Original Paper

Empirical Study on the Development of Digital Inclusive

Finance on Narrowing the Consumption Gap between Urban

and Rural Areas

-- Taking Shanxi Province as an Example

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Abstract

Based on the panel data of 11 cities and regions in Shanxi Province from 2011 to 2020, the study empirically investigates the impact of digital financial inclusion on the urban-rural consumption gap in Shanxi Province from the perspective of the overall effect and regional effect of digital financial inclusion development. The study finds that, in general, digital inclusive finance has narrowed the consumption gap between urban and rural residents through the high-quality features of low threshold and accessibility, from the perspective of regional heterogeneity, the uneven development of digital inclusive finance has led to significant differences in its effect on the consumption gap between urban and rural residents among regions, showing the characteristics of a ladder with a high level in the south and a low level in the north, and from the perspective of structural heterogeneity, the structure of digital inclusive finance development also has a significant impact on the consumption gap between urban and rural residents in Shanxi Province. From the perspective of structural heterogeneity, the impact of the development structure of digital inclusive finance on the consumption gap between urban and rural residents in Shanxi Province also varies, with the breadth of coverage bringing better bridging effects than the depth of use, while the degree of digitization creates the problem of digital divide and widens the consumption gap, finally, relevant suggestions are put forward with a view to narrowing the consumption gap between urban and rural areas and promoting the coordinated development of urban and rural areas.

Keywords

Digital financial inclusion, Urban-rural income gap in Shanxi Province

1. Introduction

The Decision of the Central Committee on Further Comprehensively Deepening Reform and Advancing Chinese-Style Modernization (hereinafter referred to as the Decision), adopted at the Third Plenary Session of the Twentieth Central Committee, has made an important strategic plan for perfecting the institutional mechanism of urban-rural integration and development, and it proposes that improving the institutional mechanism of urban-rural integration and development, and perfecting the system of strong support for the benefit of agriculture and the enrichment of the rural population, is a major task that concerns the overall situation and the long-term. Nowadays, consumption as the pulling force to revive economic growth is constantly highlighting its powerful role, but due to China's obvious urban-rural dual structure leading to unbalanced development in urban and rural areas, the consumption gap between urban and rural residents is obvious, in the context of the current expansion of domestic demand and the construction of a strong domestic consumer market, the development of digital inclusive finance has injected a strong impetus to bridge the gap between the urban and rural residents in terms of consumption. Digital inclusive finance has penetrated financial services into less developed regions on the basis of reducing information asymmetry and lowering the threshold of customer access, and the trend of civilianization of financial services has become more obvious. As digital technology and the fruits of digital economic development become more inclusive, through portable cell phone clients, rural residents can use online financial services, including Alipay, WeChat, and mobile banking, which effectively alleviate liquidity constraints, and are also conducive to smoothing out inter-temporal consumption, stimulating the potential of rural consumption, and further bridging the consumption gap between urban and rural areas.

In this paper, the consumption gap between urban and rural residents and the digital financial inclusion development index in Shanxi Province from 2011 to 2020 are statistically analyzed, and it can be seen from figure below that the consumption gap between urban and rural residents and the development of digital financial inclusion in Shanxi Province from 2011 to 2020 are characterized by the "scissor difference", and the consumption gap between urban and rural residents has been continuously narrowing, from 2.47% to 1.97%, bridging the consumption gap between urban and rural residents. The consumption gap between urban and rural residents has been narrowing, from the original 2.47 to 1.97, bridging the gap by 20%, while the digital financial inclusion development index has been rising, from the original 33.41 to 325.73, the development rate has been more than 10 times, and the development momentum is rapid. In recent years, financial institutions in Shanxi Province have accelerated their financial layout, actively expanded the application of financial technology in livelihood matters, and promoted the consumption of urban and rural residents through the "Palm Office" and "Fingertip Office," which are committed to improving and safeguarding the living standards of urban and rural residents, At the same time, the Shanxi Provincial Government attaches importance to the development environment of the digital financial industry in the province, taking into account both urban and rural residents, so that both urban and rural residents can enjoy the "dividends" of digital financial inclusion,

and capitalize on financial technology to empower the all-around and high-standard development of the local economy.

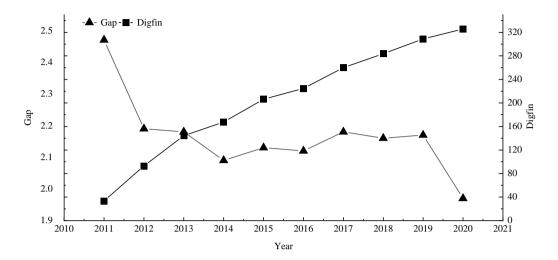


Figure 1. Consumption Gap between Urban and Rural Residents and Digital Financial Development Index in Shanxi Province (2011-2020)

Data source: Shanxi Statistical Yearbook (2011-2020), Peking University Digital Financial Inclusion Index (2011-2020).

2. Literature Review

2.1 Analyzing the Consumption Gap between Urban and Rural Residents from the Perspective of Non-digital Financial Inclusion

On the topic of urban-rural consumption gap, scholars believe that factors contributing to China's economic development are accelerating the bridging of the urban-rural consumption gap, for example, from the perspective of industrial structure upgrading and agglomeration, Xu Min and Jiang Yong use spatial panel econometric models to explore the role of industrial structure upgrading on the urban-rural consumption gap, and find that industrial structure upgrading "reduced" the consumption gap significantly from 2003-2012. "It was found that industrial structure upgrading had a significant effect on urban-rural residents' consumption from 2003 to 2012, and Song Fengxuan, Sun Yinglu and Song Baolin found that industrial agglomeration could also weaken the gap between urban and rural residents' consumption. From the perspective of urbanization, Xu Ming uses the evidence of inter-provincial counterpart support affecting Xinjiang's development to prove that urbanization development inhibits the urban-rural consumption gap in less developed areas, and Zhong Daili and Wang Huanfang argue that urbanization development and industrial structure upgrading form the "industry-city linkage effect", which effectively inhibits the urban-rural consumption gap. Consumption gap. In recent years, the reality of the digital economy driving China's economic growth has aroused the interest of scholars in studying the consumption gap between urban and rural residents

from the perspective of the digital economy and the development of the Internet, and Cheng Mingwang and Zhang Jiaping empirically examined that the popularization of the Internet significantly reduces the gap between the consumption of urban and rural residents, and continuously reduces the gap between the consumption of urban and rural residents of the subsistence type, the enjoyment type, and the development type.

2.2 Analyzing the Consumption Gap between Urban and Rural Residents from the Perspective of Digital Financial Inclusion

Regarding the impact of digital inclusive finance on the consumption gap between urban and rural residents, most of the scholars collected provincial data to conduct empirical tests and agreed that the development of digital inclusive finance is an important factor in narrowing the consumption gap between urban and rural areas. Ly Yangin and Zhao Bin selected 30 inter-provincial panel data in China from 2011 to 2017 to conduct static and dynamic tests, and the study concluded that digital inclusive finance plays an obvious role in promoting the reduction of the consumption gap between urban and rural residents, and Zhang Tongjin and Cai Kuanning found that digital inclusive finance can reduce the consumption gap between urban and rural residents by enhancing the speed of payment of rural residents, expanding the size of their credit, and reducing the farmers' preventive savings in three paths to narrow the consumption gap between urban and rural residents. Considering from the perspective of regional heterogeneity, Zhang Yuan, Hu Wenxin, and Li Junfeng found that the development of digital financial inclusion promotes urban and rural household consumption, but shows a stepwise heterogeneity of high in the east, flat in the west, and low in the west. Different from the provincial perspective of the previous scholars, Shen Huicui, Zhu Yangyang & Huang Dayong collected the panel data of 88 prefecture-level cities in the western region of China from 2011 to 2020 to test that, in terms of the structure of the development of digital finance, the breadth of coverage, the depth of use, and the degree of digitization have a promotional effect on narrowing the gap between the urban and rural residents in terms of consumption, with the breadth of coverage having the most pronounced effect. The effect of breadth of coverage is the most obvious.

To summarize, there are many results in the literature on urban-rural residents' consumption gap, with different research perspectives, but all of them prove that the urban-rural residents' consumption gap under the urban-rural dichotomy in China is accelerating to be bridged, and this trend is even more obvious under the support of digital inclusive finance, but there is little literature that explores the impact of the development of digital inclusive finance on the consumption gap between urban and rural residents within the provincial scope from the perspective of the provincial area. Based on this, this paper selects the panel data of 11 cities and municipalities in Shanxi Province, a central province with rapid development of digital inclusive finance, from 2011 to 2020 to conduct empirical tests, and seeks to analyze clearly the impact of digital inclusive finance on the consumption gap between urban and rural residents in Shanxi Province, and to study the structure of the development of digital inclusive finance and regional heterogeneity, which is of some practical significance.

3. Research Design

3.1 Data Sources and Selection of Variables

The data in this paper mainly come from Shanxi Statistical Yearbook (2011-2020) and Peking University Digital Financial Inclusion Index (2011-2020), and various variables are constructed on the basis of scholars' research by selecting the corresponding indicators to construct the panel data.

3.1.1 Explained Variables

In order to measure the consumption gap between urban and rural residents, drawing on the study of Xiong Ying, Zhang Wanghu & Guo Shouting, the ratio of per capita consumption expenditures of urban residents to per capita consumption expenditures of rural residents is used to express the gap.

3.1.2 Core Explanatory Variables

The core explanatory variable of this paper is the level of digital inclusive financial development, from the "Peking University Digital Inclusive Financial Index (2011-2020)" to get the digital inclusive financial development index of 11 cities in Shanxi Province and its grading indicators, the indicators at all levels divided by 100 to get the level of development of digital inclusive financial development in the region is also conducive to the elimination of heteroskedasticity.

3.1.3 Control Variables

In accordance with the existing literature practice, this paper selects a total of five indicators that affect the regional digital capacity and livelihood security, including the level of economic development, the level of traditional financial development, the level of social security, the degree of economic openness, and the urbanization rate. The variable description table is shown in Table 1 and the descriptive statistics of each variable is shown in Table 2.

3.2Model Construction

This paper tests the impact of digital inclusive finance development on the consumption gap between urban and rural residents in 11 cities and districts in Shanxi Province by constructing a panel regression, and the benchmark model is shown below:

$$Con_gap_{it} = \partial_0 + \beta_1 digfin_{it} + \gamma_n \sum controls_{it} + \mu_{it} + \varepsilon_{it}$$

Where con_gap_{it} denotes the consumption gap between urban and rural residents in Shanxi Province, $controls_{it}$ denotes the series of control variables (level of economic development, level of traditional financial development, level of social security, degree of economic openness, urbanization rate), μ_{it} denotes the factors that do not change over time in each city, which is used to control for the regional fixed effects, and ε_{it} is the error perturbation term. If β_1 is significantly negative, it indicates that the development of digital inclusive finance has narrowed the consumption gap between urban and rural residents in Shanxi Province.

Table 1. Description of Variables

Variable	Variable	Variable	Measurement	
Type	Names	Symbol		
Explanatory Variable	Consumption gap between urban and rural residents	con_gap	Per capita consumption expenditure of urban residents/consumption expenditure of rural residents	
Core Explanatory Variable	Level of development of digital finance Degree of digitization Breadth of coverage Depth of usage	digfin digdegree digcover digdepth	Peking University Digital Financial Inclusion Index (prefecture and city level)	
Control Variable	Level of economic development	per_gdp	GDP per capita in logarithms	
	Level of development of traditional finance	trad_fin	Balance of loans from financial institutions/regional GDP for the year	
	Level of social security	Fiscal expenditure on social security employment / regional GDP for the year		
	Degree of economic openness	eco_open	Total exports and imports/regional GDP for the year	
	Urbanization rate	urban_rate	Urban population/area resident population	

Table 2. Descriptive Statistics

Variable	N	Average	Standard	Minimum Value	Maximum
variable		Value	Deviation		Value
con_gap	110	1.862	0.259	1.012	2.601
digfin	110	1.700	0.668	0.368	2.840
digdegree	110	1.672	0.656	0.374	2.962
digcover	110	1.526	0.680	0.125	2.547
digdepth	110	1.195	0.379	0.754	3.299
per_gdp	110	10.54	0.356	9.799	11.41
trad_fin	110	0.665	0.607	0.0393	3.631
soc_secu	110	0.0168	0.0123	0.0127	0.0610
eco_open	110	0.0197	0.0474	0.0348	0.292
urban_rate	110	0.612	0.569	0.0437	6.363

4. Empirical Results and Analysis

4.1 Analysis of Baseline Results

After the Husman test results show that the P-value is less than 0.05, significantly rejecting the original hypothesis of random effects, this paper decides to use the fixed-effects model to carry out empirical tests, first of all, the digital financial inclusion data on the urban-rural residents' consumption gap to carry out a separate regression, and then add control variables to carry out the random and fixed-effects test, the results of the test are shown in Table 3. The data in columns (1) to (4) of Table 3 are all significantly negative, indicating that the development of digital inclusive finance effectively inhibits the expansion of the consumption gap between urban and rural residents in Shanxi Province, and the results in column (4) show that every unit of improvement in the level of digital inclusive finance development produces a contraction effect of 20.2%, and that the development of digital inclusive finance benefits urban and rural residents in Shanxi Province. From the perspective of control variables, the inhibiting effect of the level of economic development and urbanization on the consumption gap between urban and rural residents in Shanxi Province is not obvious, while the level of traditional financial development and the level of economic openness are still able to provide financial and market protection for the consumption of urban and rural residents in Shanxi Province, stimulate the consumption potential of urban and rural residents, and reduce the gap between the two.

Table 3. Benchmark Regression Results

Vo dala	Stochastic Effec	et	Fixed Effect	
Variable	(1)	(2)	(3)	(4)
J: _ C*	-0.116***	-0.199***	-0.118***	-0.202***
digfin	(-4.35)	(-4.61)	(-4.41)	(-4.84)
,		0.216		0.180
lnper_gdp		(0.93)		(1.15)
tuad Con		-0.184		-0.207**
trad_fin		(-1.64)		(-1.97)
		7.225*		8.225***
soc_secu		(1.92)		(2.64)
		1.961*		2.044**
eco_open		(1.83)		(2.05)
1		0.012		0.010
urban_rate		(0.35)		(0.30)
Constant	2.058***	-0.112***	2.063***	0.260***
Constant	(42.48)	(-0.05)	(30.53)	(0.16)
N	110	110	110	110

Notes. (1) ***, ** and * indicate significant at the 1%, 5% and 10% levels, respectively, and t-values are reported in parentheses, the same applies to the following tables.

4.2 Heterogeneity Analysis

4.2.1 Regional Heterogeneity

The prerequisite for the development of digital inclusive finance is the popularization of digital infrastructure and digital information technology, but due to the different levels of regional economic development and geographic environment, the degree of development of digital inclusive finance also varies, in order to examine the impact of digital inclusive financial development on the urban-rural consumption gap in Shanxi Province, this paper divides the 11 municipalities into three parts according to the north-south direction of the provincial area: north of Shanxi, central of Shanxi, and south of Shanxi. The north of Shanxi includes Datong City, Shuozhou City, and Xinzhou City, the central of Shanxi includes Taiyuan City, Luliang City, Yangquan City, Jinzhong City, the south of Shanxi includes Linfen City, Yuncheng City, Changzhi City, Jincheng City, and the results of the regional test are shown in Table 4. From the results in column (1) of Table 4, the development of digital inclusive finance fails to produce a substantial effect for the consumption gap between urban and rural residents in north of Shanxi region. The results in column (2) show that the digital inclusive financial development is significant at the 5% level for the urban-rural residents' consumption gap in central of Shanxi region with a 16.4% narrowing effect, while the results in (3) show that the digital inclusive financial development has a 23.5% narrowing effect at the 1% level. Therefore, in terms of the shrinkage effect of digital inclusive finance, south of Shanxi region is bigger than central of Shanxi region, central of Shanxi region is bigger than north of Shanxi region, showing a north-south ladder-like characteristic, which may be due to the fact that the south of Shanxi Township Circle is located in the center of the Jin-Shaanxi-Yu Yellow River Golden Triangle, and synergistically develops with the central Shanxi City Cluster, the development of digital inclusive finance is better than other regions, whereas the nouth of Shanxi Township Circle has a higher topography and lower temperature, and the development of the region is based on the advantages of scenery and electricity, integrating new energy resources and mainly serve the country's energy strategy, so the development of digital inclusive finance in south of Shanxi region has a substantial effect on the consumption gap between urban and rural residents in the region, and the capital of Shanxi province is in central of Shanxi region, which integrates economic, political and cultural development, and the development of digital inclusive finance has great advantages, so the development of digital inclusive finance has a substantial effect on the consumption gap between urban and rural residents is in between the south of Shanxi region and the nouth of Shanxi region.

4.2.2 Structural Heterogeneity

In order to more comprehensively analyze the impact of digital inclusive finance development on the

consumption gap between urban and rural residents in Shanxi Province, this paper explores the structural heterogeneity of the breadth of coverage, depth of use and degree of digitization from the structure of digital inclusive finance, as shown in Table 5. According to the results in Table 5, column (1) demonstrates that the consumption gap between urban and rural residents is bridged under the condition of the breadth of coverage of digital inclusive finance, and it is significant at the 1% level, with a bridging effect of 23.9%, accordingly, column (2) demonstrates that the consumption gap between urban and rural residents is bridged under the condition of the depth of use of digital inclusive finance, and the bridging effect is also significant at the 1% level, with a value of 16.9%, which is smaller than the bridging effect of the breadth of coverage, column (3) demonstrates the impact of the development of digitalization on the consumption gap between urban and rural residents, which is significantly positive at the 1% level, showing a widening effect, every unit increase in the degree of digitization makes the consumption gap between urban and rural residents widen by 13.9%, which suggests that the deepening of digitization creates the problem of the digital divide, and not the whole of the urban and rural residents of Shanxi province The possible reason for enjoying the digital dividend is that the financial institutions in some cities in Shanxi Province have not taken all of them into account in their inclusion policies or the unilateral development of their financial structures. Overall, the breadth of coverage of digital financial inclusion brings more bridging effects than the depth of use, while the degree of digitization polarizes the digital divide and financial exclusion.

Table 4. Results of the Regional Heterogeneity Test

Variable	North of Shanxi	Central of Shanxi	South of Shanxi
variable	(1)	(2)	(3)
J: of:	-0.224	-0.164**	-0.235***
digfin	(-0.98)	(-2.41)	(-2.75)
Control Variable	YES	YES	YES
Country	-0.640	4.183	1.134***
Constant	(-0.16)	(1.39)	(5.28)
N	30	40	40
\mathbb{R}^2	0.456	0.342	0.604

Table 5. Results of Structural Heterogeneity Test

Variable	(1)	(2)	(3)
diagonar.	-0.239***		
digcover	(-5.33)		
dia dandh		-0.169***	
digdepth		(-4.29)	

1. 1			0.139***
dig_degree			(2.67)
Control Variable	YES	YES	YES
Constant	0.750***	1.860***	2.272***
	(4.37)	(4.85)	(6.23)
N	110	110	110
\mathbb{R}^2	0.357	0.332	0.360

4.3 Robustness Test

In order to increase the reliability of the conclusions of this paper, this paper uses the replacement of explanatory variables with the generation of lagged terms for robustness testing, and the reported results are shown in Table 6. According to the theory of income-determined consumption, with the increase in income level, the corresponding consumption level of residents has been improved, so this paper will replace the urban and rural residents' income gap to test the consumption gap, and there have been a number of scholars have proved that the digital HP financial can significantly increase the income of urban and rural residents to narrow the income gap, which will promote the narrowing of the consumption gap. The results in column (1) of Table 6 show that digital inclusive finance can significantly inhibit the income gap between urban and rural residents in Shanxi Province, which provides a reliable verification of the conclusions of this paper. In addition, considering the time lag in the development of digital inclusive finance, the impact of urban and rural residents' consumption by it may not be apparent in the current period, thus smoothing the transition to the next period, so this paper generates a one-period lag term of the digital inclusive finance development index to be tested, and the results reported in Column (2) of Table 6 show that the one-period lag of the digital inclusive finance for the urban-rural residents' consumption gap is still significantly negative, and the bridging effect is up to 12.4%, further validating the conclusions of this paper.

Table 6. Robustness Test Results

Variable	(1)	(2)
digfin	-0.104***	
	(-10.47)	
l_digfin		-0.124***
		(-2.65)
Control Variable	YES	YES
Constant	4.415***	1.107***
	(8.19)	(3.57)
N	110	110
\mathbb{R}^2	0.906	0.121

5. Conclusions and Recommendations

5.1 Conclusions

This paper empirically examines the impact effect of digital inclusive financial development in narrowing the consumption gap between urban and rural residents based on panel data from 11 cities in Shanxi Province from 2011 to 2020, and the results of the study show that:

- 5.1.1 Digital inclusive finance benefits urban and rural residents in general, and reduces the consumption gap between urban and rural residents through the high-quality features of low threshold and accessibility.
- 5.1.2 From the perspective of regional heterogeneity, the imbalance in the development of digital inclusive finance has led to significant differences in its role in the consumption gap between urban and rural residents between regions, and the empirical results show a ladder-like characteristic of high in the south and low in the north.
- 5.1.3 From the perspective of structural heterogeneity, the impact of the development structure of digital inclusive finance on the consumption gap between urban and rural residents in Shanxi Province also varies, with the breadth of coverage bringing a better bridging effect than the depth of use, while the degree of digitization creates the problem of the digital divide and widens the consumption gap.

5.2 Recommendations

- 5.2.1 Strengthening Digital Infrastructure and Business Environment in Rural Areas of Shanxi Province As Shanxi Province is located in the Loess Plateau, with more mountainous areas, the construction cost of digital infrastructure is high and difficult, and the relative income of rural residents is low and their willingness to consume is low, which makes it difficult to promote the construction of digital infrastructure in rural areas of Shanxi Province. Therefore, the Shanxi provincial government should increase the financial expenditure on the construction of digital infrastructure in rural areas, reduce the cost burden of rural residents, combined with the local specificities of joint operators to set up subsidy policies in a categorical manner, governments at all levels should also pay attention to the balanced deployment of financial resources, formulate relevant policies to guide the development of local digital inclusive finance according to their own circumstances, and strengthen the depth of use of the development of digital inclusive finance, so that it can be more Efficiently enhance the quality of digital inclusive financial development.
- 5.2.2 Improving the Financial Quality of the Public and the Participation of Financial Institutions in Digital Inclusion

Strengthening the financial quality of rural residents can better promote the development of digital financial inclusion in rural areas. Governments at all levels in Shanxi Province should join hands with local financial institutions and carry out targeted financial knowledge activities in rural areas, select easy-to-understand pictures or short films for publicity and explanations, and improve the basic financial knowledge of rural residents, in addition, traditional financial institutions can strengthen cooperation with Internet financial enterprises, improve their innovation capabilities, vigorously develop digital

financial services, such as cell phone banking, and strengthen the application of the construction of scenarios to meet user needs. Scene construction to meet user needs, thus effectively improving the supply of digital inclusive financial services and increasing the participation of the public in digital inclusive services.

5.2.3 Strengthen Rural Digital Inclusive Financial Product Innovation

Meeting the service needs of rural groups is the key to narrowing the income gap between urban and rural areas in Shanxi Province, so financial institutions should be based on the different rural resource advantages of each county, fully study the needs of rural areas, and actively develop rural digital financial products for rural groups but also differentiated through continuous research to realize the innovative financial products to drive demand, thereby increasing the depth of their use and further narrowing the urban-rural The gap in consumption between urban and rural areas will be further narrowed.

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