

The Impact of Digital Financial Inclusion on the Urban-Rural Income Gap in China

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Abstract: China is the second largest economic power in the world. The dual structure of urban and rural areas restricts the fair and reasonable allocation of financial resources, resulting in the problem of excessive income gap and affecting China's social equity. Due to the widespread application of the Internet, digital financial inclusion has risen rapidly and has become an important factor affecting my country's economic development. Digital inclusive finance relies on technological innovation of inclusive financial products and services, and has advantages in reducing costs, expanding the scope of financial services, and effectively controlling risks. On the basis of theory and status quo, this paper selects data from 30 provinces in my country, uses Theil index to measure the urban-rural income gap, and uses digital financial inclusion data from the Digital Finance Research Center of Peking University as explanatory variables. After the Hausman test, random or fixed effect models are used to analyze the impact of digital financial inclusion on the urban-rural income gap, and to explore the impact of different dimensions and economic zones. The research results show that the development of digital inclusive finance in China can significantly reduce the income gap between urban and rural areas; the development effects of digital inclusive finance in different dimensions are different; the effects of different economic zones are also different. Finally, in view of the different impacts of digital financial inclusion on the urban-rural income gap, this paper puts forward relevant suggestions for the government, regulators and financial institutions.

1. Introduction

In 2005, the United Nations proposed inclusive finance to provide solutions to the wide gap between the rich and the poor, the imbalanced allocation of financial resources and the continuous spread of hunger in the world. Digital financial inclusion can reach a wider range of service areas through the Internet, provide lower cost services, and greatly improve the service efficiency of financial institutions. For poor people and small, medium and micro enterprises, financing is very difficult, and inclusive finance plays an important role.

In China's urban-rural income gap is still maintained at a high level, and the urban-rural income gap was the largest in 2009. It has been declining since 2010. Although the urban-rural income gap in China showed a decreasing trend year by year from 2010 to 2018, the huge gap in reality still needs to be paid attention to.

On the whole, digital inclusive finance in China develops rapidly, with the average level increasing from less than 50 points in 2011 to nearly 300 points in 2020. From the figure, this research find that from 2011 to 2015, the digitalization degree of digital inclusive finance has the fastest growth, followed by the coverage breadth of digital inclusive finance, and the use depth has the slowest growth. After 2016, some changes have taken place in the growth of the index. The growth of the depth index in the use of digital finance tends to exceed that of the breadth index of digital finance coverage. During the five years from 2016 to 2020, the growth of the depth index in the use of digital finance has exceeded that of the breadth index.

The digital financial inclusion index for different provinces varied widely in 2011, but by 2018, the differences among provinces had narrowed considerably.

Therefore, this paper put forward a research question for this paper. From 2011 to 2018, China's

digital inclusive finance increased year by year and the urban-rural income gap narrowed year by year. Is there a relationship between the two? If so, how does digital financial inclusion affect rural-urban income inequality? The digital financial Inclusion index is divided into three dimensions, mainly influencing the urban-rural income gap through which aspect.

2. Literature Review

Song et al. [1] takes Internet financial services as the starting point, and uses the Theil index to calculate the income gap between urban and rural residents in 31 provinces in my country from 2011 to 2015, and builds a balanced panel model based on this data. The empirical results show that digital financial inclusion can significantly reduce the urban-rural income gap. From the perspective of influence mechanism, digital inclusiveness narrows the urban-rural income gap through three influence mechanisms: threshold effect, exclusion effect and poverty reduction effect.

Neaime and Gaysset et al. [2] have empirically analyzed the relationship between financial inclusion and income, poverty and stable financial environment in the Middle East and North Africa. The research concluded that factors such as population size and inflation aggravated the situation of income imbalance, and the development of financial inclusion could reduce the income gap.

Xiaoli et al. [3] has based on the theory of financial deepening, the Theil Index was measured based on data from 20 cities in Guangdong Province from 2013-2017 to measure income disparity, and a panel data regression model was constructed to empirically analyze the impact of digital inclusive finance on urban-rural income disparity. The impact of digital inclusive finance on the urban-rural income gap was analyzed empirically by constructing a panel regression model. The factors influencing the indicators of digital inclusive finance are empirically studied from various aspects, including the level of economic development, industrial structure, urbanization rate, government financial expenditure and education.

Wang and Liu et al. [4] have used a spatial autoregressive model to verify whether digital inclusive finance could reduce the urban-rural income gap, and investigated the impact between provinces by decomposing spatial effects. The results show that: digital inclusive finance can reduce the urban-rural income gap.

Zhao Long et al. [5] have proposed that the small and micro enterprise financing platform and financing mechanism of digital inclusive finance can alleviate the problem of information asymmetry to a certain extent, reduce the related costs in the lending market, promote the formation of an effective lending market, and improve the allocation of lending resources efficiency. Digital inclusive finance has changed the financing channels of small and micro enterprises, breaking the financial restraint caused by the imperfect financial system, and on the basis of alleviating the credit constraints of small and micro enterprises, it also gives small and micro enterprises the impetus to innovate.

3. Observations and Remarks

To sum up, many scholars have conducted in-depth research on inclusive finance from the perspective of urban-rural income gap, and the system has been gradually improved. As an extension of financial inclusion, digital financial inclusion has a relatively short development time in China, and there are few literature on both theoretical and empirical testing. In addition, in the research on the relationship between digital financial inclusion and the urban-rural income gap, scholars mostly focus on the research on the general index of digital financial inclusion. And the degree of digitization is rarely mentioned, and it is impossible to distinguish which internal factor has a greater impact, so as to carry out targeted policies. On the other hand, when studying the relationship between the two, there are very few literature on the division of regions and the analysis of different economic zones.

4. Model framework

The model constructed in this paper is as follows:

$$\begin{aligned} \text{theil}_{it} &= \alpha_0 + \beta_1 \text{DIF}_{it} + \epsilon_{it} \\ \text{theil}_{it} &= \alpha_0 + \beta_1 \text{DIF}_{it} + \beta_2 \text{GDP}_{it} + \beta_3 \text{GOV}_{it} + \beta_4 \text{INDUS}_{it} + \beta_5 \text{OPEN}_{it} + \beta_6 \text{URBEN}_{it} + \\ &\quad \beta_7 \text{FIX}_{it} + \epsilon_{it} \quad (1) \end{aligned}$$

Model (1) is mainly used to study the impact of digital financial inclusion on the urban-rural income gap in the national sample. In addition to the research on the digital financial inclusion index, this paper further analyzes its three dimensions, that is, the coverage of financial services, the depth of use and the degree of digitization. The model is constructed as follows:

$$\text{theil}_{it} = \alpha_0 + \beta_1 \text{DIMENSION}_{it} + \beta_2 \text{GDP}_{it} + \beta_3 \text{GOV}_{it} + \beta_4 \text{INDUS}_{it} + \beta_5 \text{OPEN}_{it} + \beta_6 \text{URBEN}_{it} + \beta_7 \text{FIX}_{it} + \epsilon_{it} \quad (2)$$

Model (2) is mainly used to study the impact of three dimensions of digital financial inclusion on the urban-rural income gap. Among them, other variables are the same as model (1), representing the coverage breadth (DIF1), the depth of use (DIF2), and the degree of digitization (DIF3) of the province in year t.

Refer to Liang Shuanglu and Liu Peipei (2019), Zhang He and Bai Qinxian (2018) and other scholars. The study conducted a subregional study of the sample. Studies the impact of digital financial inclusion on the urban-rural income gap in different economic zones. Build the model as follows:

$$\text{theil}_{it} = \alpha_0 + \beta_1 \text{DIF}_{it} + \beta_2 \text{LOCATION}_{it} + \beta_3 \text{DIF} * \text{LOCATION}_{it} + \beta_4 \text{GDP}_{it} + \beta_5 \text{GOV}_{it} + \beta_6 \text{INDUS}_{it} + \beta_7 \text{OPEN}_{it} + \beta_8 \text{URBEN}_{it} + \beta_9 \text{FIX}_{it} + \epsilon_{it} \quad (3)$$

Model (3) is mainly used to study the impact of digital financial inclusion and urban-rural income gap in different economic belts. Among them, other variables are the same as model (1), representing the region dummy variables. Specifically expressed as east, west, mid. Among them, if east is 1, it is the east region, and if it is 0, it is other regions, and so on, west means west, and mid means central.

5. Variables and Hypothesis

This paper studies the different effects of the three main perspectives of digital Finance on the urban-rural income gap, this paper use the Theil index, which can better distinguish them.

The specific calculation formula is as follows:

$$\text{theil} = \sum_{j=1}^2 \frac{P_{ijt}}{P_{it}} * \ln \left(\frac{P_{ijt}}{P_{it}} / \frac{Z_{ijt}}{Z_{it}} \right)$$

i is the province, t is the year, j=1 is urban, and j=2 is rural. P is the total income, The formula is population multiplied by per capita disposable income, and Z is the population. P_{ijt} is the total income in the t year in the rural or urban areas of the i province, and Z_{ijt} is the total population in the t year in the rural or urban areas of the i province.

This paper selects the Peking University Digital Financial Inclusion Index as the independent variable of interest, and uses it to measure the development level of my country's digital financial inclusion. The DIF index of various regions in China and the three dimension indices that make up the DIF include the breadth of use(DIF1), the depth of use(DIF2), and the degree of digitization(DIF3). All data have been updated to 2020.

This paper selects six independent variables: economic development(GDP), industrial structure(INDUS), local government fiscal expenditure level(GOV), urbanization rate(URBAN), Fixed asset investment(FIX)and external openness(OPEN).The data are from national statistics, and this paper selects 2011-2018 as the time range of sample data.

6. Results

All in all, descriptive statistics of sample data show that there is a significant gap in the development of digital inclusive finance in each province. At the same time, there are also differences in basic conditions and government support among provinces, which have a certain impact on the urban-rural income gap.

VARIABLES	(1) N	(2) average	(3) std	(4) min	(5) max
INTERNET	240.000	48.922	12.451	5.125	78.000
DIF	240.000	188.186	84.980	18.330	377.734
DIF1	240.000	167.934	82.722	1.960	353.867
DIF2	240.000	183.526	84.883	6.760	400.397
DIF3	240.000	263.529	116.651	7.580	453.660
URBAN	240.000	0.571	0.123	0.350	0.896
theil	240.000	0.098	0.044	0.020	0.227
GAP	240.000	4.373	3.580	1.881	19.856
GDP	240.000	0.092	0.059	-0.223	0.253
GOV	240.000	0.247	0.102	0.110	0.627
INDUS	240.000	0.081	0.048	-0.279	0.192
OPEN	240.000	0.043	0.049	0.002	0.240
FIX	240.000	0.795	0.252	0.233	1.480

Figure 1 Descriptive Statistical Analysis

Hausman test	
X-statistics	Prob
9.0500	0.2491

Figure 2 Hausman test on model (1)

The null hypothesis of the Hausman test is a random effect model, and the result judgment standard is: greater than 5% to accept the null hypothesis, less than 5% to reject the null hypothesis, from the results, the p value is greater than 5%, so this paper uses a random effect model.

	(1) without control variables	(2) control variables
DIF	-0.000156*** (-17.51)	-0.000053*** (-3.11)
FIX		-0.019933*** (-4.39)
OPEN		-0.063787 (-1.21)
INDUS		-0.120975*** (-2.60)
GOV		0.095141*** (3.65)
RGDP		0.115795*** (2.73)
URBAN		-0.289882*** (-8.79)
_cons	0.127284*** (22.50)	0.267760*** (14.53)
N	240	240
R ²	0.5685	0.7856

Note: ***, **, * in the table are significance at the 99%, 95%, and 90% level respectively.

Figure 3 Model 1 pooled regression results

Using random effects model to analyze model (1), from the regression results of the table, the development of digital inclusive benefits at the national level has significantly narrowed the urban-rural income gap, which is significant at the 1% level.

Hausman test	
X-statistics	Prob
7.7900	0.3514

Figure 4 Hausman test on DIF1

The p value is greater than 5%, so this paper uses a random effect model.

Hausman test	
X-statistics	Prob
19.4400	0.0069

Figure 5 Hausman test on DIF2

The p value is less than 5%, so this paper uses a fixed effect model.

Hausman test	
X-statistics	Prob
13.5700	0.0593

Figure 6 Hausman test on DIF3

The p value is greater than 5%, so this paper uses a random effect model.

DIF1	-0.000078*** (-4.33)		
DIF2		0.000030* (1.97)	
DIF3			-0.000034*** (-3.63)
FIX	-0.020481*** (-4.60)	-0.014414*** (-2.96)	-0.017964*** (-3.93)
OPEN	-0.106253** (-2.05)	0.023958 (0.47)	-0.036467 (-0.80)
INDUS	-0.097562** (-2.11)	-0.106573** (-2.28)	-0.134379*** (-2.92)
GOV	0.104529*** (4.04)	0.054687 (1.61)	0.094380*** (3.78)
RGDP	0.092465*** (2.19)	0.121184*** (2.91)	0.118453*** (2.82)
URBAN	-0.251313*** (-7.37)	-0.490950*** (-11.96)	-0.318845*** (-13.60)
_cons	0.248984*** (13.06)	0.367196*** (16.78)	0.281618*** (18.68)
N	240	240	240
R ²	0.7784	0.7594	0.7864

Note: ***, **, * in the table are significance at the 99%,95%, and 90% level respectively.

Figure 7 Model 2 pooled regression results

It can be seen that the coverage of digital financial inclusion, the depth of use and the degree of digitalization are all significant at the 1% level, indicating that the urban-rural income gap can be narrowed in all three dimensions.

	(1) east	(2) mid	(3) west
DIF	-0.000055*** (-3.03)	-0.000062*** (-3.46)	-0.000049*** (-2.88)
DIF_EAST	0.000004 (0.29)		
DIF_MID		0.000021 (1.56)	
DIF_WEST			-0.000027** (-1.98)
FIX	-0.019623*** (-4.22)	-0.020043*** (-4.42)	-0.018032*** (-3.90)
OPEN	-0.061140 (-1.13)	-0.077254 (-1.45)	-0.056027 (-1.07)
INDUS	-0.119027** (-2.54)	-0.124689*** (-2.68)	-0.114414** (-2.46)
GOV	0.095516*** (3.61)	0.092716*** (3.59)	0.098448*** (3.85)
RGDP	0.113885*** (2.66)	0.119169*** (2.80)	0.109651*** (2.58)
URBAN	-0.290915*** (-8.74)	-0.282766*** (-8.63)	-0.284595*** (-8.79)
_cons	0.267902*** (14.40)	0.265451*** (14.57)	0.262729*** (14.46)
N	240	240	240
R ²	0.7865	0.7649	0.7688

Note: ***, **, * in the table are significance at the 99%,95%, and 90% level respectively.

Figure 8 Model 3 pooled regression results

It can be seen that the development of digital financial inclusion in different regions has a significant impact on the urban-rural income gap.

	(1)
	GAP
DIF	-0.005549*** (-5.79)
FIX	-1.040708*** (-4.37)
OPEN	-1.19e+01*** (-4.19)
INDUS	-0.655628 (-0.27)
GOV	-0.183519 (-0.12)
RGDP	-1.418731 (-0.65)
URBAN	22.554966*** (11.24)
cons	-5.898465***

Figure 9 Robustness

This paper uses the income ratio of urban and rural residents as a surrogate variable for Theil index. The higher the indicator, the greater the urban-rural income gap. The results of variable substitution are shown in the table, and the results are not significantly different from those mentioned above, indicating that the conclusions of this paper are robust.

7. Conclusion

The research results show that: First, the development of digital inclusive finance can significantly reduce the urban-rural income gap at the level of 1%, and can improve the income level of low-income people, which is conducive to solving the imbalance of urban and rural income distribution. Second, the breadth of coverage, the depth of use and the degree of digitization have different effects on narrowing the urban-rural income gap, and the breadth of coverage has the most significant impact on the mitigation of the urban-rural income gap. , all three were significant at the 1% level. This shows that in the development of digital inclusive finance, more efforts should be made to demonstrate the democratization of digital inclusive finance. Third, only the development of digital inclusive finance in the western region significantly narrowed the urban-rural income gap at the level of 1%. This shows that compared with the eastern and central regions, the development of digital inclusive finance in the western region not only expands the coverage of financial services, but also reduces transaction costs, and is more effective in narrowing the urban-rural income gap. Robustness test using variable substitution method, the conclusion still holds.

8. Suggestion

It is expected that the government should strengthen regional infrastructure construction and comprehensively promote 5g Internet coverage; Encourage financial institutions to develop apps to expand their online business; Encourage product innovation, establish a new generation of resident credit investigation system; We will accelerate the development of rural economy and encourage rural residents to start their own businesses. In terms of individual behavior, financial providers should strengthen the use of digital technology, strengthen credit management of borrowers and real-time monitoring of lent funds; For financial demanders, they should improve their financial knowledge system, improve their awareness of information security, credit and financial risk prevention

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