An Empirical Analysis of the Impact of Digital Inclusive Finance on the Income Gap between Urban and Rural Areas

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Abstract—Based on the perspective of Internet financial services, this paper uses the data of 31 provinces in China from 2011 to 2020 to build a balanced panel data model to empirically analyze the impact of digital inclusive finance on the urban-rural income gap. The research shows that the development of digital inclusive finance can significantly reduce the income gap between urban and rural residents; Among the control variables, industrial structure, economic development level, openness, fiscal expenditure and other factors also have a significant impact on the urban-rural income gap. Therefore, China should establish the development strategy and overall idea of digital inclusive finance, reshape the development path, create a digital inclusive financial ecosystem of multi-party cooperation and mutual support, and actively play the role of other factors and digital inclusive finance to promote the development of digital inclusive finance and narrow the urban-rural income gap.

Keywords- Digital inclusive finance; Urban-rural income gap; Balance panel data

1. Introduction

In recent years, the Internet revolution has promoted the unprecedented rapid development of China's digital economy. Among them, the development of digital finance is particularly dazzling and has become a banner leading the global digital finance. Digital finance is a new financial business model formed by the organic integration of Internet technology and financial business, which has had a subversive impact on the traditional financial system. Under the guidance of the national inclusive financial development strategy, a digital inclusive financial service model that effectively meets the practical needs has been developed for mobile terminal users. With its strong geographical penetration and low-cost advantages, digital inclusive finance not only reduces the transaction costs of financial services, improves the coverage and accessibility of financial services, but also effectively solves the dilemma of financial supply and demand mismatch caused by information asymmetry and market segmentation faced by traditional inclusive financial services. The characteristics of popular participation make the huge welfare effect caused by digital inclusive finance more beneficial to rural residents, small and micro enterprises related to agriculture and other vulnerable groups that are excluded by traditional finance. It is a powerful breakthrough to solve the problem of agricultural operation funds and increase the income of farmers' families.

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At present, the income gap between urban and rural residents in China is still hovering at a high level. In 2019, the per capita disposable income ratio of urban and rural residents reached 2.64, compared with 2.79 in 2000, the income gap between urban and rural residents has not been significantly improved. Therefore, solving the serious income gap between urban and rural residents is the key task of China's urban and rural planning in the new stage. However, with the continuous deepening and wide application of digital inclusive finance model, thanks to the support and help of digital inclusive finance, the pace of income increase of rural residents will be significantly accelerated, and digital inclusive finance will play a positive role in coordinating urban and rural development and narrowing the income gap between urban and rural residents.

2. Literature review

Digital inclusive finance mainly enables traditional inclusive finance through digital technology to help solve the problems encountered in the "last mile" of financial services, to significantly reduce the threshold and cost of financial services, improve the efficiency of financial services, and improve the experience of financial services, so as to help traditional inclusive finance break through the bottleneck of development, and solve the endogenous requirements of accessibility, affordability, comprehensiveness and commercial sustainability, Accelerate the development of inclusive finance. In the ten years from 2011 to 2020, the average annual growth of digital inclusive financial index is 29.1%

Shaw (1973) proposed the impact of financial development on the income gap, and believed that financial development could help narrow the income gap between urban and rural residents. However, China's financial development presents "urban-rural duality", and the urban-rural financial structure and financial system are obviously different, which makes the two markets operate independently, making it difficult for capital to circulate freely, and achieving the optimal allocation of financial resources, further expanding the gap between urban and rural financial development. The emergence of inclusive finance has effectively improved this phenomenon. Inclusive finance has lowered the threshold of access to financial services. The inclusive financing model for small and micro enterprises has lowered the threshold of financing for the enterprise sector and improved the availability of financing (Yu Bo and Dong Yiran, 2020). The financing models of traditional credit institutions, such as the three rural loans, investment and loan linkage (Yu Bo and Zhao Wanchun, 2020), have also enabled more rural residents excluded by traditional finance to access to financial services Increase income, so as to narrow the income gap between urban and rural residents.

Domestic scholars have done a lot of research on the impact of inclusive finance on the urban-rural income gap. Liang Shuanglu and Liu Peipei (2018) analyzed that digital inclusive finance can positively promote the narrowing of the urban-rural income gap, and the better the personal ability, the higher the probability of using this tool. Sun Jiguo and Zhao Junmei (2019) empirically found that digital inclusive finance has a more positive effect on narrowing the urban-rural income gap than traditional inclusive finance, and mainly has an impact on the eastern region. However, Chen Jingyu and Guo Wanli (2020) have reached different conclusions: the effect of developing digital inclusive finance in the central and western regions on narrowing the urban-rural income gap is better than that in the eastern regions. It can be seen from the existing literature that the research on the effect of digital inclusive finance on the urban-rural income gap is

still relatively lacking. This paper aims to comprehensively investigate the role of the development of digital inclusive finance in narrowing the urban-rural income gap through empirical analysis, and systematically study whether there is regional differentiation. On the one hand, it enriches the theoretical research in this area, on the other hand, it also provides some reference for provinces to formulate and improve policies to narrow the income gap in the future.

3. Materials & Methods

3.1 Data sources

This paper selects the panel data of 31 provinces (autonomous regions and municipalities) in China for a total of 10 years from 2011 to 2020 as the research sample. The digital inclusive financial index comes from Peking University Digital Inclusive Financial Index Phase II (2011-2020) issued by the Internet Financial Center of Peking University. The index integrates different proportions from three first level dimensions of coverage, depth of use and degree of digital support services, which is highly comprehensive. The data of other variables are from China Statistical Yearbook, statistical yearbooks of all provinces (autonomous regions and municipalities) and EPS big data platform.

3.2 Variable selection

3.2.1 Interpreted variable

The income gap between urban and rural residents (GAP) is expressed by the ratio of per capita disposable income of urban residents to per capita disposable income of rural residents. The greater the ratio, the greater the income gap between urban and rural residents.

3.2.2 Explanatory variable

This paper takes the Digital Inclusive Finance Index (IFI) issued by the Digital Finance Research Center of Peking University in 2019 as the core explanatory variable. With the help of Ant Group's big data on Internet finance, the index constructs a digital inclusive financial indicator system from the three dimensions of digital financial service coverage, depth of use and digital degree, and measures the development of digital inclusive finance in all provinces, including 33 specific indicators. At the same time, these indicators with different measurement units are dimensionless. For the specific processing method, refer to the calculation method of Sarma (2012).

3.2.3 Control variable

(1) Regional economic development RGDP. According to Kuznets' "inverted U-shaped" hypothesis, the urban-rural income gap should first increase and then decrease with economic growth. Some studies believe that economic growth will bring great benefits to the poor and reduce poverty, [1] but others believe that economic growth can be achieved simultaneously with balanced income distribution. It can be seen that the level of economic development has a positive impact on the urban-rural income gap, but the direction of its impact and whether China's economic development has reached the inflection point of the "inverted U-shaped" curve at

this stage still need to be verified. In this paper, the economic development level (RGDP) is expressed by the local GDP per capita.

(2) The proportion of fiscal expenditure is FE. The proportion of each fiscal expenditure in the total expenditure of a place can also reflect the extent to which the local government attaches importance to various activities. Therefore, this paper uses the ratio of fiscal expenditure on agriculture to GDP to reflect the impact on the urban-rural income gap, expressed in percentage.

(3) Industrial structure IS. China's single agricultural economic structure is an important factor in expanding the income gap between urban and rural residents. Farmers have not gained corresponding economic benefits from the development of agricultural productivity and the improvement of output. In addition to urbanization, the labor force will also shift with the change of industrial structure. Tang Lizhi et al. (2008), Xu Min, Zhang Xiaolin (2014) and others have reached the conclusion that the higher the proportion of non-agricultural, the smaller the urban-rural income gap through empirical analysis. Hu Rongcai et al. (2011) held the opposite view. They believed that factors such as backward agricultural production and low prices of agricultural products made farmers' income level and growth worse than urban residents. However, the empirical results were inconsistent with the assumption that the proportion of rural non-agricultural industries had the same impact on the expansion of urban-rural income gap. Therefore, the industrial structure IS in this paper uses the proportion of the added value of the secondary and tertiary industries in GDP to indicate that it is expected to reduce the urban-rural income gap.

(4) The opening degree of the region is OPEN. The degree of openness of a province or region may also have an impact on GAP. This paper tests the proportion of foreign investment goods import and export in GDP of provinces or municipalities directly under the Central Government.

3.3 Model Settings

Based on the analysis of the previous parts, the panel data model is preliminarily set as follows:

$$GAP_{it} = \alpha_i + \beta_1 IFI_{it} + \beta_2 RGDP_{it} + \beta_3 FE_{it} + \beta_4 IS_{it} + \beta_5 OPEN_{it} + \mu_{it}$$

Among them, β_i is the parameter corresponding to each variable, μ_{it} is other factors not included in the model, α_i is a constant term. Subscripts i and t indicate provinces and years respectively. i=1,2,⋯31;t =2011,2012,⋯,2020.

3.4 Descriptive statistics

According to the statistical results in Table 1, the average level of urban-rural income gap is 2.6, the minimum is 1.8, and the maximum is 4. The province with the largest gap is more than twice that of the province with the smallest gap, indicating that the urban-rural income gap is large in different regions, and the urban-rural income gap is still large in some regions. The average value of the digital inclusive financial index is 216, the minimum value is 16, and the maximum value is 432. There are also regional differences. The minimum value of financial support, economic development level and trade openness is 0.0078, 16413 and 0.11% respectively, and the maximum value is 0.26, 164889 and 24% respectively, with a large difference. The minimum value of industrial structure is 0.74, and the maximum value is 1.00. Although there is no such big difference as other indicators, there are still some regional imbalances.

Table 1 Descriptive statistics of variables

Variable	N	Min	Mean	p50	Max	SD
GAP	310	1.800	2.600	2.600	4	0.420
IFI	310	16	216	224	432	97
IS	310	74	90	91	100	5.100
FE	310	0.00780	0.0360	0.0250	0.260	0.0370
RGDP	310	16413	55707	47897	164889	27157
OPEN	310	0.00110	0.0400	0.0210	0.240	0.0460

4. Results & Discussion

It can be seen from Table 2 that all variables are significant. Reverse changes of IFI, RGDP, OPEN and GAP; IS, FE and GAP change in the same direction. Empirical analysis shows that digital inclusive finance has a significant role in reducing the urban-rural income gap. Factors such as the level of economic development and openness to the outside world help to narrow the urban-rural income gap, while factors such as the industrial structure optimization index and the level of financial support for agriculture expand the urban-rural income gap.

The reason why digital inclusive finance helps to narrow the income gap between urban and rural residents is that compared with the traditional rural financial support model, relying on the current high mobile phone penetration rate in rural areas, digital inclusive finance has a good access to financial services and a wide coverage of financial services through continuously upgraded digital Internet technology and innovative digital financial products, Therefore, it can more directly and effectively meet the needs of rural residents for various financial services. Especially for rural households in remote rural areas that are still suffering from credit rationing, the development of digital inclusive finance will undoubtedly break through the defects of traditional rural finance and provide more urgently needed financial products and services to rural households with lower transaction costs, Moreover, the financial management platform and insurance business provided can realize the optimal allocation of household financial assets, risk aversion and the conclusion of transaction contracts, which is conducive to accelerating the pace of income increase of rural households, and thus can show the effect of narrowing the income gap between urban and rural residents.

Table 2 Empirical analysis results

VARIABLS	GAP
IFI	-0.001***
	(-3.80)
IS	0.010**

	(1.98)
FE	3.008***
	(5.97)
RGDP	-0.000***
	(-3.23)
OPEN	-0.818*
	(-1.68)
Constant	2.171***
	(4.99)
Observations	310
R-squared	0.397
F test	0
r2_a	0.387
F	33.74

5. Conclusions

On basis of revealing the mechanism of digital inclusive finance on the income gap between urban and rural residents, and based on provincial panel data, this study constructs a cross provincial panel data model, and conducts an empirical analysis on the impact of digital inclusive finance on the income gap between urban and rural residents. Empirical analysis shows that digital inclusive finance plays a significant role in narrowing the urban-rural income gap. Examining the control variables, we found that factors such as the level of economic development and the degree of openness to the outside world helped to narrow the income gap between urban and rural residents, while factors such as the industrial structure optimization index and the level of financial support for agriculture expanded the income gap between urban and rural residents. In recent years, the rapid development of digital finance in China has made financial services for inclusive groups more feasible. It is suggested to start from the following aspects: strengthen the integration of digital technology and inclusive finance, effectively play the role of other factors, promote the narrowing of urban-rural income gap, and achieve inclusive growth and common prosperity in urban and rural areas.

Establishing the development strategy and overall idea of digital inclusive finance. Compared with traditional banking outlets, digital finance has greatly reduced the operating cost of inclusive finance, expanded the scope of services, improved service efficiency, and is easy to form economies of scale. Digital inclusive finance market has huge development potential. Financial institutions should formulate the development strategy of digital inclusive finance as early as

possible, clarify the overall development idea, and actively expand market share to take the first mover advantage and obtain returns on scale.

Rebuilding the development path of digital inclusive finance On the basis of a clear strategy, reshape the development path around the target customer groups. (1) Relying on digital finance plus physical outlets, we will reshape business processing channels, and respectively build a trinity development channel of "rural banks plus digital finance", "small and micro banks plus digital finance", and "community banks plus digital finance". (2) Rely on digital finance plus inclusive financial products to reshape the product system. In combination with the characteristics of "agriculture, rural areas and farmers", small and micro enterprises and low-income communities, we will launch personalized digital financial products closely related to these three groups, and design distinctive digital financial product packages. (3) We will upgrade technology for digital inclusive finance and reshape the path of technical support. Financial institutions should actively use the Internet, mobile technology, big data, cloud computing, biotechnology and other new digital technologies to focus on the business needs of inclusive financial groups, customer positioning, risk control issues, and enter into technology upgrading and innovation.

It is a systematic project to build a digital inclusive financial ecosystem with multi-party cooperation and mutual support, involving the construction of the entire financial ecosystem. On the one hand, traditional financial institutions and emerging Internet financial enterprises have their own advantages and disadvantages in providing inclusive financial services. Therefore, they should support and cooperate with each other. In addition, traditional financial institutions and Internet enterprises should also strengthen cooperation with digital financial industry circle and social circle, actively carry out cross-border integration with communication operators, equipment suppliers, third-party payment, e-commerce and other institutions, and jointly create an integrated digital financial ecosystem. On the other hand, we should strive for all-round external support: improve the relevant laws and regulations of digital finance, and standardize the legal environment for the development of digital inclusive finance; Strive for financial support and policy incentives from governments at all levels for digital inclusive finance, and reduce the external costs of financial institutions for digital inclusive finance; Improve the credit guarantee mechanism of inclusive financial groups and reduce the information asymmetry in business development; Strengthen the construction of digital inclusive financial infrastructure and effectively improve the coverage of digital technology; Strengthen the education of digital finance knowledge, improve the understanding of inclusive financial groups on digital finance, and avoid the generation of digital divide; Strengthen the security guarantee of online payment, and provide a safe trading environment for inclusive groups to use digital financial transactions.

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