

Analysis of the Impact of Digital Inclusive Finance on the Consumption Structure of Rural Residents

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Abstract. In light of the two macro-policies for nationwide rural revitalisation and expansion of domestic demand, unlocking the consumption potential of rural towns and secondary-tier markets is required to promote optimisation of internal economic circulation. Utilizing panel data for provincial regions spanning 2016 through 2023 alongside the Peking University Digital Inclusive Finance Index, The present study uses a two way fixed impact framework and mediation technology to investigate the impact of DFI on consumer benchmarks and structure changes in rural environments. According to these findings, digital inclusive finance enhances overall consumption while stimulating a transition in the consumption structure toward more development-oriented and leisure-oriented categories. It will increase the income of the people and improve the environment for consumer credit to stimulate the economy. At the same time, heterogeneity investigation shows that there is a significant geographical difference; most of the positive effects occur in the middle area, while the impact on the west is relatively small due to relatively weak digital infrastructure. Micro-perspective empirical data on how the function of digital inclusive finance drives consumption are presented in this study, and a reference for building stratified digital infrastructure and stimulating consumption has been provided.

Keywords: Digital inclusive finance, rural residents' consumption, consumption structure upgrading, mediating effect, regional heterogeneity

1. Introduction

In recent years, as my country has entered a stage of high-quality development, "rural revitalization" and "expanding domestic demand" have become important strategies. Unleashing the consumption potential of rural residents is crucial for building a "dual circulation" economic pattern. However, limited by insufficient traditional financial outlets and high customer acquisition costs, rural residents have long faced financial exclusion and liquidity constraints. Electronic inclusive financing, leveraging mobile networking and massive data innovations, overcomes temporal and spatial constraints while decreasing operational barriers, providing a new path to activate rural consumption.

Past researches have mostly concentrated on the influence of DFI on economy growth and gross spending from top to bottom, and research at the micro-foundation level for the rural household

sector is still relatively sparse, and the analysis of consumption structure upgrading and regional differences is also insufficient.

Utilizing the aforementioned structure, the present study combines Peking University's Digital Inclusive Finance Index to build a provincial panel data set for the period from 2016-2024, using a two way fixed effect model combined with mediation to examine how and to what extent DFI affects the size and composition of rural households.

2. Literature review and research hypotheses

2.1. Literature review

The effects of digital inclusive finance on changing consumer behaviour have been studied by scholars at present. The majority of researches indicate that, in general, the development of Digital Inclusive Finance can enhance the quality of life through lowering the cost of everyday life and offering convenient credit [1, 2]. In the context of the setting for countryside regions, relevant research has also proposed that it may promote the transformation of spending patterns from merely living-based to growth-leisure-oriented [3, 4]. Regarding the mechanism of action, scholars generally explain it through two paths: income effect and credit constraint relief. They believe that digital inclusive finance can increase household income by promoting employment and entrepreneurship, and release potential consumption demand by developing consumer credit [5, 6]. In addition, some studies place it in the context of rural revitalization, emphasizing its comprehensive role in promoting rural economic vitality and consumption expansion [7-9]. However, existing research mostly focuses on rural areas as a whole, paying insufficient attention to the township level, and the analysis of regional differences needs to be deepened [10].

2.2. Research hypotheses

2.2.1. The direct effect of digital inclusive finance on township residents' consumption

Traditional finance is limited by the cost of branch networks and the "Pareto Principle," leading to long-term financial exclusion in township areas. Digital Inclusive Finance, Using Mobile Internet and Large Data Technology, breaks through time and space constraints and reduces transaction costs. On the one hand, mobile payment improves payment convenience, reduces transaction friction, and directly releases consumer demand; on the other hand, digital platforms embed diverse consumption scenarios such as e-commerce and online healthcare, broadening purchasing options and triggering requirements for growth-oriented and leisure-oriented expenditure. According to this, this study suggests:

Hypothesis 1: Electronic inclusive financing could assist every rural resident in elevating their quality of life and promote a transition in their financial habits from a consumption-focused approach to a development-oriented and enjoyment-seeking style.

2.2.2. Analysis of the intermediary mechanism based on "income level"

The first kind of basic income is for consumption and not for raising income. Digital inclusive finance promotes entrepreneurship and business activities by providing low-threshold financing to township groups, and expands sales channels through e-commerce and digital payment, thereby increasing operating and wage income. According to Engel's law, with an increase in income, people

will need less money for basic living expenses and can afford more expensive and enjoyable goods. Therefore, the above study proposes:

Hypothesis 2: Digital Inclusive Finance promotes the Increase in Consumer Quantity and Improve Consumer Ranking by Enhancing Urban People's Income.

2.2.3. Analysis of the intermediary mechanism based on the "consumer credit environment"

The life-cycle and permanent income hypothesis points out that credit helps smooth consumption. However, rural residents are constrained by insufficient credit and collateral, facing long-term liquidity constraints. Digital inclusive finance uses alternative data to construct a credit assessment system, reducing information asymmetry and making it easier for residents to obtain small loans, thereby supporting intertemporal consumption. Based on this, this paper proposes:

Hypothesis 3: Digital Inclusive Financial Expansion Range and Optimization of Consumer Structure Through Improvement of Countryside Resident's Credit Environment (alleviating liquidity constraints).

3. Model specification

3.1. Sample selection and data sources

This study focuses on thirty-one provincial regions within China, utilizing empirical information spanning 2016 through 2023. The chosen timeframe begins in 2016, because that year marked the extensive deployment of mobile payment platforms and the incorporation of digital inclusive finance into rural communities; consequently, the data remain consistent. Additionally, this period includes the complete development and institutionalisation of DFI, which enables an overall evaluation of the effect it has on the spending patterns of rural residents.

The initial collection of this dataset comprises digital inclusive finance metrics derived from the "Digital Inclusive Finance Index" Peking University's Digital Finance Research Center, encompassing the total index plus three specific dimensions: coverage extent, usage intensity, and digitalization status; the subsequent group involves consumption and macroeconomic indicators, including rural household expenditure, categorized consumption, mean income, and rural lending, The China Statistical Yearbook and China Rural Statistical Yearbook are recorded together with the province's statistics bulletin.

3.2. Variable description

Carry out a systemic assessment on the impact of Digital Inclusive Finance on Consumer Behaviour of Rural Residents, this research identified a variety of holistic indicators. The detailed descriptions, abbreviations, assessment approaches, and explanations of every chosen variable are listed within Table 1 herein.

Table 1. Variable Description

Variable Type	Variable Name	Symbol	Measurement Method	Description
Dependent Variable	Consumption Level of Township Residents	lnConsume	Per capita consumption expenditure of rural residents (log)	Measures the expansion of consumption scale

Table 1. (continued)

	Consumption Structure Upgrade	Upgrade	(Education, Culture & Entertainment + Healthcare + Transportation & Communication) / Total consumption expenditure	Higher ratio indicates a more advanced consumption structure
Core Explanatory Variable	Digital Inclusive Finance Index	lnDIFI	Peking University Digital Inclusive Finance Index (log)	Measures the level of digital finance development
Mediating Variable	Income Level	lnIncome	Per capita disposable income of rural residents (log)	Tests the income- increasing effect
	Consumer Credit Environment	lnCredit	Balance of agricultural loans (log)	Reflects the credit supply situation
Control Variable	Urbanization Level	Urban	Percentage of urban population	Reflects urban–rural structural changes
	Government Intervention Level	Gov	Fiscal expenditure / GDP	Measures fiscal influence
	Industrial Structure	Ind	Share of tertiary industry in GDP	Reflects industrial upgrading
	Population Aging	Aging	Percentage of population aged 65 and above	Affects consumption propensity
	Infrastructure Level	Infra	Road density (mileage/area)	Reflects transportation and logistics conditions

3.3. Econometric model construction

3.3.1. The baseline regression

Empirical research is conducted on the direct impact of DFI on the increase in consumption and structure change in rural households (in order to verify Hypothesis 1), and to effectively deal with the effects of unobserved neglected variables. The above denotes the regression model with an intercept:

$$\text{InConsume}_{i,t} = \alpha_0 + \alpha_1 \text{InDIFI}_{i,t} + \sum \gamma_j \text{Control}_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (1)$$

$$\text{Upgrade}_{i,t} = \beta_0 + \beta_1 \text{InDIFI}_{i,t} + \sum \lambda_j \text{Control}_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (2)$$

Here, i represents the specific province while t signifies the particular year. Within Consume and Upgrade, the consumption level and the upgrading metric for the rural resident's structural composition in province i during year t are labeled as $\text{InConsume}_{i,t}$ and $\text{Upgrade}_{i,t}$, respectively. $\text{InDIFI}_{i,t}$ serves as the primary explanatory factor, signifying the digital inclusive finance index. Control Variables (comprising urbanization rate, degree of government intervention, industrial structure, population ageing and infrastructure conditions) are represented by $\text{Control}_{i,t}$.

Regarding parameters, α_1 and β_1 , The main estimated parameters that this study focuses on are shown here, and they reflect the gross effect of digital inclusive finance on overall consumption and consumption patterns; if hypothesis 1 is valid, both of these coefficients are expected to be positively significant. μ_i is the provincial fixed effect, which is added to control for all unobserved but unchanging characteristics of a province. (such as geographical location, dietary preferences, etc.); δ_t is the time (year) fixed effect, used to control for time-varying macroeconomic shocks; and $\varepsilon_{i,t}$ is the random error term.

3.3.2. Mediation effect model

To further explore whether digital inclusive finance promotes rural consumption and structural optimisation for households through the channels of "raising income levels" and "enhancing the consumer credit environment" (confirming hypotheses 2 and 3), this study takes as its basis stepwise regression and builds the subsequent mediation effect examination model based on the baseline regression framework:

$$M_{i,t} = \theta_0 + \theta_1 \text{InDIFI}_{i,t} + \sum \gamma_j \text{Control}_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (3)$$

$$Y_{i,t} = \rho_0 + \rho_1 \text{InDIFI}_{i,t} + \rho_2 M_{i,t} + \sum \sigma_j \text{Control}_{i,t} + \mu_i + \delta_t + \varepsilon_{i,t} \quad (4)$$

In the above mediation model, $M_{i,t}$ represents the mediating variable, namely the income level of rural residents, $\text{InConsume}_{i,t}$ represents the consumer credit environment Upgrade_{i,t}. $Y_{i,t}$ represents the dependent variable, namely consumption level InConsume_{i,t} or consumption structure Upgrade_{i,t}.

4. Empirical analysis

4.1. Descriptive statistics

Table 2. Descriptive statistics of key variables

Variable	Observed value	Mean	Standard deviation	Minimum	Maximum
lnConsume	248	9.582	0.345	8.915	10.423
Upgrade	248	0.324	0.051	0.241	0.448
lnDIFI	248	5.751	0.283	5.124	6.108
lnIncome	248	9.764	0.382	8.955	10.651
lnCredit	248	8.421	1.156	6.21	11.054
Urban	248	0.618	0.124	0.385	0.896
Gov	248	0.265	0.142	0.112	0.985
Ind	248	0.528	0.085	0.385	0.842
Aging	248	0.126	0.034	0.052	0.198
Infra	248	0.854	0.421	0.105	1.954

To visually understand the quantitative attributes of all the variables, at the beginning of this study, descriptive statistics were calculated for the 248 observations and the 31 provinces across the

country from 2016 to 2023. The following are the empirical results, as shown in Table 2.

As shown in Table 2, the average consumption standard for rural residents (lnConsume) is 9.582; that is, it differs by region. The average upgrading index for consumption patterns (Upgrade) is 0.324; that is, the proportion of developmental and leisure-oriented expenditures is approximately 32.4%, and various parts of the country show relatively small yet still significant differences. The main reason is that the mean of lnDIFI is 5.751 and it varies considerably among provinces; some are significantly higher than others. Control factors such as the ratio of urbanisation and industrial structure are relatively evenly distributed without any extreme values, and the dataset is stable enough for the following empirical analysis.

4.2. The baseline regression

In order to assess the direct impact of DAE on the size of consumption and on changes in consumption patterns among rural populations (in particular to validate Research Assumption 1), a two-directional fixed effect model is used in the main regression analysis. The results of the above calculations are shown in Table 3. Columns (1) and (2) show provisional results of regression with no control variables, whereas columns (3) and (4) show final results after all control variables have been included, together with regional fixed (single) and yearly fixed (time effects).

Table 3. Baseline regression results

	(1)	(2)	(3)	(4)
	lnConsume	Upgrade	lnConsume	Upgrade
lnDIFI	0.815*** (6.542)	0.188*** (4.821)	0.426*** (3.785)	0.145*** (3.214)
Urban			0.582*** (4.615)	0.052 (1.108)
Gov			0.235** (2.368)	-0.015 (0.412)
Ind			0.312*** (3.154)	0.118** (2.156)
Aging			-0.425** (3.218)	-0.185*** (2.954)
Infra			0.215*** (2.845)	0.045 (1.325)
_cons	4.852*** (7.125)	-0.625*** (2.845)	2.548*** (3.815)	-0.582** (2.105)
Time effect	Yes	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes
N	248	248	248	248
R ²	0.958	0.485	0.972	0.526

Note: The values within parentheses represent the t-statistics for the coefficients, with ***, **, and * denoting that these are significant at the 1%, 5%, and 10% confidence intervals, correspondingly.

Table 3 demonstrates that within the framework where rural residents' spending levels (lnConsume) serve as the primary outcome, the digital inclusive finance metric (lnDIFI) exhibits a substantial and favorable impact following the adjustment for alternative factors. After adding the auxiliary variable and employing two-way fixed effects, this coefficient has decreased slightly but remains at the 1% level of significance; Therefore, can draw a conclusion that Digital Inclusive Finance contributes to Rural Consumer Growth.

Under the conditions of an expanded consumption structure, lnDIFI is also positively related to this extent; that is, it increases the demand for consumption overall and encourages an increase in the proportion of funds allocated to developmental and pleasure sectors, such as schooling and medical services. It is widely anticipated that digital inclusive finance will improve both the quantity and the structure of consumption; therefore, assumption 1 has been validated.

4.3. Stability analysis: to examine the reliability of the primary regression outcomes, this study performs evaluations through two dimensions

Substitution of key explanatory variables. Replaces the Digital Inclusive Finance Composite Index (lnDIFI) with the three components of which it comprises, usage depth (lnDepth), and digitalization level (lnDigiti) —for regression. If these findings remain substantially positive, the outcomes are deemed robust.

Removing municipality samples. Given the special characteristics of Beijing, Shanghai, Tianjin, and Chongqing in terms of economic development and fiscal status, which may be out of line with the other results, these four regions have been excluded from the study, and the consistency of the results has been verified among the remaining 27 areas. The estimation results of the robustness analysis are shown in Table 4.

Table 4. Robustness test

	Replace the explanatory variable (dependent variable: lnConsume)	Replace the explanatory variable (dependent variable: Upgrade)	Excluding samples from municipalities	Excluding samples from municipalities
lnCoverage	0.385*** (3.125)			0.124*** (2.845)
lnDepth		0.452*** (4.012)		
lnDigiti			0.298** -2.456	
Control variables	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes
_cons	3.125***	2.845***	4.015***	-0.452**
N	248	248	248	248
R ²	0.965	0.97	0.958	0.512

Note: The figures within the brackets represent the t-statistics for each parameter, while *** denote statistical significance at the 1% level, ** at the 5% level, and * at the 10% level.

Empirical studies have shown that, after adjusting for the replacement of the original determinants, an expanded range of accessibility, a greater extent of utilisation, and increased digitalisation in inclusive finance have all been positively correlated with improvements in the quality of life and changes in consumption patterns among rural residents; thus, numerous dimensions of inclusive finance are capable of stimulating consumption.

Even after excluding local authorities from direct government control, the impact of inclusive funding in terms of both size and structural increase in consumption remains particularly positive, indicating that the conclusions are not dependent on a few developed regions and have strong universality. In short, the indicators and implications of the main factors are consistent with each other, and thus the results of the initial linear model are reliable.

4.4. Mechanism verification

Given the validation that digital inclusive finance has beneficially influenced rural residents' consumption, this part shall explore the underlying mechanisms for such impact. Grounded in the aforementioned conceptual structure, digital inclusive finance might influence rural consumption via two distinct channels: "raising income levels" and "enhancing the consumer credit ecosystem." This study utilizes a mediation effect testing approach for the quantitative examination, and the findings are presented in Table 5.

Table 5. Mediation effect analysis

	(1) Income effect	(2) Income mediation	(3) Credit effect	(4) Credit mediation
lnDIFI	0.512*** (4.215)	0.215*** (3.112)	0.448*** (3.845)	0.284*** (3.056)
lnIncome		0.412*** (5.145)		
lnCredit				0.315*** (4.812)
Control variables	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes
_cons	3.125***	2.415***	5.842***	1.954***
N	248	248	248	248
R ²	0.942	0.975	0.815	0.973

Note: The figures within parentheses represent the t-values for these coefficients, and ***, **, and .* denote that they are significantly different at the 1%, 5%, and 10% thresholds, accordingly.

The mediating role of financial status reveals that digital inclusive finance notably enhances the earnings of urban dwellers (coefficient 0.512, 1% level). With the addition of the income indicator, wealth can be seen to promote the increase in consumption; however, its own effect on consumption has been reduced but remains positive, so income serves as a partial intermediary and thus still supports the hypothesis.

The mediation analysis regarding the consumer credit landscape reveals that digital inclusive finance markedly enhances credit provision (coefficient 0.448, 1% significance). Following the inclusion of credit data, this variable maintains a substantial beneficial effect on spending, while the

digital inclusive finance coefficient diminishes, suggesting it stimulates consumption expansion by mitigating liquidity bottlenecks, thereby validating hypothesis 3.

4.5. Heterogeneity analysis

Considering the extensive territory, varied geographical landscapes, and differing degrees of socioeconomic advancement within China, the impact of digital inclusive finance on rural consumption might exhibit spatially disparate distributions. To investigate these underlying variations, The 31 provinces were divided into 3 categories according to the National Bureau of Statistical Division, and then each subpopulation was subjected to a regional regression model. Results of a generalised regression are shown in Table 6.

Table 6. Heterogeneity analysis

Variable	(1) Eastern region	(2) Central region	(3) Western region	(4) Eastern region	(5) Central region	(6) Western region
	lnConsume	lnConsume	lnConsume	Upgrade	Upgrade	Upgrade
lnDIFI	0.264** (2.415)	0.485*** (3.952)	0.532*** (4.108)	0.085* (1.854)	0.156*** (3.421)	0.194*** (4.015)
Control variables	Yes	Yes	Yes	Yes	Yes	Yes
Time effect	Yes	Yes	Yes	Yes	Yes	Yes
Individual effect	Yes	Yes	Yes	Yes	Yes	Yes
_cons	3.512***	2.145***	1.842***	-0.152	-0.645**	-0.812***
N	88	64	96	88	64	96
R ²	0.985	0.954	0.962	0.584	0.495	0.482

Note: The figures within brackets represent the t-statistics for each parameter, and ***, **, and * denote that these are statistically significant at the 1%, 5%, and 10% confidence intervals, respectively.

As shown in the Integrated Regression Results in Table 6, the positive effects of Digital Inclusive Funding on the Size of Rural Household Spending (CPI) and the Modernisation of Consumer Models (Update) are similar in East, Centre and West. However, the marginal effects still show a step-wise increase and are distributed as "western > central > eastern".

5. Conclusion

Based on the survey of 31 Chinese provinces between 2016 and 2023, this paper investigates the variation of consumer patterns of rural households caused by digital inclusive finance. From the foregoing analysis, can find that at first, the development of Digitized Inclusive Financial has raised the level of people's life, and has changed its consumption preference from everyday items to other commodities; second, it releases consumption potential through the dual mechanisms of increasing residents' income and alleviating liquidity constraints; third, this effect varies regionally, with a more significant promoting effect in the central and western regions.

According to the aforementioned assessment, the following strategic proposals are hereby presented: first, intensify the construction of urban digital infrastructure to narrow the "digital divide"; second, innovate electronic financial products tailored to the unique requirements of rural

populations and reform the credit framework correspondingly; lastly, advance synchronized regional growth, enhance governmental assistance for central and western territories, and stimulate the equitable advancement of rural consumption.

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