

Original Paper

Research on the Impact of Digital Inclusive Financial
Development on the Income Gap between Urban and Rural
Residents in Henan Province

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Abstract

This paper begins with an introduction of what digital inclusive finance is; it immediately describes and analyzes the development of digital inclusive finance in Henan, and analyzes the status of disposable incomes of urban and rural residents in Henan from 2011-2021; secondly, based on the digital inclusive finance index released by Peking University from 2011-2021, and based on the panel data of the corresponding years and prefectural cities of Henan Province, it applies the Stata software, through econometric regression and other methods, to empirically analyze the relationship between the development of digital inclusive finance and the income differences between urban and rural residents, to explore the intrinsic relationship between the development of digital inclusive finance and the income differences between urban and rural residents, and to meticulously examine the impact of the coverage, depth of use, and degree of digitalization of digital inclusive finance on the income differences between urban and rural residents. Through the empirical analysis, it is found that the index of digital inclusive finance development has a significant effect on the reduction of the income gap between urban and rural residents, in which the index of the degree of digital inclusive finance digitization has a greater impact on the reduction of the gap between urban and rural residents' incomes.

Keywords

Digital inclusive finance, Urban-rural income gap, Panel data, Peking University Digital Inclusive Finance Development Index

1. Introduction

1.1 Background of the Study

Inclusive finance means that financial institutions, represented by banks, provide appropriate and efficient financial services to those in need of them, including small and micro enterprises, low-income urban residents, and rural residents, based on their affordability. Financial inclusion can also optimize the distribution of financial resources so that those who do not have access to traditional financial services can get better services and can also improve their income. However, inclusive finance is not entirely profit-free; it should be developed in such a way as to meet the financing needs of the more vulnerable while ensuring the profitability of banks and other financial institutions.

Traditional inclusive finance is mostly in the form of additional physical outlets to satisfy a wider range of people, but due to its special characteristics, it has resulted in spatial and temporal limitations and high operating costs, making it impossible to achieve profitable business objectives, as well as leading to poor operational sustainability and an imbalance between supply and demand, which are factors restricting the development of inclusive finance in China. However, in the past decade, with the rapid development of digital and network technologies, China has become the most advanced industry in the world in the fields of e-commerce and mobile payment, and a service model called "digital financial inclusion" has emerged to provide consumers with a new kind of financial service using artificial intelligence and big data as tools. A new service model called "digital financial inclusion" has emerged. Digital financial inclusion has transformed the traditional financial service model, based on digitalization, improved the efficiency of financial services, expanded the coverage of services, lowered transaction costs, improved service efficiency, broadened investment and financing channels, and lowered financing costs through digital technologies such as mobile Internet, mobile payment, network communication services, cloud computing, and so on, which have brought new opportunities for the development of financial inclusion, and also brought economic growth dividends for more people with the dividends of economic growth.

1.2 Research Significance

From 2011 to 2021, Chinese digital credit, payment, and insurance have been developed to different degrees, and the development of digital inclusive finance has made great progress, which is of great significance in solving the problems of insufficient financial services and unbalanced incomes in rural and low-income areas, as well as in changing the imbalance of development between urban and rural areas in China. However, the government of Henan Province has always insisted on taking the road of "common prosperity", which has led to a great increase in the per capita disposable income of urban and rural residents, of which the per capita disposable income of Henan's urban residents reached RMB 17,661, an increase of RMB 19,434, or a cumulative growth of 110%, with an average growth of 10% per year. The per capita disposable income of farmers in Henan Province was 6,989 yuan in 2011 and 17,533 yuan in 2021, an increase of 10,544 yuan over the same period of the previous year, a cumulative increase of 151%, or an average annual increase of 14%. However, the proportion of

farmers, low-income earners, and other disadvantaged groups in Henan to the total population is very large, and the development of the "three rural" economy has never been at the forefront of the country. It is hoped that the findings of this paper will help facilitate the development of digital finance in Henan and improve the income disparity between urban and rural residents in Henan, as well as explore countermeasures to narrow the income gap between urban and rural residents, to provide a reference value for Chinese development of digital inclusive finance, research on the balanced development of urban and rural areas, and the realization of commonwealth.

2. Development Status of Digital Inclusive Finance in Henan

Since April 2018, the people's government of Lankao County has responded to the requirements of the central government on promoting the development of inclusive finance, accelerated the pilot demonstration work of inclusive finance, actively explored sustainable development and replicable experience, and created Lankao's "Digital Inclusive Finance Town", which initially explores the "digital finance as the center, based on financial services, credit construction, inclusive credit as the main content, supported by "a platform and four systems", and to some extent solves the problem of "digital finance". The Lankao model centered on digital finance, based on financial services, credit construction and inclusive credit, with risk prevention and control as the main content, and supported by "one platform and four systems" has, to some extent, solved the problems existing in the operation of financial services in some counties, and shortened the distance between financial services and the common people, thus providing convenience for the common people's production and life. Provides convenience for the production and life of the people. Lankao's "one platform, four systems" digital inclusive financial system refers to the effective integration of all kinds of financial service resources, incorporating all kinds of financial institutions, enterprises, and individuals into an open digital financial system, providing customers with a variety of services such as credit, insurance, financial management and payment, and establishing the "information collection, risk control, and capital settlement" system. It is an online financial supermarket with "information collection, risk control, and capital settlement", which provides a new idea for solving the "last kilometer" problem of inclusive financial development in villages and towns, and promotes the realization of the ultimate goal of inclusive financial development in rural areas, and builds a set of the inclusive financial system suitable for Chinese national conditions with this as the center.

As can be seen from the Ministry of Finance's fund issuance, the scale of the special fund for inclusive financial development in 2022 issued by the Ministry of Finance has reached 10.7 billion yuan, of which 340 million yuan is divided among Henan Province, which is enough to see that the development of inclusive finance in Henan Province has been highly valued by the central government. Lankao County, as an "experimental area of inclusive financial reform", has established a corresponding service platform through years of unremitting exploration, and gradually established a more complete credit system, inclusive financial "Lankao system" will play an irreplaceable role in the

digitalization of inclusive finance in Henan. The "Lankao System" of financial inclusion will play an irreplaceable role in the digitalization of financial inclusion in Henan. Henan Provincial People's Government in Lankao County "inclusive financial reform experimental area" based on the first to select Kaifeng City and other 22 experimental counties (cities, districts), and steadily promote the pilot work of financial inclusion, the pilot counties and cities by their characteristics, regarding the Lankao experimental area of the advanced experience, to explore their direction of the development of digital inclusive finance. Luoyang Luanchuan organically combines financial inclusion with the development of rural tourism, and implements inclusive credit; Nanyang Xichuan Branch takes "credit by household, village by village" as its guide, and "three cultivation and three realization" as its goal, and builds a "financial inclusion smart platform". The Zhumadian Zhishan Branch has constructed a "financial service station" based on "village supermarkets" and "agricultural department", effectively improving the quality of rural financial services. This has effectively improved the quality of financial services in rural areas and has led to the innovative development of the "Lankao model" on this basis.

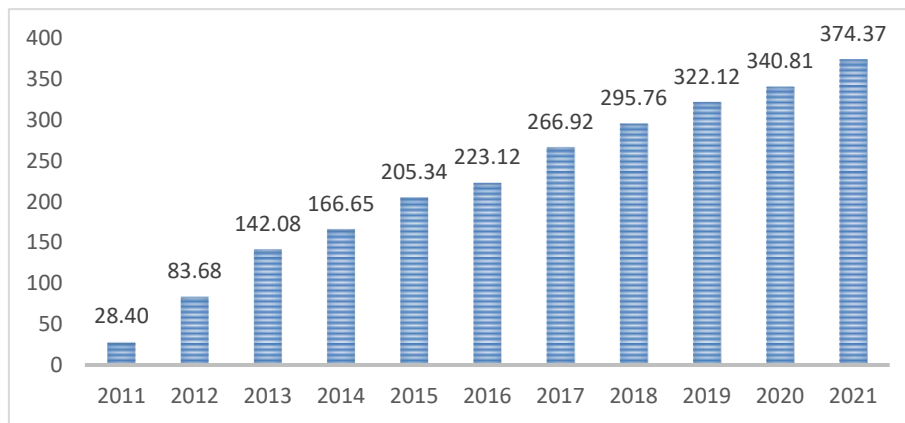


Figure 1. Digital Financial Inclusion Development Index in Henan Province, 2011-2021

2.1 Current Situation of the Development of Digital Financial Inclusion Products in the Banking Sector in Henan Province

In 2021, although Henan faced a complex and severe development environment and numerous risk challenges, especially after the double blow of the massive flood and the new coronary pneumonia epidemic, Henan's economic development still showed strong resilience, and over the past two years, the main economic indicators have continued to grow, while the gap between the year-on-year growth rate and that of the country has been narrowed on the whole. The province's financial system has adopted a proactive and prudent monetary policy, increased financial support for the real economy, ensured the stability of the entire financial system, provided strong financial protection for epidemic prevention and control, post-disaster recovery and reconstruction, and economic and social development, and overall stabilized the functioning of the financial industry, with better development of inclusive finance.

10.5 trillion dollars, the value of total assets of the province's banks and other financial sectors, up 7.8 percent over the same period last year; debt balances of 10.1 trillion dollars, up 7.5 percent. The average asset balance was 10.1 trillion yuan, an increase of 8.4 percent; the year-end liquidity ratio reached 75.3 percent, an increase of 8.5 percentage points compared with the same period of the previous year. Profit for the year amounted to 57.82 billion yuan, an increase of 0.72 billion yuan over the same period of the previous year. (Source: Henan Banking and Insurance Supervision Bureau)

In recent years, with the application and development of financial technology, the banking industry in the country has entered a new milestone in its development, namely, the "digital era". In the course of its reforms, the banking industry has shifted from the model of providing services to customers through physical business outlets to actively integrating itself into the wave of digital technology, with each industry increasing its use of modern technologies such as blockchain, big data, and cloud computing, while at the same time actively exploring models of cooperation with innovative enterprises in the fields of science and technology, finance and so forth.

The banking sector should integrate digital technologies into the "three rural areas" sector to meet the individualized, personalized, and personalized needs of different industries and small businesses. Various new network technologies, digital electronic terminals and other digital modes, especially the new digital financial platform for the "three rural areas", have comprehensively developed diversified financial products and services, which have reduced financing costs while also more clearly identifying and improving the accuracy of financial services. On this basis, the banking industry can make use of the ability of financial science and technology, combine the actual situation of the customer, fully explore the potential of the customer, timely and accurately grasp the credit situation of the customer, and provide the customer with a more comprehensive and objective credit assessment service, which can then better determine the loan amount, interest rate, as well as the term and other elements, continuously improve and optimize the credit-granting mechanism of the banking industry, and enhance the efficiency of the service in all aspects. Improve the service supply mechanism to better meet the needs of customers, to enhance the development of digital inclusive finance in rural areas.

2.2 Development Status of Internet Loan Services for Digital Financial Inclusion in Henan Region

2.2.1 Digital Inclusion Loans Help Revitalize the Countryside

Henan is one of the largest agricultural provinces in China, and is a large province with farmers as the main focus, doing a good job in the "three rural" aspects of Henan has a pivotal role. Since 2021, the financial system of Henan Province has been actively assuming the political responsibility of "assisting rural revitalization", focusing on the general requirements of "rural revitalization", focusing on "digital financial inclusion", and continuously improving "rural revitalization". Focusing on the general requirements of "rural revitalization" and "digital inclusive finance", it has continuously improved the quality of financial services for "rural revitalization" and achieved obvious results. While deepening financial reforms and innovations, Henan has also been copying and popularizing the experience of Lankao inclusive finance to promote the "universality" and "benefit" of inclusive finance. The Lankao

experience has been fully tested for its universality and usefulness from the beginning of the pilot program to its gradual extension to the whole province, resulting in a great development of "universal" and "beneficial" financial services in the province.

By the end of 2021, inclusive financial service stations had covered 99.1% of administrative villages, basic inclusive credit had covered 87.3% of farm households, and credit user evaluation had covered 85.5% of farm households, promoting the development of rural digital inclusive finance. Pu among them, the amount of inclusive financial credit invested in agriculture increased by 14.05 billion yuan over the same period of the previous year, and the growth rate of small and micro-enterprise loans was higher than the overall loan growth rate of 3.2 percentage points, of which the growth rate of inclusive small and micro-enterprises and the growth rate of credit are still at a high level. At the end of 2021, the balance of the province's agricultural refinancing reached 32.29 billion yuan, and a total of 21.46 billion yuan was issued during the year, which was 3.64 billion yuan more than the same period of last year, which played a good leveraging role for financial investment in poverty-eradicating areas and rural areas of the province.

2.2.2 Digital Financial Inclusion Helps Small and Medium-sized Enterprises in Henan Province

In recent years, the Zhengzhou branch of the People's Bank of China has taken a variety of measures to vigorously promote the construction of credit systems for small, medium-sized and micro-enterprises and rural areas. By late March 2019, in the rural credit information system in Henan Province, a total of 15,631,200 households of farmers had been registered with household information, the inclusion ratio was around 80%, and the inclusion ratio of poor households with documented cards was over 96%; at present, 59 counties (cities and districts) have completed the registration of the credit information system for small and medium-sized enterprises (SMEs), and the number of registered enterprises reaches 361,800 units. Some local governments have paid more attention to this, and the long-term mechanism for collecting and updating credit information has been gradually improved, and the amount of credit information collected has been steadily increasing. Financial institutions have issued a total of 300,200 loans with a total balance of 43.234 billion yuan, relying on the Henan Provincial Rural Credit Information System; utilizing the Henan Provincial Small and Medium-sized Enterprises Credit Information System, a total of 1,872 loans have been processed, with a balance of 15.886 billion yuan.

Money is the lifeblood of an enterprise's growth. In response to the current situation of difficult and expensive financing for small, medium and micro enterprises, Henan Province has constructed the first "Henan Financial Services Sharing Platform" with "big data" as the core, giving full play to the advantages of governmental data resources to fill the "inherent shortcomings" of small, medium and micro enterprises in the areas of the imperfection of the financing system, lack of transparency of information and lack of clarity of credit status. imperfect, non-transparent information, unclear credit status and other aspects of the "inherent shortcomings", to build a "credit bridge" for "bank-enterprise cooperation", and effectively alleviate the "financing difficulties". It is of great practical significance to build a "credit bridge" for "bank-enterprise cooperation" and effectively alleviate the problems of

"difficult financing" and "expensive financing". The platform is committed to creating a province-wide integrated financial services sharing platform, reflecting the gradual improvement and maturity of the development of digital inclusive financial Internet financing services in Henan Province. Responding to the call to open up the way forward and lead the future, Henan Financial Services Sharing Platform keeps up with Chinese policy requirements and, with the help of financial technology and data empowerment, provides Internet lending services that can be subdivided into all prefectural-level cities in Henan Province and economic development zones, Lankao County, and other parts of the county (district)-level units. As of March 2023, the financial service-sharing platform in Henan Province has 684,673 enterprises in its database, 437.67 million shared data entries, 30 financial institutions and 234 financial products on the platform.

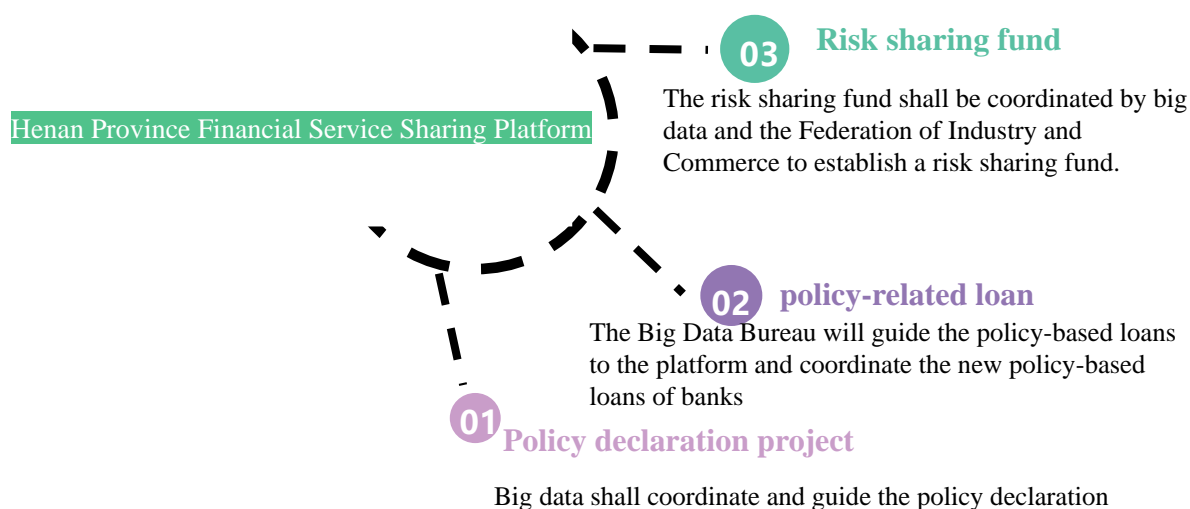


Figure 2. Functions of the Financial Information Service Sharing Platform in Henan Province

Source: Official website of Henan Province Financial Services Sharing Platform

3. Disposable Income of Urban and Rural Residents in the Henan Region

The economic development of Henan Province has entered a new era since the reform and opening up, and the distribution of residents' income has been transformed from the average distribution mode in the past to the distribution mode dominated by the market mechanism, and the per capita income of the residents has increased significantly (Gu & He, 2015). In 2011, the GDP of Henan Province exceeded 2.6 trillion yuan, and the annual per capita disposable income of urban residents reached 17,661 yuan, while that of rural residents reached 6,989 yuan, which substantially improved the living standard of the residents. While the income of our residents is growing rapidly, the income gap between regions and industries is also widening. In 2021, the per capita disposable income of urban residents in Henan Province reached RMB 37,095, an increase of RMB 17,252 from 2012, with a cumulative growth of 86.9% and an average annual growth of 7.2%. In 2021, the per capita disposable income of rural residents in Henan Province reached RMB 17,533, an increase of RMB 9,570 from 2012, with a

cumulative growth of 7.2%. 2012, an increase of 9,570 yuan, a cumulative increase of 120.2%, and an average annual growth rate of 9.2%.

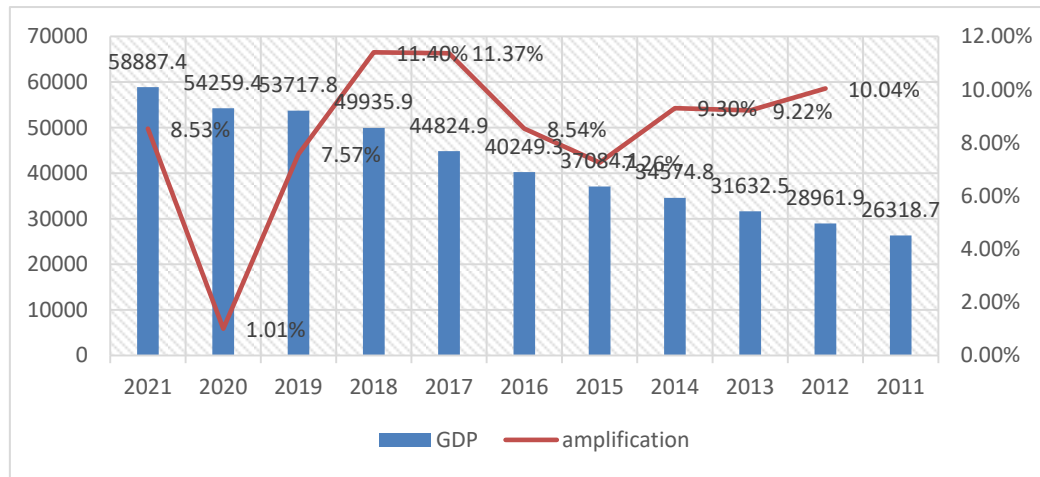


Figure 3. GDP and its growth in Henan Province, 2011 – 2021

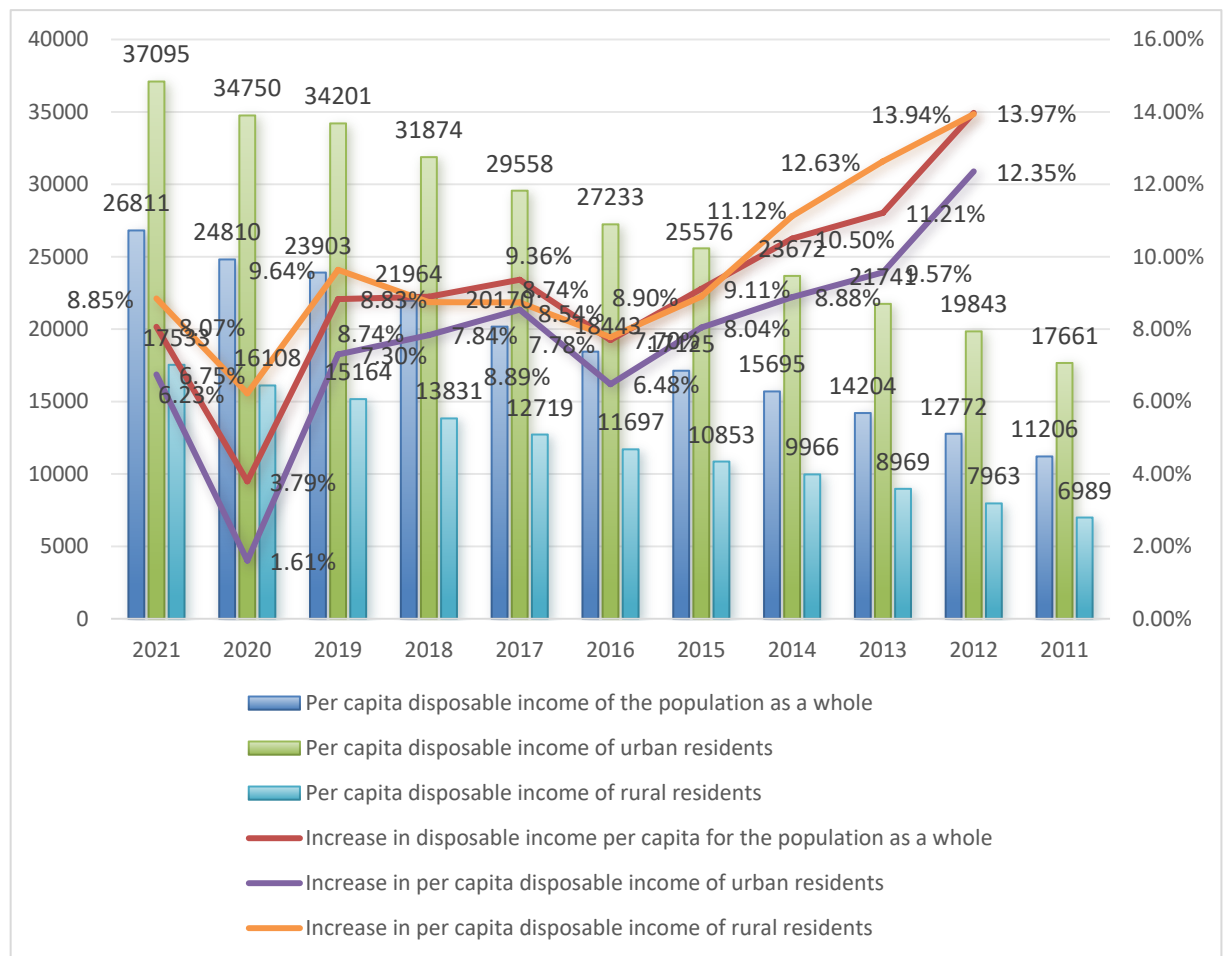


Figure 4. Schematic Diagram of Disposable Income per Capita of Urban and Rural Residents' Income in Henan, 2011 – 2021

4. Empirical Study on the Development of Digital Inclusive Finance and the Income Difference between Urban and Rural Residents in Henan Province

4.1 Description of Variables

To comprehensively reflect the impact of digital financial inclusion on the income gap between urban and rural residents in Henan Province, it is necessary to first understand the explanatory variables, this paper selects the digital financial inclusion index of each prefecture-level city in Henan Province and three-dimensional indexes from 2011-2021, and the explanatory variable is the gap between the per capita disposable incomes of urban and rural residents in Henan Province, GAP. The main indicators of the urban-rural income gap in the existing studies are the Thiel index, Gini coefficient, urban-rural income difference, the ratio of disposable income per capita of urban residents to net income per capita of farmers, urban-rural income multiplier, etc. This paper chooses the urban-rural income multiplier of the urban-rural residents of 18 prefectural-level cities in Henan Province as the explanatory variable from the perspective of the caliber of the statistics, the availability of the data, and objectivity in reflecting the development trend of urban-rural income gap of Henan Province from 2011 to 2021. The income gap between urban and rural residents is not only affected by the development of regional digital inclusive finance, but also by the level of local economic development as well as other factors, this paper, based on the previous research, eliminates some variables with weak explanatory power, and adopts three control variables, namely, the strength of financial support (GOV), the urbanization rate (UR) and the level of economic development (RGDP).

4.1.1 Explanatory Variable

Because the assessment of the level of development of digital inclusive finance involves a wide range and many data are not publicly available, if you measure the inclusive finance index on your own, in terms of data availability, it is difficult to collect data related to the coverage outlets of traditional financial institutions and agriculture-related loans, in addition to the fact that websites such as the National Bureau of Statistics and the Statistics Bureau of Henan Province, the People's Bank of Chinese Zhengzhou Branch, and the Provincial Banking and Insurance Supervisory Administration are unable to obtain directly the calculation of the required Some data. The Peking University Digital Financial Inclusion Index, which includes 33 indicators in three broad categories: depth of digital financial use, breadth of digital financial coverage, and degree of digitization of financial inclusion, has been updated for the fourth time up to this point, and the index spans 2011-2021, covering 31 provinces, 337 cities above the prefecture level, and about 2,800 counties in mainland China (Guo, Wang, Wang, Kong, Zhang & Cheng, 2020). This study takes the indicators of "digital financial inclusion" in 18 cities in Henan Province as the object of study and analyzes them empirically. As shown in Figure 5 shows the weighted graph of digital financial inclusion index of each city in Henan Province in 2021.

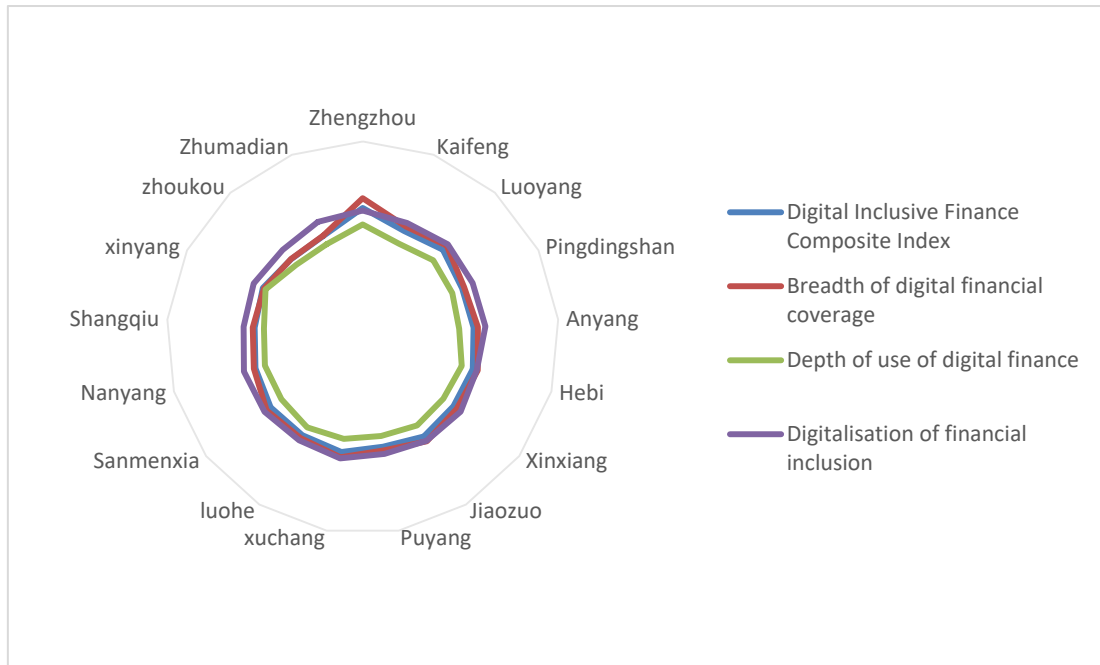


Figure 5. Weighted Digital Financial Inclusion Index by City in Henan Province, 2021

4.1.2 Explanatory Variable

At present, the main indicators for measuring the income gap between urban and rural residents include the Gini coefficient, the income gap between urban and rural residents, the ratio of disposable income per capita for urban residents to disposable income per capita for farmers, the urban-rural income multiplier, and the Tyrell index (Han & Zhang, 2017). Among them, the most used indicator in the literature by most scholars in China is the ratio of disposable income per capita of urban and rural residents, but this calculation method does not reflect the impact of the change in the ratio of urban and rural populations; the calculation of the Gini coefficient and the Tyrell index is more complicated. From 2011 to 2021, China is in a medium- to high-speed development stage. Although the income gap continues to widen in absolute terms, the increase in the per capita income of rural residents has shown a higher growth trend than that of urban residents.

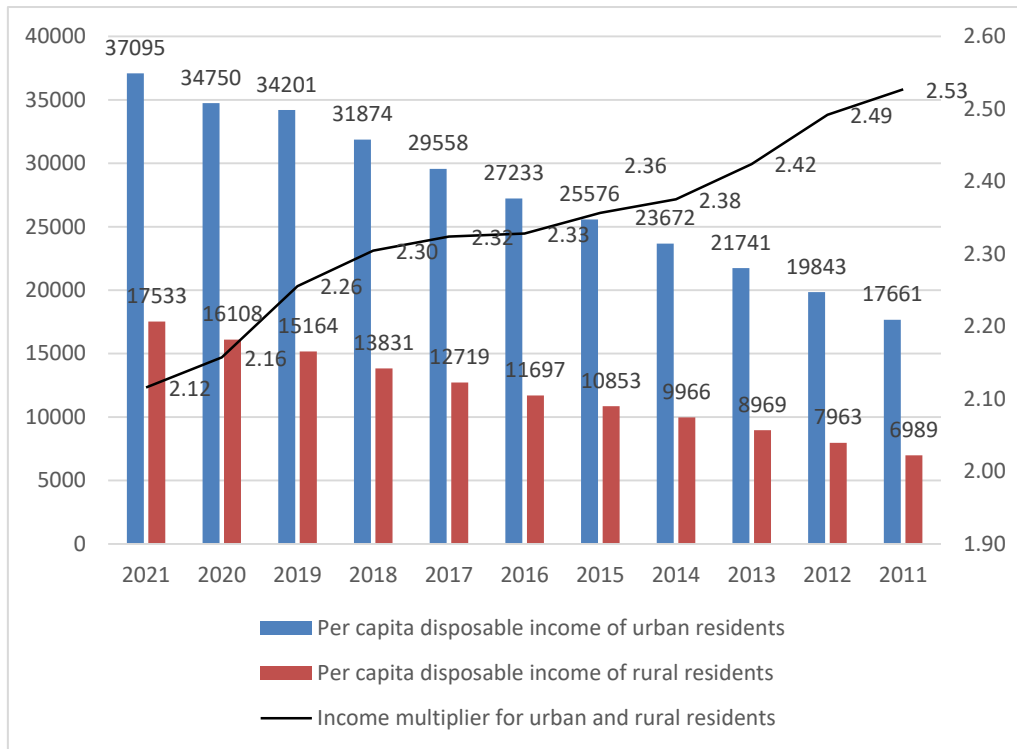


Figure 6. Income Gap between Urban and Rural Residents in Henan Province, 2011-2021 (Times Difference)

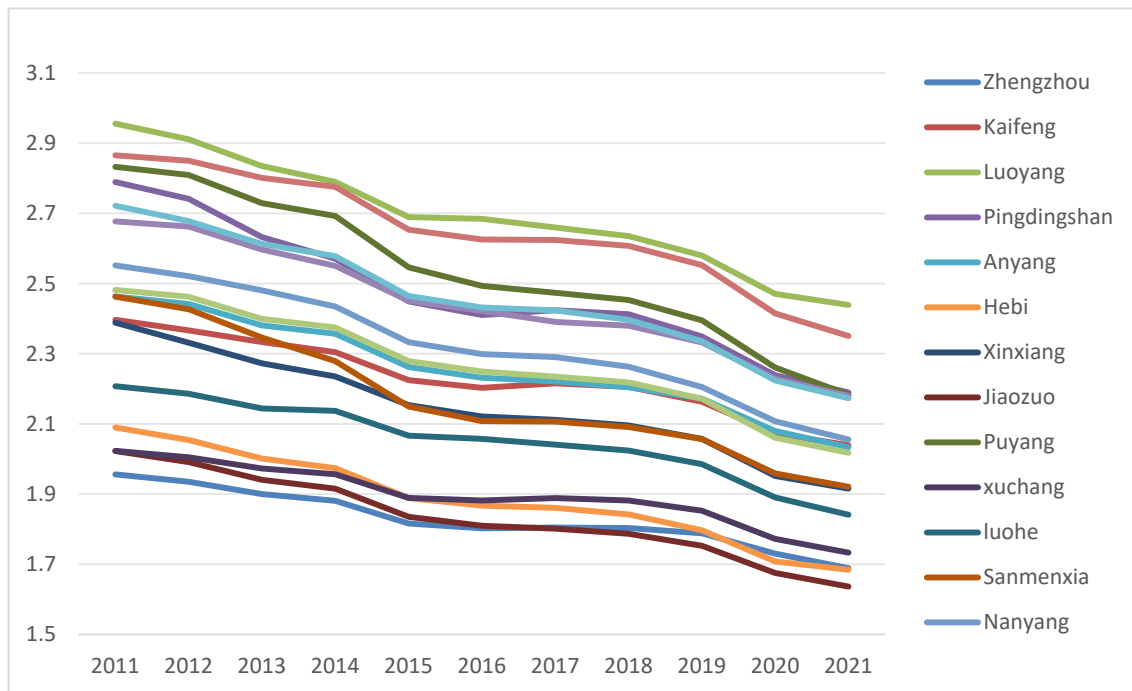


Figure 7. Income Gap between Urban and Rural Residents in 18 Cities of Henan, 2011-2021 (GAP)

Source: Henan Provincial Statistical Yearbook

By the Figure 7 shows that the income gap (GAP) between urban and rural residents in the 17 prefecture-level cities in Henan Province is generally on a slow decline, and the income gap between urban and rural residents in different urban areas varies greatly, with the gap in Zhengzhou, the provincial capital, and the neighboring cities around the provincial capital, such as Jiaozuo and Xuchang, being smaller than that in cities farther away from the provincial capital, such as Luoyang, Puyang, Shangqiu, and so on. Such a situation, in addition to the impact of geographic location factors, but also with the overall level of local economic development, government fiscal policy urbanization rate, and other factors, of course, the degree of digital financial inclusion may also cause the phenomenon of income inconsistency. Such problems can be addressed through measures such as the development of diversity policies.

4.1.3 Control Variable

In recent years, while the economy has been developing at a high speed, the income gap between urban and rural residents is also expanding, which has become a major problem in building a strong socialist modernization country and realizing common prosperity in China, therefore, many experts and scholars in China have studied the main factors affecting the income difference between urban and rural residents in China. Shen Kunrong and Zhang Jing (2017) conducted an empirical analysis from the perspective of the national financial expenditure and concluded that the government's financial expenditure has different effects on reducing the income gap between urban and rural residents, and different items have different effects, among which the expenditure items of science, education, culture and health have the most significant effect on reducing the income gap between urban and rural residents. The most significant effect on reducing the income gap between urban and rural residents is the expenditure program on science, education, culture and health. Lin Yifu (2003) believes that economic development can make significant changes in the income gap between urban and rural residents and that economic development has a certain role in promoting the reduction of the income gap between urban and rural residents.

In addition, the impact of urbanization on the income gap between urban and rural residents is mainly divided into the following three statements: the first one is that Chen Zhao, Lu Ming (2004), and others, through empirical analysis, concluded that there is a double effect of the impact of the level of urbanization on the income gap between urban and rural residents and that on the whole, the increase in the level of urbanization is conducive to narrowing the gap between the incomes of urban and rural residents. The second is that the development level of urbanization widens the income gap between urban and rural residents. Su Xuexue (2002) argues that the development level of urbanization in China is relatively backward, thus restricting the growth of rural residents' income and leading to a gradual increase in the income gap between urban and rural residents. The third one is that Li Jing (2007) and others believe that the relationship between the short-term and long-term impacts of the two is not the same, in the short term it is to expand the income gap between urban and rural residents, while in the long term it can narrow the income gap between urban and rural residents. Therefore, this paper

decides to adopt three variables, namely, the strength of financial support (GOV), the urbanization rate (UR), and the level of economic development (RGDP), as the control variables to study the impact of the development of digital inclusive finance on the income gap between urban and rural residents.

Fiscal support (GOV): finance is a tool of macro-control and a pivot of redistribution, and is closely related to the transformation of the regional economic development mode, which can improve the relative level of inputs of factors of production and achieve the goal of rationalization and efficiency of industrial structure (Jin, 2011).

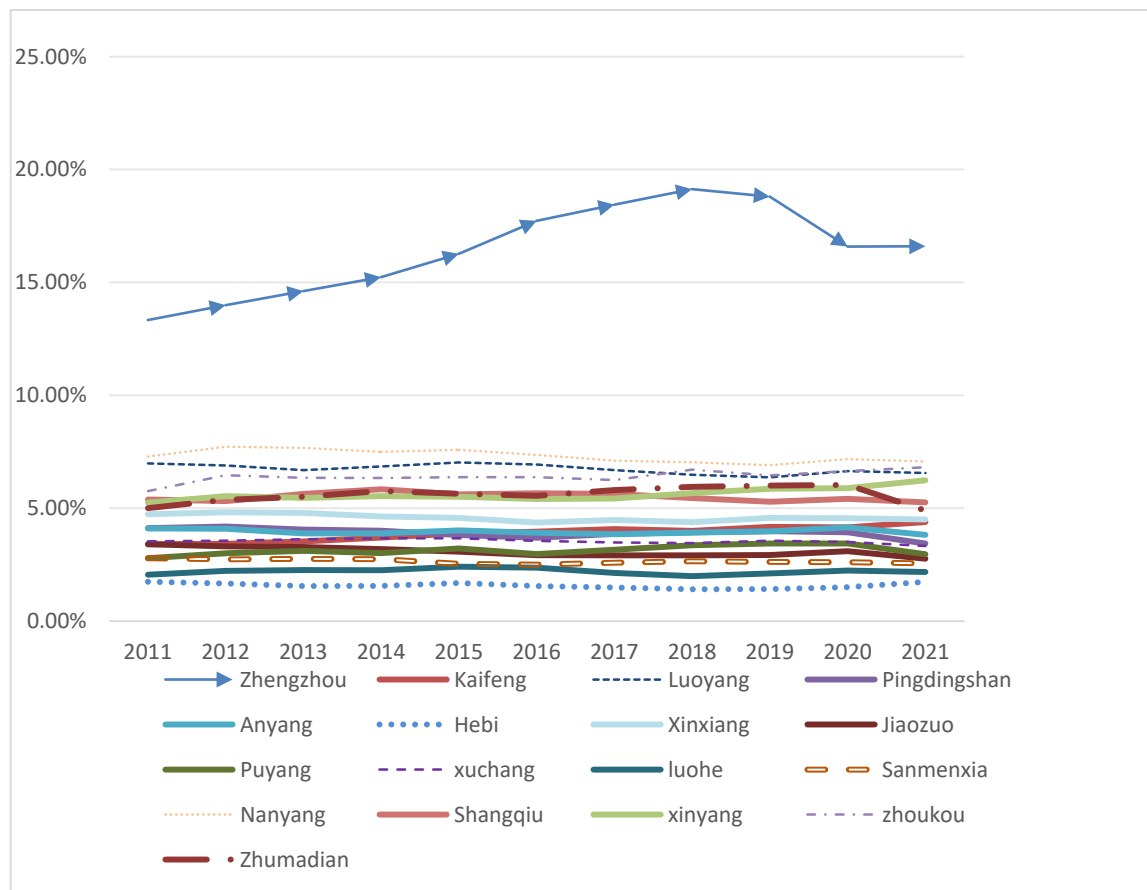


Figure 8. Financial Support for 17 Prefecture-level Cities in Henan Province, 2011-2021 (GOV)

Urbanization rate (UR): It is used to reflect the process of population concentration in cities and its degree of concentration, and is also an important indicator of the economic development of a country or region, as well as the level of social organization and management, and is expressed as the ratio of the urban population to the total population (Zhu, Li, & Le, 2011). The ratio of urban population to total population is used to indicate the urbanization rate.

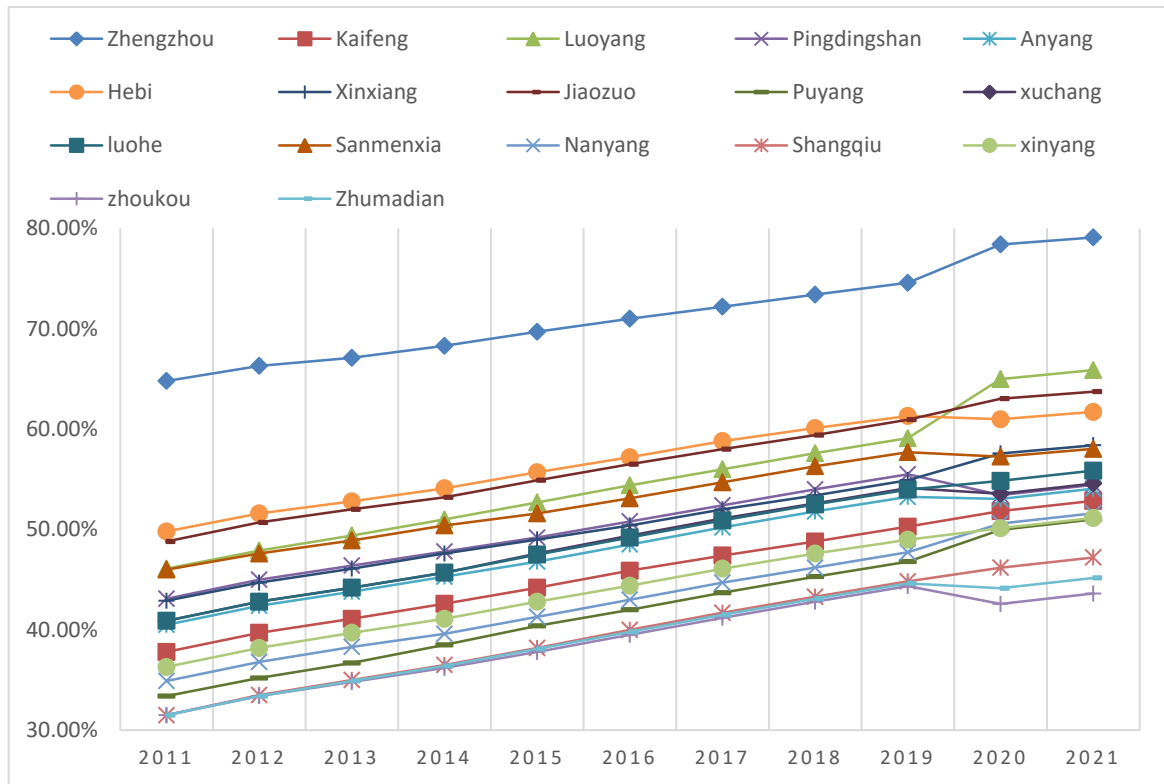


Figure 9. Urbanization Rate of 17 Prefecture-level Cities in Henan Province, 2011-2021 (UR)

Level of economic development (RGDP): According to Kuznets' "inverted U-curve" hypothesis, the income gap between urban and rural areas tends to increase and then decrease with socio-economic development (Li, Zhang, & Luo, 2013). According to Kuznets' "inverted U curve" hypothesis, the income gap between urban and rural areas tends to increase and then decrease with the development of the social economy. Therefore, this paper chooses 17 districts in Henan Province as the research object.

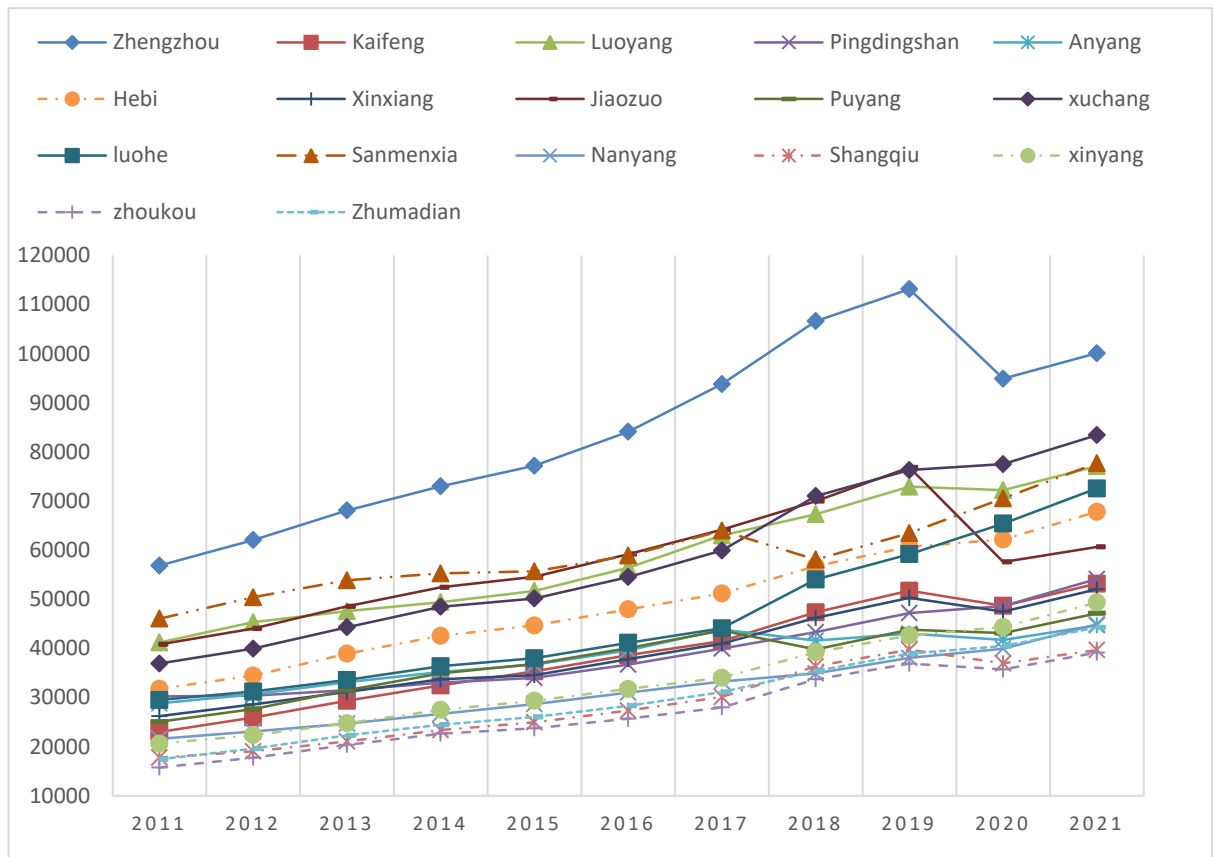


Figure 10. Level of Economic Development of 17 Prefecture-level Cities in Henan Province, 2011-2021 (RGDP)

Source: Henan Provincial Statistical Yearbook

4.2 Descriptive Statistical Analysis of Variables

In this study, we chose eight reference variables: urban-rural income gap (GAP), urbanization rate (UR), financial support (GOV), level of economic development (GDP), Digital Inclusive Finance Composite Index (DIFI), Digital Inclusive Finance Coverage Breadth Index (DIFI1), Digital Inclusive Finance Usage Depth Index (DIFI2), Digital Inclusive Finance Digital Inclusion Index (DIFI3), to analyze and study the role of the development of digital inclusive finance in influencing the urban-rural income gap. After logarithmic processing, the results are as follows:

Table 1. Descriptive Statistical Analysis of Variables

variant	average value	standard deviation	minimum value	Maximum values	sample size
DIFI	5.072	0.560	3.173	5.801	187
DIFI1	4.995	0.668	1.502	5.874	187
DIFI2	5.029	0.529	3.298	5.665	187
DIFI3	5.301	0.512	3.723	5.781	187

GAP	0.799	0.138	0.492	1.084	187
UR	3.874	0.187	3.450	4.371	187
GOV	1.474	0.524	0.348	2.951	187
RGDP	1.416	0.391	0.453	2.426	187

By Table 1 it can be found that the average value of GAP of the urban-rural income gap in 17 prefecture-level cities in Henan Province is 0.799, the minimum value is 0.492, and the maximum value is 1.084, which indicates that the phenomenon of a large income gap between urban and rural residents in prefecture-level cities across Henan Province is still prominent at present, and it is necessary to take some effective measures to properly deal with the problem of income distribution. The data show that the average value of DIFI in Henan Province is now 5.072, and the minimum value is 3.173, which proves that all 17 prefecture-level cities in Henan Province have maintained a high speed of digital inclusive financial development, but there are obvious gaps in the development of digital inclusive finance in different regions due to the limitations of geography, population and other factors. The average value of the urbanization rate (UR) of 17 prefecture-level cities in Henan Province is 3.874, the minimum value is 3.45, and there is a certain gap with the maximum value of 4.371, which indicates that urbanization in Henan Province is developing at a faster pace at this stage, and a large number of rural population will be transferred to cities every year, with the ultimate purpose of rural residents to increase their income. The average value of financial support (GOV) of 17 prefecture-level cities in Henan Province is 1.474, the minimum value is 0.348, and the maximum value is 2.951. The expansion of the scale of financial expenditure causes the phenomenon of financial tilt in the non-agricultural sector, which is the main reason for the expansion of the urban-rural income gap. In terms of RGDP, the 17 prefecture-level cities in Henan Province still maintain a good economic growth rate at this stage, but due to the different distances between each prefecture-level city and Zhengzhou, which has a certain impact on the level of economic development, the level of economic development around the capital of the province is significantly faster than that of other cities.

4.3 Econometric Modeling: Panel Data Regression

The urban-rural income gap (GAP) of 17 prefecture-level cities in Henan Province is used as an explanatory variable, and the corresponding level of economic development (RGDP), financial support (GOV), and urbanization rate (UR) of each city is used as a control variable to establish a panel data model as follows:

$$GAP_{i,t} = \beta_0 + \beta_1 DIFI1_{i,t} + \beta_2 DIFI2_{i,t} + \beta_3 DIFI3_{i,t} + \beta_4 UR_{i,t} + \beta_5 GOV_{i,t} + \beta_6 RGDP_{i,t} + \varepsilon_{i,t}$$

where $i=1,2,\dots,17$, $t=2011,2012,\dots,2021$, i represents cities in Henan Province, t represents year, GAP represents urban-rural income gap, β represents the regression coefficient, DIFI1 represents the digital financial inclusion coverage breadth index, DIFI2 represents the depth of use of digital financial inclusion, DIFI3 represents the degree of digitization of financial inclusion, UR for the urbanization rate, GOV for the level of financial support, RGDP stands for the level of economic development, ε

stands for the random disturbance term. (The following equations represent the same meaning)

To completely reflect how the depth of digital financial inclusion use, the breadth of digital financial inclusion coverage, and the model of the degree of financial inclusion digitization work together to affect the income gap between urban and rural residents, we refer to the method of Zhang Xue (2018) in the study of the impact of the development of digital financial inclusion on the income gap between urban and rural residents in the empirical analysis, and take the digital financial inclusion composite index, which is compiled by the three together *DIFI* to establish model 2 and empirically analyze the impact of the digital inclusive finance composite index on the level of the income gap between urban and rural residents (Zhang, 2018).

$$GAP_{i,t} = \beta_0 + \beta_1 DIFI_{i,t} + \beta_2 UR_{i,t} + \beta_3 GOV_{i,t} + \beta_4 RGDP_{i,t} + \varepsilon_{i,t}$$

To make the data smoother, the variables were logarithmized and the final model is as follows:

$$\ln GAP_{i,t} = \beta_0 + \beta_1 \ln DIFI1_{i,t} + \beta_2 \ln DIFI2_{i,t} + \beta_3 \ln DIFI3_{i,t} + \beta_4 \ln UR_{i,t} + \beta_5 \ln GOV_{i,t} + \beta_6 \ln RGDP_{i,t} + \varepsilon_{i,t}$$

$$\ln GAP_{i,t} = \beta_0 + \beta_1 \ln DIFI_{i,t} + \beta_2 \ln UR_{i,t} + \beta_3 \ln GOV_{i,t} + \beta_4 \ln RGDP_{i,t} + \varepsilon_{i,t}$$

4.4 Empirical Process and Results

4.4.1 Unit Root Test

To avoid the validity of the regression results from being adversely affected, before carrying out the regression analysis operation, we ensure that the smoothness test requirements are met by employing the unit root test, which starts from the perspective of eight variables. After the LLC test, we mainly observe the observation value and P value corresponding to Adjusted t*, and the smaller the P value, the better. If the P-value is smaller than 0.01, it can be said that the original hypothesis is not accepted at 1% level of significance. The results are shown in Table 2, all eight variables passed the 10% significance test and all of them except *DIFI* and *DIFI1* passed the 5% significance test, indicating that the variables are smooth series and can be regressed for subsequent tests.

Table 2. LLC Unit Root Test

variable name	Unadjusted t	Adjusted t*	p-value
DIFI	-12.7162	-1.4093	0.0794
DIFI1	-17.0695	-1.3926	0.0819
DIFI2	-14.5325	-7.9489	0.0000
DIFI3	-15.5850	-8.0922	0.0000
UR	-3.9077	-2.5465	0.0054
GOV	-6.5945	-3.0173	0.0013
RGDP	-5.4423	-2.0854	0.0185
GAP	-6.7560	-5.1902	0.0000

4.4.2 Hausman Test

First, we constructed a random effects model for 17 prefecture-level cities in Henan Province and tested it with the Hausman method, and got the test result $P=0.7940$ and did not reject the original hypothesis at 1% level, so we chose the model. Similarly, a random effects model was used for model 2.

Table 3. Hausman Test Results for Model 1

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f	Prob.
ross-section random	3.88	6	0.7940

Table 4. Hausman Test Results for Model 2

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f	Prob.
ross-section random	0.59	4	0.9886

4.4.3 Results of Empirical Tests

Table 5. Model 1 Random Effects Estimation Results

Variable	Coefficient	Std. err.	t	$P> t $
DIFI1	-0.075843	0.0420776	-1.80	0.073
DIFI2	-0.0302814	0.0419152	-0.72	0.471
DIFI3	-0.0352325	0.0457323	-0.77	0.442
UR	-0.5018504	0.0951068	-5.28	0.000
GOV	0.0593665	0.0126446	4.69	0.000
RGDP	-0.0379702	0.0461491	-0.82	0.412
C	2.788543	0.3218431	8.66	0.000

Table 6. Model 2 Random Effects Estimation Results

Variable	Coefficient	Std. err.	t	$P> t $
DIFI	-0.0074999	0.0154498	-0.49	0.628
UR	-0.4761133	0.0936596	-5.08	0.000
GOV	0.059717	0.012655	4.72	0.000
RGDP	-0.0294736	0.0461673	-0.64	0.524
C	2.634895	0.3060396	8.61	0.000

4.4.4 Analysis of Empirical Test Results

The GAP of the 17 prefecture-level cities in Henan Province is negatively correlated with the DIFI Digital Financial Inclusion Index, indicating that the income gap between urban and rural residents will be further reduced with the gradual improvement of the digital financial inclusion system.

The root cause is that, with the deep development of digital inclusive finance in China, the level of its financial services is gradually changing from traditional offline bank branches to online digital platform financial services, and the scale is expanding year by year. Especially in rural and remote mountainous areas, limited by many factors, traditional financial services are limited to townships and streets, etc. Nowadays, inclusive finance will take advantage of the Internet, digitalization, and other opportunities to enter thousands of households. There are significant changes in the degree of utilization of financial products and the coverage of financial services by rural residents. At this stage, it will not only lower the financing threshold for farmers and small and microenterprises, but also alleviate the suppression of rural finance, and, ultimately, not only narrow the income gap between urban and rural areas but also promote the development of social fairness, justice and common prosperity.

The urbanization rate of 17 prefecture-level cities in Henan Province is negatively correlated with the GAP of urban-rural residents' income gap, and the coefficient corresponding to the urbanization rate is -0.4761133, which indicates that the urban-rural residents' income gap gradually decreases with the increase of urbanization rate.

Correspondingly, along with the increasing degree of urbanization, more rural laborers are entering the towns, which has led to dramatic changes in the production methods of farming households, with improved output ratios and labor efficiency. At the same time, farmers' incomes have increased. The process of urbanization has also led to more idle capital in the countryside, in the form of population movement, to industries with higher productivity in the cities, which has also played a large role in reducing the income gap between urban and rural residents.

The degree of digital inclusion financial digitization development in 17 prefecture-level cities in Henan Province, DIFI3, is significantly and negatively correlated with the urban-rural residents' income gap GAP, with a coefficient of -0.0352325; the depth of digital inclusion financial use in Henan region, DIFI2, is significantly and negatively correlated with the urban-rural income difference GAP value and the coefficient of the latter is smaller than the coefficient of the former, which indicates that with the digital inclusion financial in all prefectures and cities in Henan Province digitization level continues to improve, the income gap between urban and rural residents is tending to narrow. On the basis of the deepening digital financial digitization of digital inclusive finance, each city has gradually introduced financial digitization tools, thus changing the status quo that rural residents could not access financial services as conveniently as urban residents in the past, and narrowing the income gap between urban and rural residents. Overall, the DIFI3 has a positive effect on the reduction of the urban-rural income gap, and the coefficient effect of "positive effect" is the most significant, which is consistent with the empirical findings of the DIFI.

5. Conclusions and Policy Recommendations

At present, the difference in the income of urbanized residents in China is still a more prominent problem. In this context, an in-depth exploration of the relationship between the development of digital

inclusive finance and the income differences between urban and rural residents has a very important theoretical and practical value for the realization of the common prosperity of the whole country.

5.1 Findings

Across the province, only a few cities, such as Zhengzhou, Kaifeng and Luoyang, are in a good position to develop digital financial inclusion. In a sense, with the development of the city's economy, the development of financial inclusion will also improve. The empirical study based on the "digital financial inclusion development index" shows that the "expansion of digital financial inclusion coverage" has a significant role in the "improvement of digital financial inclusion development", which indicates that the "expansion of digital financial inclusion coverage" has a significant role in the "improvement of digital financial inclusion development", which indicates that the "expansion of digital financial inclusion coverage" has a significant role in the "improvement of digital financial inclusion development". This suggests that "different regions" should work together to increase the coverage of digital inclusion.

From the relationship between the explanatory variables and the explained variables, there is a big difference between the income of urban and rural residents in China, so it is very necessary to vigorously develop digital inclusive finance in Henan to reduce the income gap between urban and rural areas. Although in the study, the depth of digital inclusive finance use is in some conflict with the theoretical assumptions, it is not very useful.

5.2 Policy Recommendations

First, traditional financial institutions need to carry out digital reform. Chinese traditional financial system is centered on commercial banks in the long-term development process. However, after entering the stage of digital inclusive financial development, commercial banks should re-adjust their development strategy, seize the development opportunities, and utilize a dispersed mode of thinking to jointly create favorable conditions for promoting digital inclusive financial development. In the process of selecting service targets, they should focus on micro, small and medium-sized enterprises and groups with lower income levels, and utilize different ways to provide financial services. In the process of selecting services, as far as possible to take a combination of online and offline, through the "digital platform + offline outlets" collaborative financial services, at the same time, to speed up the construction of online platforms, to provide more online services can improve customer acceptance; from the point of view of the content of the service, the tailor-made service program for the target population also helps to meet the differentiated needs of customers. In terms of service content, tailor-made service solutions for target groups can also help meet the differentiated needs of customers. Second, expand inclusive financial services. Now that we have overcome the impact of the epidemic, realized the building of a moderately prosperous society in all aspects, and moved towards the second hundred-year goal, Henan Province's economic development has both great opportunities and challenges. Financial services in Henan Province should strongly support the development of the real economy and guide more capital to industries with good development prospects through financial

innovation and financial services. With the continuous improvement of the financial system, the development of rural financial services is also receiving more and more attention. It is necessary to make full use of the Internet, digital and other advantageous resources and combine them with information technology means to promote the innovation of rural financial service products, introduce resources favorable to rural development through financial services, and combine them with local characteristic agricultural products to develop a kind of agricultural finance suitable for the local area. In order to raise the income level of farmers, the income level of urban and rural residents can be effectively raised, so that the urban and rural economies of each region can be developed in a balanced manner, and the goal of common prosperity can be achieved in the end.

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