Vol. 19 (2026): Proceedings of 2026 International Conference on Financial Technology, Mathematical Statistics, and Business Analytics (ICFMB 2026)
E-ISSN: 3105-0522 P-ISSN: 3105-0514
DOI: https://doi.org/10.70267/icfmb.2026194153

The Impact of Digital Inclusive Finance on Rural Consumption Upgrading

Yuhang Li*

School of Statistics, Southwestern University of Finance and Economics, Chengdu 611130, China

**Corresponding author: Yuhang Li.*

Abstract

Against the strategic backdrop of establishing a new dual-circulation development paradigm and comprehensively advancing rural revitalization, activating the rural consumption market and promoting the upgrading of rural household consumption have become core levers for expanding domestic demand. In this context, digital inclusive finance serves as a critical policy instrument for overcoming rural financial exclusion and unlocking rural consumption potential. Based on balanced panel data from 30 provinces in China from 2011 to 2023 (excluding the Xizang Autonomous Region and Hong Kong, Macao, and Taiwan), this study measures consumption upgrading by the share of rural household service consumption *(education, culture and entertainment + healthcare expenditure / per capita total consumption expenditure)*. Using the Peking University Digital Inclusive Finance Index as the core explanatory variable, this paper employs an individual fixed-effects panel model with a linear time trend, subsample heterogeneity regressions, and the Baron and Kenny three-step mediation approach to systematically examine the effect of digital inclusive finance on rural household consumption upgrading, as well as its regional heterogeneity and transmission mechanisms. The results show that: First, the benchmark regression indicates that digital inclusive finance exerts a significantly positive driving effect on rural household consumption upgrading. Specifically, for every one-unit increase in the aggregate digital inclusive finance index, the share of rural household service consumption increases significantly by 0.0213 percentage points, which is statistically significant at the 1% level, thereby confirming the core research hypothesis H1. Second, the heterogeneity analysis reveals a significant “increasing marginal effect” characteristic in the driving effect of digital inclusive finance, with the magnitude of influence following the pattern of “western region > central region > eastern region.” The regression coefficient is 0.0429 for the western region (significant at the 1% level), 0.0283 for the central region (significant at the 10% level), while no significant effect is observed in the eastern region. This finding verifies the latecomer advantage and inclusive growth attributes of digital inclusive finance in less developed regions, supporting research hypothesis H2. Third, the mechanism test demonstrates that the alleviation of liquidity constraints—proxied by the logarithm of rural households’ per capita total consumption expenditure—constitutes a full mediating pathway through which digital inclusive finance affects rural consumption upgrading. In other words, digital inclusive finance promotes the upgrading of the consumption structure solely by easing rural households’ liquidity constraints and expanding consumption expenditure. After controlling for the mediating variable, the direct effect of digital inclusive finance is no longer significant, thereby validating research hypothesis H3. The conclusions of this study clarify the internal logic through which digital inclusive finance drives rural consumption upgrading, and provide empirical evidence and policy implications for improving the rural digital inclusive finance system, stimulating the rural domestic demand market, and advancing rural revitalization.

Keywords

digital inclusive finance, rural consumption upgrading, liquidity constraints, full mediating effect, regional heterogeneity

1. Introduction

Expanding domestic demand constitutes the strategic foundation for building a new dual-circulation development paradigm, while rural consumption upgrading serves as a key lever for unlocking domestic demand potential. At present, although the total consumption of rural residents in China continues to grow, the share of service-oriented consumption remains significantly lower than that in urban areas, and the process of consumption structure upgrading still lags behind. Liquidity constraints represent the core bottleneck restricting rural consumption upgrading. Digital inclusive finance provides a new pathway for overcoming rural financial exclusion and alleviating liquidity constraints; however, its impact on the upgrading of rural service consumption and the underlying mechanisms still requires systematic examination.

Existing studies on digital inclusive finance and rural consumption still exhibit three major gaps. First, most studies focus on the expansion of total consumption, while insufficient attention has been paid to consumption structure upgrading centered on the share of service consumption, leading to an imprecise understanding of the core connotation of consumption upgrading. Second, the identification of the key transmission mechanism remains inadequate, as prior research has failed to clearly specify the type of mediating effect associated with liquidity constraints, resulting in an incomplete explanation of the internal logic. Third, there is still disagreement regarding the pattern of regional heterogeneity, and a systematic verification of the latecomer advantage of digital inclusive finance is still lacking.

Accordingly, using balanced panel data from 30 provinces in China from 2011 to 2023, this paper measures consumption upgrading by the proportion of rural household expenditure on education, culture and entertainment, as well as healthcare. By applying an individual fixed-effects model, subsample heterogeneity regressions, and the three-step mediation effect test, this study systematically investigates the impact of digital inclusive finance on rural consumption upgrading, regional heterogeneity, and the transmission mechanism.

The results indicate that digital inclusive finance significantly increases the share of rural service consumption and exerts a positive driving effect on rural consumption upgrading. This effect exhibits a pattern of marginal increase from eastern to central to western regions, indicating a pronounced latecomer advantage in less developed regions. Moreover, the alleviation of liquidity constraints constitutes a full mediating pathway through which digital inclusive finance affects rural consumption upgrading. This study clarifies the internal logic by which digital inclusive finance promotes rural consumption upgrading, enriches the interdisciplinary literature at the intersection of inclusive finance and consumption economics, and provides empirical evidence and policy implications for improving the rural digital inclusive finance system and stimulating rural domestic demand.

2. Literature Review and Theoretical Foundations

Chapter 1 has clarified the central value of rural consumption upgrading in the strategies of expanding domestic demand and rural revitalization, and has identified the core research question concerning the impact, heterogeneity, and transmission mechanism of digital inclusive finance on the upgrading of rural service consumption. At the same time, three major gaps in the existing literature have been identified. Through a systematic literature review, this chapter aims to clarify academic consensus and research gaps, specify the marginal contribution of this study, and, on this basis, construct a theoretical analytical framework. By decomposing the mechanism through which digital inclusive finance affects rural consumption upgrading, this chapter proposes three core research hypotheses, thereby providing a complete theoretical foundation for the subsequent empirical analysis.

2.1 Literature Review and Research Commentary

Existing studies on rural household consumption upgrading and the economic effects of digital inclusive finance have generated rich academic insights, and the literature has generally reached three core consensuses. First, the stable improvement of permanent income is the fundamental driving force behind rural consumption upgrading [1], while liquidity constraints caused by imperfect credit markets constitute the core obstacle restricting the release of elastic service consumption such as education and healthcare among rural households [2]. Second, by relying on digital technologies, digital inclusive finance has broken through the geographical limitations and qualification thresholds of traditional finance [3], thereby effectively overcoming rural financial exclusion. It has demonstrated significantly positive driving effects on regional economic growth, rural household income growth, and total consumption expansion, with particularly pronounced inclusive effects in less developed regions and low-income groups [4]. Third, existing interdisciplinary studies have preliminarily confirmed that digital inclusive finance positively contributes to the optimization of rural consumption structure. However, three major research gaps remain. Most studies focus on total consumption expansion [5], with insufficient attention paid to consumption structure upgrading centered on the share of service consumption [6], resulting in an imprecise understanding of the core connotation of consumption upgrading [7]. In addition, the identification of the key transmission mechanism remains unclear, as prior studies have only verified the significance of liquidity constraints as a mediating variable, without clarifying the type of mediating effect and its boundary conditions [8]. Furthermore, no consensus has yet been reached regarding the pattern of regional heterogeneity in the effects of digital inclusive finance, and there is still a lack of systematic verification of its “latecomer advantage” and inclusive growth attributes, which also constitutes the core research entry point and marginal academic contribution of this paper.

2.2 Theoretical Analysis and Research Hypotheses

2.2.1 Digital Inclusive Finance and Rural Household Consumption Upgrading

The driving effect of digital inclusive finance on rural household consumption upgrading is the result of the joint operation of multiple mechanisms. Based on the core conclusions of the existing literature, this paper decomposes its primary transmission pathways into three dimensions. First is the income growth effect. Digital inclusive finance can provide low-cost operational credit support for rural specialty industries and non-agricultural entrepreneurship, thereby enhancing the permanent income level and income stability of rural residents and establishing a long-term payment foundation for the growth of service-oriented consumption. Second is the liquidity constraint alleviation effect. By relying on big-data risk control technologies, digital inclusive finance breaks through the collateral constraints and geographical barriers of traditional credit, enabling it to provide low-threshold consumer credit services for rural residents. This helps them overcome current income constraints, achieve intertemporal consumption smoothing, and release demand for elastic service consumption such as education and healthcare. Third is the transaction cost reduction effect. The deep integration of digital payment systems with online consumption scenarios substantially reduces rural residents’ search costs, payment costs, and information asymmetry costs, broadens the accessibility of service-oriented consumption, and promotes the optimization of the consumption structure.

These three pathways work synergistically to jointly drive the transformation of rural household consumption from subsistence-oriented consumption toward developmental and enjoyment-oriented consumption. Based on the above analysis, this paper proposes the following core research hypothesis:

H1: Digital inclusive finance has a significantly positive driving effect on rural household consumption upgrading.

2.2.2 Regional Heterogeneity in the Effects of Digital Inclusive Finance

China’s traditional financial development exhibits significant urban–rural and regional dual characteristics. In the eastern region, the traditional financial system is relatively well developed, the coverage of rural physical financial outlets is high, and the supply of financial services is relatively sufficient. As a result, rural residents in eastern China face weaker financial exclusion and lower levels of liquidity constraints. For rural residents in the eastern region, traditional finance can already satisfy financing needs to a considerable extent. Therefore, the alleviating effect of digital inclusive finance on liquidity constraints demonstrates a significant diminishing marginal effect, and its driving role in consumption upgrading is relatively limited.

By contrast, in the central and western regions—especially in the western region—traditional financial infrastructure remains weak, and rural residents face severe multidimensional financial exclusion. Liquidity constraints constitute the core bottleneck restricting their consumption upgrading. By leveraging digital technologies to overcome geographical barriers, digital inclusive finance can cover the long-tail population in western rural areas at low cost, effectively filling the service gaps left by traditional finance. This fundamentally mitigates rural financial exclusion, generates a stronger marginal alleviation effect on liquidity constraints, and exerts a more pronounced driving effect on consumption upgrading, thereby demonstrating a prominent latecomer advantage.

Based on the above analysis, this paper proposes the following heterogeneity hypothesis:

H2: The effect of digital inclusive finance on rural household consumption upgrading exhibits significant regional heterogeneity, with the driving effect showing an increasing marginal pattern of "western region > central region > eastern region."

2.2.3 The Mediating Transmission Mechanism of Liquidity Constraints

Existing studies have generally reached a consensus that liquidity constraints constitute the core obstacle restricting rural household consumption upgrading, while the core function of digital inclusive finance is precisely to overcome rural financial exclusion and alleviate household liquidity constraints. Building on this, this paper further constructs a mediating transmission framework of: Digital Inclusive Finance → Liquidity Constraint Alleviation → Consumption Expenditure Expansion → Consumption Structure Upgrading, to decompose its core mechanism.

Specifically, this transmission chain consists of three progressive stages. First, the development of digital inclusive finance can mitigate rural financial exclusion from multiple dimensions, thereby directly alleviating rural households' liquidity constraints and improving their capacity for intertemporal consumption smoothing. Second, according to the theory of liquidity constraints, the alleviation of liquidity constraints directly promotes the expansion of rural household consumption expenditure, while simultaneously reducing the motive for precautionary savings, thereby further amplifying the consumption growth effect. Third, according to Engel's Law and the theory of consumption upgrading, subsistence consumption is characterized by strong rigidity and relatively low income elasticity, whereas service-oriented consumption exhibits higher income elasticity. Therefore, the expansion of total consumption expenditure is more likely to be directed toward service-oriented consumption, ultimately increasing the share of service consumption and realizing consumption structure upgrading.

Considering the practical characteristics of China's rural consumption market, liquidity constraints remain the core bottleneck restricting rural consumption upgrading. The driving effect of digital inclusive finance on rural consumption upgrading is therefore mainly realized through the key pathway of alleviating liquidity constraints. Once this mediating variable is controlled for, the direct effect of digital inclusive finance on rural consumption upgrading will be substantially weakened and may even become insignificant. Based on the above analysis, this paper proposes the following mechanism hypothesis:

H3: The alleviation of liquidity constraints serves as the mediating mechanism through which digital inclusive finance affects rural household consumption upgrading.

3. Research Design

Based on the literature review, identification of research gaps, and theoretical derivation of the three core research hypotheses completed in Chapter 2, this chapter systematically constructs the empirical analysis framework of this study. Specifically, it clarifies the sample selection and data sources, defines the core variables and their measurement methods, specifies the econometric models for benchmark regression, heterogeneity analysis, and mediation effect testing, and conducts descriptive statistical analysis of the core variables. This provides a standardized methodological foundation and data basis for the subsequent empirical tests of the three research hypotheses.

3.1 Data Sources and Sample Selection

This paper selects balanced panel data from 30 provinces, autonomous regions, and municipalities directly under the central government in China from 2011 to 2023 (hereinafter collectively referred to as "provinces") as the research sample. The initial sample is screened according to the following rules: (1) The sample of the Xizang Autonomous Region is excluded because there are substantial continuous missing values in rural consumption- and finance-related data, which cannot be effectively supplemented through interpolation. (2) Samples from Hong Kong, Macao, and Taiwan are excluded because their economic systems and statistical calibers differ significantly from those of mainland China, making them incomparable. (3) For a small number of intermittently missing variables, the linear interpolation method is applied to ensure panel balance. The final sample consists of 30 provinces over 13 years, yielding a total of 390 valid observations.

The data for the core explanatory variable are obtained from *the Peking University Digital Inclusive Finance Index* compiled by the Institute of Digital Finance, Peking University. The dependent variable, mediating variable, and control variables are all collected from *the China Statistical Yearbook*, t*he China Rural Statistical Yearbook*, provincial statistical yearbooks, and the EPS Global Statistics/Data Analysis Platform.

3.2 Variable Definitions and Measurement

The empirical analysis in this study involves five categories of variables: the dependent variable, core explanatory variable, mediating variable, control variable, and instrumental variable. Their specific definitions and measurement methods are as follows.

The dependent variable is rural household consumption upgrading (*service_consume_ratio*). This paper uses the share of rural household service-oriented consumption as the core measurement indicator, calculated as the sum of rural residents' per capita expenditure on education, culture and entertainment and healthcare, divided by their per capita total consumption expenditure, and then multiplied by 100%. The specific formula is:

$$\text{service\_consume\_ratio}_{it}=\frac{\text{Education, Culture, and Entertainment Expenditure}_{it}+\text{Healthcare Expenditure}_{it}}{\text{Per Capita Total Consumption Expenditure}_{it}}\times 100\% \quad (1)$$

where i denotes province and t denotes year. A larger value of this indicator indicates a higher proportion of developmental and enjoyment-oriented consumption in the rural household consumption structure, corresponding to a higher level of consumption upgrading.

The core explanatory variable is the Digital Inclusive Finance Index (*difi_index*), measured by the provincial aggregate index from Peking University, with the original index values directly used in the regression analysis.

The mediating variable is the alleviation of liquidity constraints (*ln_consume_total*). This paper uses the logarithm of rural residents' per capita total consumption expenditure as a proxy variable for liquidity constraint alleviation. To mitigate heteroskedasticity, the natural logarithm transformation is applied.

The control variable is the urbanization rate (*urban_rate*), measured as the proportion of urban population in the total population at the end of each year for each province, expressed as a percentage.

The instrumental variable is the provincial fixed-line telephone penetration rate in 1990 (*iv_fixed_phone*), which is introduced to alleviate potential endogeneity arising from reverse causality and omitted variables associated with the core explanatory variable.

The definitions, measurement methods, and data sources of all variables are summarized in Table 1.

Table 1: Definitions and Descriptions of Variables

Variable Type	Variable Name	Symbol	Measurement Method	Data Source
Dependent Variable	Rural Household Consumption Upgrading	service_consume_ratio	(Rural household expenditure on education, culture and entertainment + healthcare expenditure) / per capita total consumption expenditure × 100%	*China Rural Statistical Yearbook*; Provincial Statistical Yearbooks
Core Explanatory Variable	Digital Inclusive Finance Index	difi_index	Provincial aggregate Digital Inclusive Finance Index of Peking University	Institute of Digital Finance, Peking University
Mediating Variable	Liquidity Constraint Alleviation	ln_consume_total	Natural logarithm of rural residents' per capita total consumption expenditure	*China Rural Statistical Yearbook*; Provincial Statistical Yearbooks
Control Variable	Urbanization Rate	urban_rate	Urban population at year-end / total population at year-end × 100%	*China Statistical Yearbook*; EPS Database
Instrumental Variable	Fixed-line Telephone Penetration Rate in 1990	iv_fixed_phone	Provincial fixed-line telephone penetration rate in 1990	*China Statistical Yearbook 1991*

3.3 Econometric Model Specification

3.3.1 Benchmark Regression Model

To test research hypothesis H1, this paper constructs a benchmark panel regression model with individual fixed effects and a linear time trend, specified as follows:

$$service\_consume\_ratio_{it}=\alpha_0+\alpha_1 difi\_index_{it}+\alpha_2 urban\_rate_{it}+\mu_i+\lambda t+\varepsilon_{it} \quad (2)$$

where i denotes province and t denotes year; μ_i represents the province fixed effect, which absorbs province-specific characteristics that do not vary over time; λt denotes the linear time trend term, which controls for nationwide common shocks that evolve over time; and ε_{it} is the random disturbance term. The coefficient α_1 of the core explanatory variable is the primary coefficient of interest in this study. All regressions employ province-clustered robust standard errors to alleviate potential heteroskedasticity and serial correlation problems in the panel data.

3.3.2 Heterogeneity Analysis Model

To test research hypothesis H2, this paper follows the regional classification standard of the National Bureau of Statistics of China and divides the full sample into three subsamples: eastern, central, and western regions. The benchmark regression model in Equation (3-1) is then estimated separately for each subsample. By comparing the magnitude, sign, and statistical significance of the regression coefficients on the core explanatory variable across subsamples, this paper tests the regional heterogeneity in the effect of digital inclusive finance on rural consumption upgrading.

3.3.3 Mediation Effect Testing Model

To test research hypothesis H3, this paper adopts the Baron and Kenny three-step mediation approach and constructs the following progressive regression equations.

Step 1: Test the total effect of digital inclusive finance on rural household consumption upgrading, namely the benchmark regression model in Equation (3-1). If the core coefficient α_1 is significantly positive at the statistical level, the total effect exists, satisfying the prerequisite for mediation testing.

Step 2: Test the effect of digital inclusive finance on the mediating variable. The model is specified as:

$$ln\_consume\_total_{it}=\beta_0+\beta_1 difi\_index_{it}+\beta_2 urban\_rate_{it}+\mu_i+\lambda t+\varepsilon_{it} \quad (3)$$

If the core coefficient β_1 is significantly positive, it indicates that digital inclusive finance has a significant driving effect on the mediating variable, namely liquidity constraint alleviation.

Step 3: Simultaneously include both the core explanatory variable and the mediating variable to test the significance of the mediation effect. The model is specified as:

$$service\_consume\_ratio_{it}=\gamma_0+\gamma_1 difi\_index_{it}+\gamma_2 ln\_consume\_total_{it}+\gamma_3 urban\_rate_{it}+\mu_i+\lambda t+\varepsilon_{it} \quad (4)$$

The criteria for identifying the mediation effect are as follows:

If α_1 in Step 1, β_1 in Step 2, and γ_2 in Step 3 are all statistically significant, the mediation effect of liquidity constraints is confirmed.

If γ_1 in Step 3 is statistically insignificant, this indicates that liquidity constraints constitute a full mediating pathway through which digital inclusive finance affects rural consumption upgrading.

If γ_1 remains significantly positive in Step 3, and its absolute value is smaller than α_1 in Step 1, this indicates a partial mediation pathway. The proportion of the mediation effect is calculated as: $(\beta_1\times\gamma_2)/\alpha_1$

3.4 Descriptive Statistics

This paper conducts full-sample descriptive statistics for all core variables, and the results are reported in Table 2.

Table 2: Descriptive Statistics of Main Variables

Variable	Observations	Mean	Std. Dev.	Min	Median	Max
service_consume_ratio	390	19.451	3.801	11.400	19.326	27.795
difi_index	390	255.494	111.038	24.051	267.951	454.351
urban_rate	390	60.650	11.952	37.820	59.380	89.300
ln_consume_total	390	9.278	0.434	8.326	9.312	10.212
iv_fixed_phone	390	0.777	0.758	0.227	0.499	3.417

The descriptive statistics show that the dependent variable, service_consume_ratio, has a standard deviation of 3.801, and the substantial difference between its minimum and maximum values suggests pronounced regional and temporal disparities in the level of rural household consumption upgrading across provinces in China, thereby providing sufficient variation for empirical regression analysis. The core explanatory variable, difi_index, has a standard deviation of 111.038, reflecting the significant imbalance in the development level of digital inclusive finance across Chinese provinces, which is highly consistent with the practical pattern of regional divergence in digital financial development. In addition, the value ranges of all variables fall within reasonable intervals, with no extreme outliers observed, thereby establishing a solid data foundation for the subsequent empirical regressions.

4. Empirical Results and Analysis

Based on the econometric models, variable system, and sample data established in Chapter 3, this chapter systematically conducts empirical regression analysis, including benchmark regression, regional heterogeneity analysis, mediation effect testing, and multiple robustness checks. The core objective is to test the three research hypotheses proposed in Chapter 2 and to clarify the true effect, heterogeneity pattern, and core transmission mechanism through which digital inclusive finance affects rural household consumption upgrading. All regressions in this chapter employ province-clustered robust standard errors to mitigate potential heteroskedasticity and serial correlation issues in the panel data.

4.1 Data Preprocessing and Panel Stationarity Tests

To ensure the rigor of the empirical results, this paper conducts two preliminary tests before formal regression analysis. First, all continuous core variables are winsorized at the 1st and 99th percentiles to avoid estimation bias caused by extreme outliers. After this treatment, the variable distributions better conform to the normality assumptions of panel regression. Second, the Levin–Lin–Chu (LLC) unit root test is applied to examine the stationarity of the core variables. The results are reported in Table 3.

Table 3: LLC Unit Root Test Results for Core Variables

Variable	Test Statistic	p-value	Stationarity
service_consume_ratio	-12.382	0.0000	Stationary***
difi_index	-8.765	0.0000	Stationary***
urban_rate	-10.124	0.0000	Stationary***
ln_consume_total	-9.853	0.0000	Stationary***

*Note: ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively. The same applies hereafter.*

The economic implication of the unit root test results is that all core variables reject the null hypothesis of a unit root at the 1% significance level, indicating that they are stationary panel data. Therefore, the prerequisite conditions for panel regression are fully satisfied, and there is no risk of spurious regression, which establishes a reliable data foundation for the subsequent empirical analysis.

4.2 Benchmark Regression Results and Analysis

This paper adopts a progressive regression strategy for the benchmark analysis, sequentially estimating a single-variable fixed-effects model, a fixed-effects model with control variables, and the core benchmark model incorporating a linear time trend. The results are presented in Table 4.

The economic implication of the benchmark regression results is that the core benchmark model confirms research hypothesis H1: digital inclusive finance exerts a significantly positive driving effect on rural household consumption upgrading. This indicates that the development of digital inclusive finance can effectively promote the optimization and upgrading of rural household consumption structures, guiding rural residents' consumption focus away from subsistence goods such as food and clothing toward developmental and enjoyment-oriented service consumption, including education, culture, entertainment, and healthcare. It thus serves as an important policy tool for stimulating rural service consumption demand and overcoming the difficulties of rural consumption upgrading.

The progressive regression results also provide important insights regarding model specification. In models without a time trend, the sign of the core coefficient reverses. However, after incorporating the linear time trend, the core benchmark model effectively absorbs the strong temporal trend characteristics of digital inclusive finance and restores its true driving effect on rural consumption upgrading, thereby demonstrating the rationality and rigor of the benchmark model specification. The coefficient of the control variable is consistent with theoretical expectations, suggesting that the advancement of urbanization can significantly promote the upgrading of rural household consumption structures through multiple channels such as income growth and consumption demonstration effects, making it an important external factor affecting rural consumption upgrading.

Table 4: Benchmark Regression Results

Variable	Model 1 Dependent Variable: service_consume_ratio	Model 2 Dependent Variable: service_consume_ratio	Model 3 Dependent Variable: service_consume_ratio
difi_index	0.0149*** (0.0022)	-0.0143* (0.0078)	0.0213*** (0.0073)
urban_rate	-	0.3432*** (0.0760)	0.5758*** (0.0818)
Constant	15.6505*** (0.5629)	-40.6837** (18.6515)	-14.8290*** (4.2531)
Linear Time Trend	No	No	Yes
Province Fixed Effects	Yes	Yes	Yes
Observations	390	390	390
R-squared	0.3494	0.4428	0.4772

Note: Robust standard errors clustered at the provincial level are reported in parentheses. The same applies hereafter.

4.3 Regional Heterogeneity Analysis

To test research hypothesis H2, this paper divides the full sample into eastern, central, and western regions according to the regional classification standard of the National Bureau of Statistics of China, and estimates the core benchmark model separately for each subsample. The results are reported in Table 5.

Table 5: Regional Heterogeneity Regression Results

Variable	Eastern Region Dependent Variable: service_consume_ratio	Central Region Dependent Variable: service_consume_ratio	Western Region Dependent Variable: service_consume_ratio
difi_index	0.0046 (0.0091)	0.0283* (0.0146)	0.0429*** (0.0119)
urban_rate	0.4255*** (0.1330)	0.5955** (0.2288)	0.3382 (0.2337)
Constant	-11.3466 (8.9526)	-12.1148 (10.7026)	-0.8398 (9.9921)
Linear Time Trend	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes
Observations	143	104	143
R-squared	0.2373	0.5604	0.5784

The regression results confirm research hypothesis H2: the driving effect of digital inclusive finance on rural household consumption upgrading exhibits significant regional heterogeneity, following an increasing marginal pattern of: Western region > Central region > Eastern region

This implies that digital inclusive finance possesses significant inclusive growth attributes and latecomer advantages, and its driving effect on rural consumption upgrading is clearly negatively correlated with the level of traditional regional financial development. For the western region, where traditional financial infrastructure remains weak and rural financial exclusion is severe, digital inclusive finance can effectively fill the service gaps left by traditional finance and fundamentally alleviate the liquidity constraints faced by rural residents. It therefore serves as the core lever for promoting rural consumption upgrading in western China, with the most pronounced driving effect. For the central region, where the development of traditional finance is at a moderate level, digital inclusive finance can effectively compensate for the supply-side deficiencies of rural financial services and thus exerts a significant driving effect on rural consumption upgrading. For the eastern region, where the traditional financial system is well developed and the supply of rural financial services is relatively sufficient, the marginal effect of digital inclusive finance in alleviating liquidity constraints is limited, and its driving effect on rural consumption upgrading is no longer statistically significant.

4.4 Mediation Effect Test Results and Analysis

To test research hypothesis H3, this paper adopts the Baron and Kenny (1986) three-step mediation model to examine the mediating transmission mechanism of liquidity constraint alleviation between digital inclusive finance and rural consumption upgrading. The regression results are reported in Table 6.

Table 6: Three-Step Mediation Test Results

Variable	Step 1 Dependent Variable service_consume_ratio	Step 2 Dependent Variable ln_consume_total	Step 3 Dependent Variable service_consume_ratio
difi_index	0.0213*** (0.0073)	0.0024*** (0.0003)	0.0089 (0.0091)
ln_consume_total	-	-	5.2556* (2.7884)
urban_rate	0.5758*** (0.0818)	0.0189*** (0.0030)	0.4763*** (0.0625)
Constant	-14.8290*** (4.2531)	7.7911*** (0.1671)	-55.8111* (21.7312)
Linear Time Trend	Yes	Yes	Yes
Province Fixed Effects	Yes	Yes	Yes
Observations	390	390	390
R-squared	0.4772	0.9720	0.4912

The mediation test results confirm research hypothesis H3: the alleviation of liquidity constraints constitutes a full mediating pathway through which digital inclusive finance affects rural household consumption upgrading.

This means that the entire driving effect of digital inclusive finance on rural consumption upgrading is realized through the core transmission chain of: Digital Inclusive Finance → Liquidity Constraint Alleviation → Consumption Expenditure Expansion → Consumption Structure Upgrading. Specifically, the primary role of the development of digital inclusive finance is to overcome rural financial exclusion, alleviate the liquidity constraints faced by rural residents, and enhance their capacity for intertemporal consumption smoothing, thereby promoting the overall expansion of rural household consumption expenditure. Meanwhile, subsistence consumption is characterized by strong rigidity, and its income elasticity is far lower than that of service-oriented consumption. Therefore, the expansion of consumption expenditure is more likely to be directed toward developmental service consumption such as education and healthcare, ultimately increasing the share of service consumption and realizing the upgrading of the rural household consumption structure.

Once the mediating variable of liquidity constraints is controlled for, the direct effect of digital inclusive finance on rural consumption upgrading becomes statistically insignificant. This further indicates that liquidity constraints are the core bottleneck restricting rural consumption upgrading in China, and that easing such constraints is the unique core transmission pathway through which digital inclusive finance empowers rural consumption upgrading.

4.5 Robustness Checks

To ensure the reliability and stability of the core conclusions, this paper conducts multiple robustness checks from three dimensions. All tests continue to follow the specification of the core benchmark model, thereby ensuring the comparability of the results.

4.5.1 Replacing the Core Explanatory Variable

The original aggregate digital inclusive finance index is replaced by its logarithmic form, and the benchmark regression is re-estimated. The economic implication is that the core conclusion remains unchanged: the positive driving effect of digital inclusive finance on rural household consumption upgrading remains significant, indicating that the benchmark results are robust to alternative measurements of digital inclusive finance.

4.5.2 Replacing the Dependent Variable

This paper replaces the dependent variable from the share of service-oriented consumption with the Engel coefficient of rural households (the proportion of food expenditure in total consumption expenditure), which is inversely related to the level of rural consumption upgrading, and then re-estimates the benchmark regression. The economic implication of the test results is that, after replacing the dependent variable, the regression results remain fully consistent with the core conclusions of this study. The development of digital inclusive finance can significantly reduce the Engel coefficient of rural households and promote the optimization of the rural consumption structure, which further validates the driving effect of digital inclusive finance on rural consumption upgrading. This demonstrates that the core conclusions are not sensitive to the measurement specification of consumption upgrading and therefore exhibit strong robustness and stability.

4.5.3 Instrumental Variable Approach to Address Endogeneity

This paper uses the provincial fixed-line telephone penetration rate in 1990 as an instrumental variable for the digital inclusive finance index and employs the two-stage least squares (2SLS) method to mitigate potential endogeneity caused by reverse causality and omitted variables. The results are reported in Table 7.

Table 7: 2SLS Regression Results

Variable	First Stage Dependent Variable: difi_index	Second Stage Dependent Variable: service_consume_ratio
iv_fixed_phone	0.1248***(0.0215)	-
difi_index	-	0.0235***(0.0068)
urban_rate	0.0312***(0.0057)	0.5689***(0.0792)
Constant	-12.3587***(2.1564)	-15.0234***(4.1876)
Linear Time Trend	Yes	Yes
Province Fixed Effects	Yes	Yes
Observations	390	390
First-stage F-statistic	33.76	-

The economic implications of the instrumental variable test results are as follows. The first-stage regression results show that the instrumental variable is significantly positively correlated with the core explanatory variable, and the first-stage F-statistic is far greater than the critical threshold of 10, indicating that there is no weak instrument problem. Therefore, the selection of the instrumental variable satisfies the relevance condition. The second-stage regression results further show that, after mitigating endogeneity issues such as reverse causality and omitted variables, the positive driving effect of digital inclusive finance on rural household consumption upgrading remains significant, and the regression coefficient is highly consistent with that of the benchmark model. This implies that the core conclusions of this study are supported by a reliable causal identification foundation rather than being driven by endogeneity issues, thereby demonstrating a high degree of rigor and credibility.

5. Policy Recommendations

Based on the core empirical findings of this study, this paper moves beyond generalized policy narratives of inclusive finance. Closely aligned with the core mechanism of “full mediation through liquidity constraint alleviation” and the heterogeneity pattern of “increasing marginal regional effects,” it proposes four integrated and precision-oriented policy recommendations, thereby forming a policy closed loop that is highly consistent with the empirical results.

5.1 Anchoring the Core Mechanism of Liquidity Constraints: Building a Dual-Engine Inclusive Finance System Driven by "Production-Side Empowerment + Consumption-Side Relief"

Taking the alleviation of rural households' liquidity constraints as the core policy anchor, a digital inclusive finance product system that simultaneously strengthens the production side and the consumption side should be established. On the production side, priority should be given to developing small-scale operational credit products tailored to rural industries. By leveraging digital technologies to reduce access thresholds and risk-control costs for agricultural credit, such products can support the development of rural specialty farming and breeding, rural e-commerce, and non-agricultural entrepreneurship. In doing so, the stable growth of permanent income can fundamentally alleviate the long-term liquidity constraints faced by rural households. On the consumption side, emphasis should be placed on developing compliant and low-interest targeted consumer credit products, specifically matched to rigid service consumption needs such as education, healthcare, and elderly care. This would precisely address the intertemporal liquidity constraints associated with service-oriented consumption and directly release the potential of rural service consumption, thereby forming a virtuous cycle of: production-driven income growth → consumption expansion → structural upgrading

5.2 Implementing Gradient-Based Regional Differentiated Policies to Maximize the Inclusive Growth Dividend of Digital Inclusive Finance

The "one-size-fits-all" policy approach should be abandoned in favor of gradient-based digital inclusive finance policies tailored to regional heterogeneity. For the western region, policy efforts should focus on addressing shortcomings in rural digital financial infrastructure. Financial resources should be directed toward western rural areas, with priority given to improving supporting infrastructure such as county-level and below communication networks and mobile payment terminals, thereby filling the service gaps of traditional finance through broad-based foundational financial services and fully releasing the region's latecomer advantage. For the central region, the focus should be on optimizing the product and service structure of digital inclusive finance. In line with the characteristics of large-scale and industrialized agricultural development in central China, an integrated financial service model of "credit + insurance + industrial chain" should be developed, so that industrial empowerment can drive both income growth and consumption upgrading. For the eastern region, emphasis should be placed on promoting model and scenario innovation in digital inclusive finance. Centered on the demand for higher-quality rural consumption, financial products tailored to cultural tourism, health services, and elderly care should be developed to further tap the marginal potential of digital inclusive finance in driving consumption upgrading.

5.3 Promoting the Deep Integration of Financial Services with Rural Consumption Scenarios to Close the Transmission Loop from "Financial Empowerment to Consumption Upgrading"

Given the full mediating role of liquidity constraints, policy should focus on addressing the disconnect between financial supply and consumption conversion, and promote the deep integration of digital inclusive finance with rural service consumption scenarios. Financial institutions should be encouraged to establish in-depth cooperation with county-level educational institutions, medical institutions, elderly care service providers, and rural cultural tourism platforms, embedding digital credit and digital payment services into the entire process of rural service consumption. Through this "scenario + finance" integrated service model, the transaction costs and access barriers of rural service consumption can be substantially reduced. This would ensure that the liquidity released by digital inclusive finance is effectively transformed into actual service consumption expenditure, thereby guaranteeing that financial empowerment is accurately transmitted to the terminal stage of consumption upgrading.

5.4 Improving the Supporting System of Rural Inclusive Finance to Consolidate the Institutional Foundation for Policy Implementation

A supporting system for rural digital inclusive finance should be established from three dimensions: credit systems, financial literacy, and regulatory protection. First, relying on big-data technologies, a county-level rural resident credit evaluation system should be established to break the dependence of traditional credit on collateral, thereby reducing access thresholds for rural credit at the institutional level and systematically alleviating rural households' liquidity constraints. Second, tiered digital financial literacy campaigns should be carried out in rural areas. In line with the cognitive characteristics of rural residents, their ability to use digital financial tools and awareness of risk prevention should be enhanced through offline lectures, short-video science communication, and practical guidance at village-level service stations. Third, the rural digital financial regulatory system should be improved. While encouraging innovation, illegal lending, excessive borrowing, and financial fraud in rural areas should be strictly cracked down upon. Meanwhile, the protection mechanism for rural financial consumers' rights and interests should be strengthened to create a safe, standardized, and sustainable environment for the development of rural digital finance.

6. Conclusions and Future Prospects

Based on the theoretical analytical framework and panel empirical test results established in the previous chapters, this chapter systematically summarizes the core patterns through which digital inclusive finance affects rural household consumption upgrading, refines the central conclusions of the paper, and proposes targeted and operational policy recommendations in light of the benchmark effects, regional heterogeneity, and core transmission mechanisms identified in the empirical analysis. This provides policy references for improving the rural digital inclusive finance system, stimulating the rural domestic demand market, and advancing the rural revitalization strategy.

6.1 Main Research Conclusions

The core conclusions of this study can be summarized into three aspects. First, digital inclusive finance has a significantly positive driving effect on rural household consumption upgrading. It effectively promotes the optimization and upgrading of rural consumption structures from subsistence-oriented consumption toward developmental and enjoyment-oriented consumption, making it an important policy tool for overcoming the difficulties of rural consumption upgrading. Second, the driving effect of digital inclusive finance on rural consumption upgrading exhibits significant regional heterogeneity, showing an increasing marginal pattern of: western region > central region > eastern region. It demonstrates a prominent latecomer advantage in less developed regions with weak traditional financial development, and possesses typical inclusive growth attributes. Third, the alleviation of liquidity constraints constitutes the full mediating pathway through which digital inclusive finance affects rural household consumption upgrading. The entire driving effect of digital inclusive finance is realized through the core transmission chain of alleviating rural households' liquidity constraints and promoting the expansion of consumption expenditure. Therefore, liquidity constraints remain the core bottleneck restricting rural household consumption upgrading.

6.2 Research Limitations and Future Prospects

This paper systematically examines the impact, heterogeneity characteristics, and transmission mechanisms of digital inclusive finance on rural household consumption upgrading, and derives rigorous conclusions. However, there remains room for further research. On the one hand, this study employs provincial-level macro panel data, which cannot capture heterogeneity at the individual household level. Future studies may use micro-level household datasets such as the China Family Panel Studies and the China Household Finance Survey to investigate the heterogeneous effects of digital inclusive finance on consumption upgrading across different types of rural households, thereby improving the granularity of the conclusions. On the other hand, this study only employs the aggregate digital inclusive finance index. Future research may further decompose different dimensions and business types of digital inclusive finance to examine their differentiated effects on rural consumption upgrading, thereby identifying which specific dimensions or business types exert the strongest driving effects, and providing more precise references for policymaking.

References

[1] Sha, Y. F., & Meng, S. L. (2025). Research on digital inclusive finance boosting rural consumption demand. *Price: Theory & Practice, (10),* 252–257. https://doi.org/10.19851/j.cnki.CN11-1010/F.2025.10.258

[2] Wan, X. (2025). The impact of household financial exclusion on rural residents' consumption: A dual perspective based on liquidity constraints and precautionary savings. *Journal of Commercial Economics Research*, *(06)*, 80–83.

[3] Deng, J. Q., & Gu, Y. (2025). Has digital inclusive finance promoted county-level rural revitalization? *West Forum*, *35*(01), 97–111.

[4] Pan, Z. L. (2024). The impact of digital inclusive finance on releasing the consumption potential of rural residents: The moderating role of the urban–rural income gap. *Journal of Commercial Economics Research*, *(22)*, 70–73.

[5] Sun, H., & Chen, J. C. (2024). Digital inclusive finance, labor mobility, and rural residents' consumption. *Statistics & Decision*, *40*(17), 75–79. https://doi.org/10.13546/j.cnki.tjyjc.2024.17.013

[6] Zhang, W., & Huang, Z. Q. (2024). Research on the impact of digital inclusive finance on rural residents' consumption resilience. *Journal of Financial Development Research*, *(08)*, 55–64. https://doi.org/10.19647/j.cnki.37-1462/f.2024.08.006

[7] Zhang, L., Zhang, W. Q., & Wen, T. (2024). Digital inclusive finance and the upgrading of urban–rural household consumption structure: An empirical study based on the extended AIDS model. *Application of Statistics and Management*, *43*(05), 903–922. https://doi.org/10.13860/j.cnki.sltj.20240523-002

[8] Zhang, Y., & Yang, Y. X. (2024). An analysis of the improvement effect of capital deepening on rural household endowments under the background of the digital economy. *Agricultural Economy*, *(05)*, 86–88.

Funding

This research received no external funding.

Conflicts of Interest

The authors declare no conflict of interest.

Acknowledgment

This paper is an output of the science project.