmus graph of the cumulative contribution rate of each component of the model that the first two principal components have the highest degree of interpretation of the original variables and the largest eigenvalues. Starting from the third principal component, it decreases downward successively, the line chart remains steadily declining, and finally tends to be flattened, and the selection of the principal components is presented in the form of a gravel diagram and contains less information after the description.

After the original collected data are preliminarily sorted out, the covariance matrix of 14 types of evaluation problems is solved by the principal component analysis operation of SPSS software, and then the magnitude of the cumulative contribution rate is obtained by calculating the corresponding eigenvalues and eigenvectors of each problem, and finally the linear combination of evaluation variables is used to evaluate the respondents of the questionnaire.

Based on the above 14 quantitative evaluation indicators of willingness to participate, SPSS is used to analyze the principal components of the data, and the contribution rate of each principal component, the rotated component matrix and the characteristic vector matrix are obtained, and the principal components with characteristic values greater than 1 are selected, and there are 5 principal components, with a cumulative contribution rate of 74.638%, that is, the 5 principal components cover 74.638% of the 14 residents' willingness evaluation index.

Table 4. Characteristic values, variances and cumulative contribution rates of each component

Ingredients	Initial eigenvalue			Extract the sum of squares of the loads		
	Total	Percentage of variance	Cumulative %	Total	Percentage of variance	Cumulative %
1	2.816	26.111	26.111	2.816	26.111	26.111
2	2.069	15.78	41.891	2.069	15.78	41.891
3	1.335	13.537	55.428	1.335	13.537	55.428
4	1.207	10.619	66.047	1.207	10.619	66.047
5	1.063	8.591	74.638	1.063	8.591	74.638
6	0.94	5.711	80.349	—	—	—
7	0.841	5.007	85.356	—	—	—
8	0.795	3.677	89.033	—	—	—
9	0.719	3.138	92.171	—	—	—
10	0.643	2.592	94.763	—	—	—
11	0.529	1.781	96.543	—	—	—
12	0.509	1.633	98.177	—	—	—
13	0.308	1.199	99.375	—	—	—
14	0.228	0.625	100	—	—	—

After rotation by the variance maximal method, five principal components are obtained, as shown in Table 5.

According to the load of each principal component reflected in the indicators reflected in the composition matrix, it can be obtained that information technology occupies a higher load on the first main component, the lending channel occupies a higher load on the second main component, the government policy supports a higher load on the third main component, and commercial sustainability occupies a higher load on the fourth main component. Financial consumer protection carries a higher load on the fifth principal component.

The advantage of linear weighting each principal component is to quantify the degree of combined influence in order to further explore the influencing factors. In summary, we get the

order of importance of the five main components from high to low: information technology> lending channels> government policy support> business sustainability> financial consumer protection.

Table 5. Composition matrix

Influencing factors	Ingredients				
	1	2	3	4	5
Information technology	0.379	0.397	-0.118	-0.143	0.236
Lending channels	0.131	0.495	-0.236	0.043	-0.361
Government policy support	0.316	0.371	0.389	0.148	0.377
Business sustainability	0.503	0.624	-0.091	-0.232	0.117
Protection of financial consumer rights	0.46	0.606	-0.168	-0.238	-0.134
Willing to participate	0.758	-0.108	0.081	0.223	0.021
Reasons for support	0.662	-0.368	-0.302	0.175	0.035
Wait and see why	-0.794	0.369	0.195	-0.163	0.006
A way to attract residents	0.19	0.111	0.481	0.244	-0.414
Incentives	-0.073	-0.177	0.123	-0.425	0.583
Item presentation preferences	-0.228	0.349	-0.314	0.496	0.357
Promotional format	-0.27	0.173	-0.125	0.661	0.213
Attitude tendencies	0.527	-0.433	0.293	0.042	0.127
What needs to be perfected	0.039	0.326	0.704	0.144	0.03

4. Exploring the Path of Digital Inclusive Finance to Empower Rural Revitalization

In order to explore the development path of rural inclusive finance under the background of rural revitalization strategy, this paper proposes to explore the path from four perspectives: government, financial institutions, regulatory authorities and individuals, that is, to make suggestions from different subjects.

4.1. Government

Improve the construction and system of financial infrastructure, and be the initiator of national participation (Activator). On the whole, financial infrastructure is the most basic and core component of the process of social and financial development. Since the implementation of reform and opening up in China, China has strengthened the construction of financial infrastructure year by year. Financial infrastructure already has a certain scale in China. In recent years, the concept of digital inclusive finance has been proposed and developed, and the economic finance dominated by the market has developed slowly in terms of high-cost, low-yield infrastructure construction, and lags behind other aspects, and the system has not been recognized by residents and shared resources. Because the government has strong credibility in the hearts of the people, the government has the unshirkable responsibility and obligation to establish and gradually improve the financial infrastructure, and establish a solid foundation and guarantee for the promotion of China's social economy and finance.

4.2. Financial Institutions

Innovate the rural digital inclusive financial service model and create a new brand of financial institutions. The innovative needs of digital inclusive finance and the goal of poverty alleviation are highly compatible, digital Inclusive finance is a way to enable all people with financial needs,

especially the poor and special groups, to access financial services, effectively improve the efficiency of financial resource allocation, and ultimately achieve a dynamic balance between supply and demand of financial services. In order to promote poverty alleviation and let low-income groups such as farmers enjoy China's development dividends equally, we must effectively use financial means to focus on the financial poverty alleviation process. The development of financial poverty alleviation must continue to innovate financial service models, meet the credit needs of poor groups, and expand the coverage of financial services, which is also in line with the innovative needs of digital inclusive finance.

4.3. Regulatory Authorities

Do a good job in the supervision of digital inclusive financial risks, and respond to the masses to improve credibility (Credibility). The concept of digital inclusive finance belongs to a new type of concept related to financial development, and in the process of developing digital inclusive finance, there are traditional financial risks. There are also special risks in the development process. Since the main audience of digital inclusive finance is relatively vulnerable groups such as rural residents, farmers have poor risk-bearing ability, difficulty in collecting credit information, poor credit awareness, financial literacy is low, which makes it difficult to prevent and control the risk of digital inclusive finance. Therefore, there regulatory authorities should improve the risk prevention and control measures of inclusive finance, strengthen financial supervision, and promote healthy and sustainable development.

4.4. Persons

Actively understand and practice, the whole people mutual benefit and win-win (Deed). Measures aimed at rural revitalization, such as financial policies to support agriculture, are measures that bring benefits to farmers and provide great help to their daily lives and their own needs. Therefore, for financial policies that are not understood, we should actively ask relevant people; for financial products that are still worried, we should try according to our own needs, not limited to personal factors.

Acknowledgments

This work is supported by the project of Undergraduate Scientific Research and Innovation Fund of Anhui University of Finance and Economics, "Research on the path of digital inclusive finance to empower rural revitalization" (Grant No.: XSKY22007ZD).

References

- [1] Wang F Y, Ran L R. The impact of digital inclusive finance on alleviating rural relative poverty in China [J]. China Circulation Economy, 2021 ,36(03):105-114.
- [2] Kang S S, Yang N N. Analysis on the effect of digital inclusive finance development on rural industry revitalization [J]. Financial Theory and Practice, 2022(02):110-118.
- [3] Li X Y, Liu Y M. How does digital financial inclusion promote rural entrepreneurship? [J]. Economic Management, 2021, 43(12):24-40.
- [4] Ren H J, Wang Y X. Research on efficiency measurement and influencing factors of digital inclusive finance in western China under rural revitalization Strategy [J]. Journal of Lanzhou University (Social Sciences), 2021, 49(05):40-48.
- [5] Liu N N. Research on financial development of Agricultural value chain in China under the background of rural revitalization [J]. Southwest Finance, 2021(10):89-100.
- [6] Zhang H. The impact of digital inclusive finance on economic growth in western China under the background of comprehensively promoting rural revitalization. Journal of Yunnan Minzu University (Philosophy and Social Sciences edition), 2021, 38(05):55-62.

- [7] Xie L. Functional analysis of rural inclusive finance on rural economy under rural revitalization strategy. Hubei Social Sciences, 2020(08):84-89.
- [8] Ma X L. The realistic dilemma and path solving of financial support for farmers' entrepreneurship under the background of rural revitalization [J]. Southwest Finance, 2020(10):36-46.