Research on Spatial Spillover Effect of Digital Financial Inclusion on Common Prosperity

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Abstract. This article constructs a comprehensive evaluation system for Common Prosperity from three dimensions: people's prosperity, social cohesion, and sustainable development. A Spatial Durbin Model is employed to investigate the spatial spillover effect of Digital Financial Inclusion on Common Prosperity, the research findings reveal that: Common Prosperity in China exhibits clustering patterns, and Digital Financial Inclusion has a spatial spillover effect on Common Prosperity. Notably, In the eastern region, the indirect effect is significantly positive, while in other regions, it is significantly negative. Based on the conclusion, this article advises government to devise staged policies to evenly promote the process of Common Prosperity across cities.

Keywords: Digital Financial Inclusion; Common Prosperity; Spatial Spillover

1 INTRODUCTION AND LITERATURE REVIEW

The deep integration of digital technology with financial inclusion, known as Digital Financial Inclusion, has significant implications for economic growth and well-being[1], and it serves as a pivotal tool in attaining Common Prosperity.

Theoretically, Digital Financial Inclusion can impact Common Prosperity via diverse mechanisms. The first mechanism is to alleviate financing constraints, Digital Financial Inclusion can enhance the financing efficiency of enterprises[2]. Secondly, it can positively influence innovation, stimulate entrepreneurship, drive economic growth[3], thereby comprehensively accelerating the process of achieving Common Prosperity. Additionally, by promoting distribution fairness and optimizing household consumption patterns[4], Digital Financial Inclusion bridges the income gap between urban and rural regions, contributes to the improvement of rural infrastructure, and makes it easier for farmers to access financial resources[5], thereby furthering China's pursuit of Common Prosperity.

However, the development of Digital Financial Inclusion demonstrates cumulative growth patterns and exhibits regional discontinuity. Its rollout across regions demonstrates polarization, return, and diffusion effects. These effects have spatial spillover impacts in neighboring regions[6]. Therefore, it's crucial to research its impact on Common Prosperity from a staged and spatially correlated perspective.

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2 THEORETICAL ANALYSIS OF SPATIAL SPILLOVER EFFECT

From a macro perspective, Digital Financial Inclusion effectively breaks through geographical constraints, and prompts government departments to refine their policy frameworks, enhance financial market regulation, and improve infrastructure. Under the "policy diffusion" effect, Common Prosperity is facilitated through a blend of financial development and government guidance. Microscopically, Digital Financial Inclusion revolutionizes data collection and processing methods, significantly reducing the cost of obtaining critical information in other regions, enabling more vulnerable groups to be integrated into the pursuit of Common Prosperity ultimately.

Based on the above analysis, this article formulates Hypothesis H1: Digital Financial Inclusion exhibits a positive spatial spillover effect on Common Prosperity.

However, Digital Financial Inclusion exhibits a pronounced "Matthew Effect," where individuals' professional abilities and financial literacy can potentially lead to novel forms of financial exclusion. Ideally, when cities are equipped with sound infrastructure and robust market systems, the advancement of Digital Financial Inclusion can foster a coordinated resource allocation model across regions. Conversely, if significant economic disparities persist among cities, the blind implementation of Digital Financial Inclusion may lead to a concentration of financial resources towards cities that already possess superior infrastructure and well-developed markets. This scenario can further exacerbate the development gap among cities.

Therefore, this article proposes Hypothesis H2: The spatial spillover effect of Digital Financial Inclusion on Common Prosperity exhibit regional heterogeneity.

3 EVALUATION SYSTEM FOR COMMON PROSPERITY

3.1 A Comprehensive Evaluation System for Common Prosperity

The comprehensive evaluation system is constructed from three dimensions: people's prosperity, social commonality, and sustainable development. The specific indicators are detailed in Table 1, and the weights are calculated using the entropy method.

The first aspect is people's prosperity. This aspect is measured by four specific indicators, including Per Capita GDP, Per Capita Deposit Balance, Per Capita Retail Sales of Consumer Goods, and Per Capita Education Expenditure. All the above indicators are positive evaluation indicators, which means the higher the value of the indicator, the higher the level of common prosperity.

The second aspect is social cohesion. This aspect is measured by four specific indicators, including Urban-Rural Income Ratio, Urban-Rural Consumption Ratio, Basic Pension Insurance Participation Rate, and Unemployment Insurance Participation Rate. The first two indicators are negative, measuring the balanced development between urban and rural areas within a city region, the higher the value of these indicators, the lower the level of common prosperity. The last two indicators are positive, reflecting the situation in the field of social security.

The third aspect is sustainable development. This aspect including GDP Growth Rate, Non-hazardous Treatment Rate of Domestic Waste, Centralized Treatment Rate of Sewage Treatment Plants, and Industrial Smoke and Dust Emissions per Unit of GDP. The last indicator is negative, reflecting the loss of resources. The other indicators are positive, reflecting economic growth and resource utilization efficiency.

Table 1. Multi-Level Comprehensive Evaluation System for Common Prosperity

Dimension	Specific Indicator	Weight
People's prosperity	Per Capita GDP	18.03%
	Per Capita Deposit Balance	10.13%
	Per Capita Retail Sales of Consumer Goods	7.28%
	Per Capita Education Expenditure	9.65%
Social cohesion	Urban-Rural Income Ratio	7.14%
	Urban-Rural Consumption Ratio	8.25%
	Basic Pension Insurance Participation Rate	6.85%
	Unemployment Insurance Participation Rate	4.59%
Sustainable development	GDP Growth Rate	13.85%
	Non-hazardous Treatment Rate of Domestic Waste	4.22%
	Centralized Treatment Rate of Sewage Treatment Plants	4.08%
	Industrial Smoke and Dust Emissions per Unit of GDP	5.93%

Data sources: the China Urban Statistical Yearbook, and Government Work Reports of China.

3.2 Analysis of the Current Status of Common Prosperity Development

This article computes the Common Prosperity index for 285 cities in China, and presents geographical distribution maps of Common Prosperity index in 2012 and 2021, as shown in Figure 1 and Figure 2. It generally demonstrates a gradually rising trend in Common Prosperity development. However, the spatial distribution is not uniform, characterized by strong-strong adjacency and weak-weak adjacency.

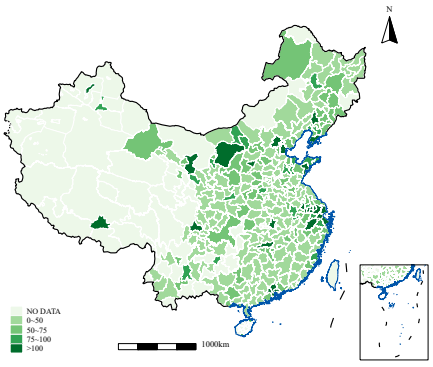

Fig. 1. Geographical Distribution of the Common Prosperity Index in 2012

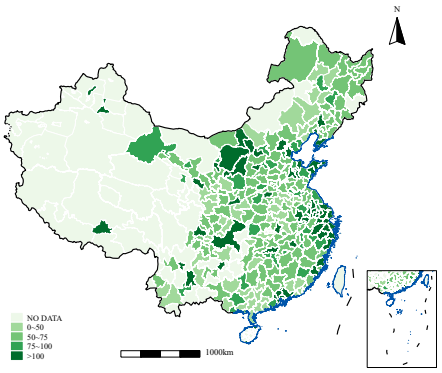

Fig. 2. Geographical Distribution of the Common Prosperity Index in 2021

4 EMPIRICAL ANALYSIS BASED ON SPATIAL DURBIN MODEL

4.1 Establishment of Spatial Weight Matrices

This article utilizes an economic geography weight matrix (W1) to formulate a spatial econometric model. Notably, the economic weights (W2) are calculated based on the per capita GDP data of each city from 2012 to 2021, the geography weights (W3) are generated by Geoda software, and we multiply W2 and W3 to obtain W1 finally.

4.2 Construction of Spatial Econometric Model

This article sets a two-way fixed-effect Spatial Durbin Model, as shown in formula (1).

$$CP_{it} = \alpha DFI_{it} + \beta_k Control_{ikt} + \nu_t + \mu_i + \varepsilon_{it} + \rho WCP_{jt} + \theta WDFI_{jt} + \gamma_k WControl_{jkt} \quad (1)$$

W represents the spatial weight matrix; α is the regression coefficient of the explanatory variable, β is the regression coefficient of each control variable, θ is the spatial regression coefficient of the explanatory variable, and γ is the spatial regression coefficient of each control variable; ρ is the autoregressive coefficient of common prosperity.

The dependent variable is Common Prosperity (CP), the primary explanatory variable is Digital Financial Inclusion (DFI), which is measured using the "Peking University Digital Financial Inclusion Index (2011-2021)", the control variables include the level of economic openness (OPEN), government public expenditure (GOV), regional crowding degree (CRO), and environmental regulation intensity (ENV).

The data for the various control variables were sourced from the China Urban Statistical Yearbook, government work reports of various cities, and the China Industrial Enterprise Database. Missing values were filled in using interpolation methods.

4.3 Spatial Regression Results

Using the spatial effect decomposition method[7], we can calculate the direct effect and indirect effect, the results are presented in Table 2.

The benchmark regression results show that the direct effect is 0.2180, indicating that for every 1% increase in Digital Financial Inclusion, local Common Prosperity will increase by approximately 0.2%. The indirect effect is 0.1729, this indicates that a 1% enhancement in Digital Financial Inclusion is conducive to approximately a 0.17% augmentation in Common Prosperity within neighboring regions.

To ensure robustness, this article replaces W1 with W2 and W3, the results remain significantly positive and validate Hypothesis H1 proposed in this article."

This article categorizes the samples into the eastern region and other regions based on the level of economic development to verify regional heterogeneity. The indirect effect is positive only in the eastern region, while negative in the other regions. All regression results are significant at the 1% level. This finding validates Hypothesis H2.

This indicates that in the development of Digital Financial Inclusion, we should not only focus on its role in promoting Common Prosperity in the local region, but also be aware of its spatial spillover effects on neighboring areas, and strive to promote Common Prosperity in a balanced manner from a global perspective.

Table 2. Spatial Effect Decomposition Results

	(1) W1	(2) W2	(3) W3	(4) eastern region	(5) other regions
Direct Effect	0.2180*** (0.0278)	0.2966*** (0.0275)	0.2700*** (0.0253)	0.2734*** (0.0689)	0.2607*** (0.0504)
Indirect Effect	0.1729*** (0.0275)	0.1385* (0.0836)	0.1744*** (0.0252)	0.2145*** (0.0398)	-0.1512*** (0.0496)
Observations	2850	2850	2850	860	1990
Control	Y	Y	Y	Y	Y
Individual FE	Y	Y	Y	Y	Y
Time FE	Y	Y	Y	Y	Y
R^2	0.3699	0.3751	0.3113	0.3829	0.5223

Standard errors are presented in parentheses. ***p＜0.001, **p＜0.05, *p＜0.1

5 CONCLUSION AND SUGGESTIONS

This article utilizes Spatial Durbin Model to explore the spatial spillover effect of Digital Financial Inclusion on Common Prosperity, and the conclusions are as follows:

Firstly, the spatial distribution of Common Prosperity indices among cities exhibits strong-strong adjacency and weak-weak adjacency. From a temporal perspective, the Common Prosperity index shows an upward trend. From the perspective of spatial distribution, the Common Prosperity index is higher in eastern coastal cities and inland provincial capital cities, while it is relatively lower in other regions.

Secondly, a 1% enhancement in Digital Financial Inclusion is conducive to a 0.17% augmentation in Common Prosperity within neighboring regions. The reason lies in the

fact that Digital Financial Inclusion can effectively overcome geographical restrictions, change the fragmented situation of financial markets across regions, and attract more disadvantaged groups to join the journey towards Common Prosperity.

Thirdly, the indirect effect is significantly positive in the eastern region, whereas it is significantly negative in other regions. Theoretically, Digital Financial Inclusion helps form a coordinated regional resource allocation model and jointly promotes Common Prosperity. However, if there is a significant gap in regional economic development, and there is no phased development plan or focus, it will fail to achieve the desired results and may even hinder the process of achieving common prosperity.

Based on the preceding conclusions, this article posits that: It is imperative to refine the top-level design of Common Prosperity and establish phased objectives. The initial-stage should focus on bolstering policy support for underdeveloped regions, ensuring a balanced infrastructure layout across cities. By implementing precise resource allocation and targeted fiscal support, we can effectively bridge the developmental divide between stronger and weaker regions. The intermediate-stage goal is to promote regional economic cooperation and optimizing the efficiency of financial services, sharing cutting-edge technology and financial resources. We can enhance the service quality and allocation efficiency of inclusive digital finance by leveraging the demonstration effect. The advanced-stage objective strives to enrich the diversity of inclusive financial products, refine payment and credit systems, promote a balanced economic structure across the region, and ultimately attain comprehensive Common Prosperity.

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