



Statistical Analysis of the Influence of Digital Inclusive Finance on High-quality Economic Development

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Abstract. The development of digital inclusive finance has further improved the inclusiveness of financial resources, making financial resources more fully and rationally used. The rapid development of digital inclusive finance in China can help China's high-quality economic development. Based on the Spatial Dubin Model, this paper collected panel data from 30 provinces in China from 2012 to 2021 to explore the impact of digital inclusive finance on provincial economic growth and whether there is a spatial spillover effect. The results show that digital inclusive finance has a significant positive impact on high-quality economic development, and the development of digital inclusive finance is an important factor to promote high-quality economic development in China.

Keywords: Digital inclusive finance, high-quality economic development, statistical analysis

1 Introduction

After entering the new era, China's development goals have changed from promoting high-speed economic development to promoting high-quality economic development [1]. At the Fifth Plenary Session of the 19th Central Committee of the Communist Party of China, it was proposed that we must optimize the economic structure, push forward the scientific and technological revolution and industrial reform, accelerate the cultivation and development of a modern economic system, and achieve sustainable and stable development based on significantly improved quality and benefits. Digital inclusive finance is the most active field in the development of China's financial system. Its inclusive nature helps to alleviate the financing discrimination existing in the traditional financial system, thus improving the efficiency and fairness of financial services. It is also important in infrastructure investment and guiding consumption. As a gathering place of talents, information, technology and other resources, digital inclusive finance can drive technological innovation by optimizing the allocation of capital, which can significantly promote and achieve high-quality economic development. At the stage of high-quality economic development in China, there must be a high-quality financial system that

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can promote industrial upgrading, support innovative economy, and achieve sustainable economic growth. The rapid development of digital economy and the construction and improvement of basic facilities provide good conditions for the development of digital inclusive finance. In recent years, China has made unprecedented achievements in its economic development through continuous efforts and exploration. China's economy has turned from high-speed growth to high-quality development stage. The essence of high quality and economic development is to meet the growing needs of the Chinese people for a better life [2].

With the progress of Internet technology, digital inclusive finance with wider coverage, lower service threshold, more service types and more convenient service experience has achieved rapid development in an inclusive innovation environment. Whether it can help promote high-quality economic development is worth exploring. Most previous studies discussed the relationship between financial development and economic growth from the perspective of financial development, while ignoring the impact of the introduction of Internet technology on high-quality economic development. And because the concept of digital inclusive finance was put forward for a short time, there is less research on this aspect. At present, China's economic development is in the new normal period, the GDP growth rate has declined, the regional development is uneven, and the urban-rural income gap is large. How to maintain the social and economic stability and high-quality development has become an urgent problem for the government. To this end, the government has carried out a series of measures to deepen and reform the financial sector and protect the development of the real economy. One of the representative achievements of the deepening reform in the financial field is digital inclusive finance. Therefore, explore the relationship between digital inclusive finance and high-quality economic development, and promote the development of digital inclusive finance through rational use of big data and modern information technology to alleviate the problems in regional economic development and promote high-quality economic development. It is of great practical significance to explore the impact of digital inclusive finance on high-quality economic development and provide targeted suggestions for the trend of maintaining high-quality and stable economic growth [3].

2 Key Concepts and Model

2.1 Digital Inclusive Finance

Digital, inclusive and finance are three terms of digital inclusive finance, so we can analyze the connotation of digital inclusive finance from these three aspects. From the financial perspective, finance is an economic activity in our daily life, and it often appears together with such terms as market, supply, and demand. Finance is the premise and basis for the development and implementation of digital inclusive finance, and an important tool for economic development. From the perspective of inclusive finance, the focus of inclusive finance is on vulnerable groups. Its purpose is to better meet the financial needs of vulnerable groups and promote the fair development of society. Due to the existence of financial exclusion, some groups are

unable to quickly access the financial services they need, while Inclusive Plus Finance, from the perspective of social equity, hopes to provide these groups with appropriate financial services to solve their capital needs. From the digital perspective, the core meaning of digital inclusive finance is to closely link digital technology with inclusive finance. The application of digital technology products such as artificial intelligence in inclusive finance can promote the formation of Internet credit reporting, which is conducive to improving the regional credit reporting system. At the same time, the application of digital technology also reduces the information asymmetry and improves the service efficiency of inclusive finance [4].

2.2 High-Quality Economic Development

In 2017, the General Secretary Xi Jinping put forward the concept of “high-quality development” for the first time, and pointed out that China's economy began to shift from high-speed development to high-quality development stage, which indicates that China's economic development is no longer a simple pursuit of quantity and speed [5]. The connotation of high-quality economic development is rich. At present, scholars mainly elaborate its meaning from the micro and macro perspectives. High quality economic development means that the products and services produced and provided by enterprises should be able to effectively meet the quality needs of consumers and have use value. In terms of production mode, they should change from extensive development to intensive development. They should improve total factor productivity through technological innovation. They should not only focus on their own benefits, but also pay attention to social benefits. The production process should be green, clean, and sustainable, and the distribution of results should be fair and reasonable, continuously promote the internal management reform, system reform, power reform and efficiency reform of the enterprise, and continuously provide high-quality products and services for the public. It requires taking the realization of the people's yearning for a better life as the highest guidance, adhering to innovation as the endogenous driving force of economic development, taking coordination as the endogenous feature of economic development, taking green as the universal form of economic development, taking openness as the only way of economic development, and taking sharing as the fundamental purpose of economic development. It is reflected in the innovation of finished products in all walks of life, high efficiency of input and output, low cost of resources and environment, and fair distribution of development achievements. To achieve high-quality development, we need to comprehensively promote the economic, social, cultural and ecological construction, and thoroughly implement the five development concepts of innovation, coordination, green, openness and sharing [6]. Under the condition that the overall economic operation is good and effective, we should not only focus on the results of economic development, but also on the process of economic development, achieve the goal of stable and balanced economic growth and meet the growing needs of the people for a better life.

2.3 Spatial Durbin Model

Since the 1970s, the rapid development of geographic information technology has promoted the enrichment of spatial data. The development of spatial data has caused many scholars to pay attention to and investigate the spatial location factors in the field of regional development. The spatial effect has led to huge doubts about the independence assumption of variables and the reliability of regression parameters in traditional econometrics. Ansein put forward the classical definition of spatial econometrics, took the spatial interaction and spatial structure of economic activities into consideration in econometrics, and established a spatial econometric model [7]. He believes that the spatial effects of the spatial relationship between influencing variables can be divided into spatial correlation and spatial heterogeneity. The introduction of spatial effect is the main difference between spatial econometrics and traditional econometrics. Spatial correlation refers to the mutual influence between variables with different locations, that is, the observed values in different spatial locations are consistent, such as spillover, proximity effect, etc., which causes a variable to affect other variables around. The spatial Dubin model (SDM) is a spatial lag model that is enhanced by adding variables after spatial post change [8].

$$y = \rho W_1 y + X\beta_1 + W_2 X\beta_2 + \varepsilon \quad (1)$$

W_1 is the spatial correlation of dependent variables; W_2 is the spatial correlation of independent variables, which can be set as the same or different matrix; β_1 and β_2 are the spatial autocorrelation coefficients of exogenous variables; ε It is a random disturbance term satisfying normal independent identical distribution.

The Dubin model also includes many general models. When $\beta_2=0$, it includes the spatial lag of variables, and excludes the factors of spatial lag to explain variables, thus becoming a spatial autoregressive model.

$$y = \rho W y + X\beta + \varepsilon \quad (2)$$

When $\rho=0$, that is, if the observed values between dependent variables are not correlated, but the dependent variables are related to the characteristics of adjacent areas in the form of spatial lag explanatory variables, then the model becomes a spatial lag model of explanatory variables, when $\rho=0$, $\beta_2=0$, the model becomes the standard minimum multiple regression model in the following form:

$$y = X\beta + \varepsilon \quad (3)$$

3 Empirical Analysis

3.1 Variable Selection

The core explanatory variable of this paper is the development level of digital inclusive finance (fin), which is measured by the "digital inclusive finance index" compiled and measured by the Financial Research Center of Peking University. This variable is logarithmically treated in regression analysis. This paper mainly studies

the impact of digital inclusive finance on provincial economic growth [9]. The explanatory variable is the level of economic development (pgdp). Referring to previous scholars' practices, 30 provinces' per capita GDP is selected for measurement, and this variable is logarithmically treated in regression analysis. In addition to digital inclusive finance, there are still many factors that will affect provincial economic growth. Based on previous scholars' research, this paper selects the following five important factors that have an impact on economic growth as control variables: the level of scientific and technological innovation (tech), which is an important driving force for economic growth, the core engine, and the primary driving force for economic growth. In this paper, the number of domestic patent applications granted by each province is taken as a measure of the level of scientific and technological innovation. Industrial structure (ss), the rationality of industrial structure determines the level of economic development to a certain extent, especially in the process of industrialization, the adjustment and transformation of industrial structure is particularly important. This paper measures this variable by the proportion of secondary and tertiary industries in GDP [10]. The urbanization rate (city), to a certain extent, reflects the allocation of human resources. Talents are constantly concentrated in cities, driving industrial development, and promoting economic growth. The level of opening, like scientific and technological innovation, is an important factor that cannot be ignored in economic growth. This paper measures the proportion of total imports and exports in GDP. Human capital (hum), human capital is an indispensable resource for economic development, and education is the decisive factor to improve the quality of human resources. Therefore, the measurement index adopted in this paper is the number of years of education per capita in each province. The variable selection results are shown in **Table 1**.

Table 1. Table of variable selection results

Variable Type	Variable name	Variable abbreviation
Explanatory variable	Development level of influence of digital inclusive finance	fin
Control variable	Scientific and technological innovation level	tech
Control variable	Industrial structure	ss
Control variable	Urbanization rate	city
Control variable	Opening level	open
Control variable	Human capital	hum
Explained Variable	Economic development level	pgdp

3.2 Data Sources

This paper uses provincial panel data from 2012 to 2021 to build a spatial econometric model to analyze the relationship between digital inclusive finance and economic growth. All index data are from the National Statistical Yearbook,

statistical yearbooks of provinces, EPS data platform, the National Bureau of Statistics and the Financial Research Center of Peking University. Table 2 shows the statistical characteristics of all indicators:

Table 2. Statistics characteristics of variables

Variable	Sample size	Mean	Standard deviation	Minimum	Maximum
lnpgdp	300	10.925	0.514	9.691	12.356
lnfin	300	5.193	0.684	2.624	6.885
tech	300	61297.1	91241.4	506.3	768966
ss	300	90.665	6.321	74.621	99.147
city	300	55.234	10.852	34.925	89.671
open	300	30.917	22.694	1.625	146.521
edu	300	9.694	1.121	7.983	12.891

Examining the spatial correlation and dependence of variables is the premise to judge whether the spatial econometric model can be used. This paper first constructs a spatial weight matrix based on geographical distance, and then calculates the Moran index of core variables (explained variables, explanatory variables) from 2012 to 2021 to test the spatial correlation between the economic development level and the development level of digital inclusive finance among provinces in China. This paper first calculates the overall Moran index, and analyzes the overall spatial nature of digital inclusive finance and high-quality economic development according to the measurement results of the Moran index [11].

$$Moran I = \frac{n}{i,j} \frac{\sum_{i,j} W_{ij} (x_i - \bar{x})(x_j - \bar{x})}{\sum_i (x_i - \bar{x})^2} \quad (4)$$

W_{ij} is the spatial weight matrix constructed above, x_i and x_j represents the element attribute values of the i th and j th provinces respectively, and n represents the total number of provinces studied. The threshold value of the global Moran index is between - 1 and 1. When the measured index is greater than 0, it indicates that there is a positive spatial relationship between adjacent regions. When the measured index is equal to 0, it indicates that there is no spatial relationship between adjacent regions. When the measured index is less than 0, it indicates that there is a negative spatial relationship between adjacent regions [12]. From 2012 to 2021, the per capita GDP of each province and Moran of the digital inclusive finance development index are positive numbers, and all have passed the test under the significance level of 1%, indicating that the economic development level of each province is positively correlated with the development level of digital inclusive finance. The positive spatial correlation indicates that the economic development level and the development level of digital inclusive finance among provinces are closely related. Specifically, it shows that the economic development level, the development level of digital inclusive finance, high value and high value, low value and low value gather, which has an

obvious spatial diffusion effect. At the same time, it also shows that a spatial econometric model can be built for empirical research.

3.3 Empirical Test

Table 3 reveals the regression results of Spatial Dubin Model under random effects. It can be seen from Table 3 that there is a significant positive correlation between the development level of digital inclusive finance and provincial economic development, with a regression coefficient of 0.1521, indicating that every 1% increase in the level of digital inclusive finance in a region will drive the per capita GDP of the region to increase by 0.1521%. The decision coefficient is 0.9562, and the goodness of fit is high. The regression coefficient of W-Infin is significant at the 1% confidence level, indicating that the development of digital inclusive finance in the province will inhibit the economic growth of neighbouring provinces, and the promotion effect of inclusive finance on economic growth will not "radiate" to surrounding areas, or even inhibit the economic development of these areas. This may be because the measurement system of the level of digital inclusive finance includes three dimensions: coverage, depth of use and digital degree. The higher the digital inclusive finance index in a region, the more perfect the inclusive finance system in the region is, the larger the customer group it can reach and cover, and the higher the actual utilization rate of inclusive finance in the region. At the same time, digital inclusive finance is based on the Internet, blockchain, big data and cloud computing as the main technologies, and customers' use of it is not subject to geographical restrictions and constraints. A relatively mature digital inclusive financial system, with a high degree of digitalization, can provide customers with more cost-effective financial services. This advantage will attract users from surrounding provinces, especially those groups and enterprises that have financing needs but cannot meet the entry threshold conditions of the local traditional financial system due to their own actual conditions. Provinces with a high level of digital inclusive finance have attracted customers from some neighbouring provinces by virtue of this advantage, making it more difficult for provinces with slow development of digital inclusive finance to achieve innovation and progress, thus causing a negative spatial spill over effect of digital inclusive finance.

Table 3. Empirical results of Spatial Dubin Model

Variable	Coefficient	Standard deviation	Variable	Coefficient	Standard deviation
Infin	0.1521***	0.0171	W-Infin	0.0787***	0.0113
tech	0.0374	0.0413	W-tech	-0.0435	0.1052
ss	0.0012***	0.1041	W-ss	-0.0184**	0.0021
city	0.0269***	0.0001	W-city	0.0032**	0.0371
open	0.0861	0.0217	W-open	0.0062	0.0513
hum	0.0726**	0.0024	W-edu	-	0.0461

				0.0033***	
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3.4 Robustness Check

In this paper, time fixed effect and double fixed effect spatial econometric models are used to test the robustness. The spatial weight matrix W used in the model is the same. The estimation results of the spatial econometric model under the control of time effect and double effect are highly like those of the benchmark model. The difference is that in the time fixed effect model, digital inclusive finance plays a more significant positive role in promoting regional economic growth. At the same time, its negative impact on the economic growth of neighbouring regions is also greater, but the significance is relatively low. The regression results of the double fixed effect model show that digital inclusive finance still plays a role in promoting the economic growth of the province. Compared with the other two models, it has less impact, and the impact is relatively insignificant. The impact on surrounding areas is also a negative spatial spillover effect, with relatively low coefficients and significance. It can be seen from this that, in addition to the differences in coefficient and significance level, the core explanatory variable of this paper, inclusive finance, is significantly positively correlated with the economic growth of the explained variable, and both have negative spatial spillover effects on the economic growth of surrounding provinces. The regression results of the control variables are basically consistent with the benchmark regression. The improvement of the urbanization rate of a province can promote the economic level of the province and neighbouring provinces at the same time.

4 Conclusions

This paper uses panel data from 30 provincial regions in China from 2012 to 2021 as samples for empirical analysis, and finally draws the following conclusions: Digital inclusive finance can have a significant positive impact on high-quality economic development in terms of overall effect. From the perspective of the spatial effect of digital inclusive finance on high-quality economic development, digital inclusive finance will not only have a positive impact on the high-quality economic development of the region, but also have a spatial spillover effect on neighbouring regions, which can effectively promote the high-quality economic development of neighbouring regions. We should vigorously develop digital inclusive finance to consolidate and enhance its position in economic development. We deepened the development of digital inclusive finance, fully explored the application scenarios of digital inclusive finance, and maximized the effect of inclusive finance.

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