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On the Impact of Inclusive Financial Development on the Income Gap between Urban and Rural Residents in Anhui Province

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Abstract

This paper first analyzes the connotation and relevant theories of inclusive financial development and urban-rural income gap, and then further analyzes the mechanism of inclusive financial development and urban-rural income gap, based on which, it calculates and analyzes the current situation of inclusive financial development and urban-rural income gap in Anhui Province, and finally selects the appropriate analysis model to conduct empirical research on inclusive financial development and urban-rural income gap in Anhui Province, Based on the empirical research results, conclusions and policy recommendations are given. On the whole, the level of inclusive financial development in Anhui Province is significantly negatively correlated with the level of urban-rural income gap. However, from the perspective of the three major regions of Anhui Province, the impact of inclusive financial development and urban-rural income gap is different. Because the provincial capital city Hefei has an early development start, the level of economic development is high, and the financial market is relatively mature. In southern and northern Anhui, inclusive financial development can significantly reduce the urban-rural income gap and balance regional development.

Keywords

Inclusive Finance; Urban-rural Income Gap; Panel Index; IFI Index; Regression Analysis.

1. Introduction

In recent years, the living standard of residents in Anhui Province has been improving, but at the same time, the income gap between urban and rural areas has also been increasing. This problem has existed for a long time, and its main causes are the following two points: In the past, the country implemented the development strategy of "valuing industry over agriculture" and "valuing cities over villages". The implementation of these policies did make the economy of New China recover rapidly, but the issue of rural development was put on hold. With the economic development, cities and towns continue to attract rural labor, resulting in the unstable focus of production resources allocation between urban and rural areas, indirectly widening the income gap between urban and rural areas. These factors are very unfavorable to the overall development of Anhui Province, and the problem of income gap cannot be ignored. In the past decade, the income gap between urban and rural residents in Anhui Province has become increasingly large, and the reality is more severe than our data estimates. If there is a large gap between urban and rural incomes for a long time, it will not only lead to insufficient effective consumption demand of the whole society economically, but also affect social peace and stability politically.

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The long-standing urban-rural dual structure in Anhui Province is another reason for the huge gap between urban and rural income in Anhui Province. Financial institution outlets are mainly set up in urban areas, with high wage levels and high capital utilization rate, so financial practitioners are more willing to work in urban areas, which leads to small coverage of financial institution outlets in relatively backward rural areas, insufficient density of practitioners, and continuous concentration of rural funds to urban areas. This is not conducive to the gradual penetration of financial institutions in rural areas, increases the threshold effect of rural regional financial development, and brings substantive difficulties to the reduction of urban-rural income gap. At the "International Year of Microcredit" conference in 2005, the United Nations specifically put forward the concept of inclusive finance for the first time. The inclusive financial system helps to rationally allocate scarce financial resources, reduce the income threshold, enable low-income people to enjoy financial services, and improve the income level of low-income people. It will help Anhui Province improve its income level, narrow the income gap between urban and rural residents, and break the urban-rural dual structure.

Inclusive finance can micro-adjust the income distribution of residents and reduce the income gap. Therefore, the research on inclusive finance has theoretical significance. Putting the theory into practice and solving the urban-rural dual structure problem in Anhui Province have practical significance for reducing the income gap. In China, scholars mostly focus on the whole country to carry out research on the impact of inclusive finance on the income gap between urban and rural residents. There are few studies on the basis of provinces and cities. The development of each province and city has its own particularity, especially in the eastern and western regions of China. The national research is not universal. This paper first expounds the mechanism of inclusive finance. Secondly, it analyzes the current situation of inclusive finance in Anhui Province, and points out the existing problems after a brief analysis. Then, on the basis of domestic and foreign literature, the author constructs an inclusive financial measurement system based on the actual situation of Anhui Province to quantitatively analyze the development level of inclusive finance in Anhui Province. Then build a model to explore the mechanism of inclusive finance, and finally put forward suggestions according to the conclusions of empirical analysis.

2. Theoretical Research

2.1. Inclusive Finance Connotation and Relevant Theories

2.1.1. Inclusive Financial Connotation

In 2005, the United Nations specifically put forward the concept of inclusive finance for the first time. It refers to providing appropriate and effective financial services to all sectors and groups of society (especially vulnerable groups) with financial service needs at an affordable cost. It allows vulnerable groups to enjoy more diversified financial services through effective allocation of financial resources. Its development process focuses on low-income groups and economically underdeveloped areas. The purpose is to improve the income level of low-income groups and narrow the gap between rich and poor. Inclusive finance has the following characteristics:

(1) Equality. At the present stage, China's capital market is not perfect, and information asymmetry and credit problems often occur. The main service objects of financial institutions are large enterprises or relatively wealthy (middle class and above) families. Small and micro enterprises and low-income families cannot enjoy financial services well. This inequality will lead to the unstable focus of resource allocation. The characteristic of inclusive finance is "inclusive", that is, universality. It is a financial policy that serves the whole society. Inclusive finance can expand the scope of financial services, orient financial resources to vulnerable

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groups, promote the effective distribution of financial resources, and realize the equality of service objects.

(2) Comprehensiveness. In the past, the audience of financial services was relatively limited, with a certain degree of one-sidedness. With the development of the financial market, inclusive finance provides diversified financial products and services to all groups of society in all aspects. It can provide different solutions to different needs of different groups. This comprehensive financial service makes the development of inclusive finance more popular.

2.1.2. Relevant Theories of Inclusive Finance

(1) Financial structure theory. The theory of financial structure was first put forward by Raymond W. Goldsmith in 1969. This theory is based on structuralism. He believes that financial structure is the sum of existing financial instruments and financial institutions in a country. The essence of financial development is the change of financial structure. Studying financial development is to study the change process and trend of financial structure. The optimization of the financial structure is conducive to promoting economic growth. Through the research and analysis of a large number of financial data from various countries, he found that the evolution of the financial structure of various countries has convergence. The theory of financial structure gives the reason for financial exclusion from the perspective of structure, but it only gives the reason and has no reference solution, but it also lays the foundation for the establishment and development of inclusive finance.

(2) Financial repression and financial deepening theory. Ronald I McKinnon and Shaw Edward S. (1973) proposed the theory of financial repression and financial deepening. Financial repression means that the government restrains the development of the financial system through excessive intervention in financial activities and financial system, and the lagging development of the financial system hinders the development of the economy, resulting in a vicious circle of financial repression and economic backwardness. In view of this phenomenon, they put forward the financial deepening theory, which believes that the government can effectively control inflation by giving up excessive intervention in finance and making the interest rate and exchange rate fully reflect the supply and demand situation. In addition, financial deepening has also made finance and economy form a virtuous circle of mutual promotion. These theories point out the shortcomings of financial repression, emphasize the importance of financial deepening, make important contributions to narrowing the urban-rural gap, and provide reference value for the development of inclusive finance.

(3) Financial restraint theory. In 1988, Hellman put forward the theory of financial restraint. They believed that the government could control the bad phenomena in the financial development environment by implementing restrictive financial policies such as interest rate restriction, and at the same time, the government could increase the fiscal revenue through policy intervention, and use the revenue to better serve the society. In general, the government chooses the process of financial marketization according to the change of economic conditions. Financial constraints are the transition of financial repression and deepening. Financial constraints restrict the inclusiveness of financial services by policies, but also play a transitional role in the development of inclusive finance.

2.2. Connotation and Relevant Theories of Income Gap between Urban and Rural Residents

2.2.1. Connotation of Income Gap between Urban and Rural Residents

The income gap between urban and rural residents mainly refers to the disposable income gap between urban residents and rural residents. The income gap can be divided into absolute income gap and relative income gap. The relative income gap refers to the income gap expressed by the proportion of income or the relative amount of income. The absolute income

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gap cannot reflect the wealth distribution of all social strata, but is generally used to measure the wealth of all social strata. The relative income gap is more widely used, which can measure the wealth distribution of all social strata. This paper will also use the relative income gap between urban and rural residents to carry out theoretical and empirical research.

2.2.2. Relevant Theories of Income Gap between Urban and Rural Residents

(1) The theory of dual economic structure. Lewis put forward the theory of dual economic structure in 1954. He believes that there are agricultural sectors dominated by traditional modes of production in rural areas and modern sectors dominated by manufacturing in cities in developing countries. Land and labor affect agricultural development, while capital affects industrial development. Since there is surplus labor with zero marginal productivity in agriculture in developing countries, the non-agricultural transfer of agricultural surplus labor can promote the gradual reduction of the dual economic structure. After that, H. Fei and G. Ranis revised the Lewis model hypothesis in 1964, that is, they perfected the dual economic development thought on the basis of the balanced development of industry and agriculture.

(2) Welfare economics theory. In the 1920s, Pigou put forward welfare economics for the first time. He believed that developing welfare economics could narrow the gap between rich and poor and improve people's livelihood. Welfare economics initially believed that social welfare mainly comes from the level of national income and its distribution, while Pigou believed that social welfare comes from the improvement of income level and the reasonable distribution of income. He believed that the country should develop social welfare by improving the level of national income and the reasonable distribution of income. Then Pareto put forward the Pareto optimal theory, which enriched the theory of welfare economics. The theory believes that the efficiency of social welfare will reach the highest level only when the three optimal conditions of exchange, production, exchange and production are met, that is, Pareto efficiency is the best.

The theory of dual economic structure can explain the causes of the income gap between urban and rural residents, while welfare economics provides a theoretical basis for the analysis of the causes of the income gap between urban and rural residents and the design of solutions, and also provides a new perspective for the reduction of the income gap.

2.3. The Mechanism of Inclusive Finance Affecting the Income Gap between Urban and Rural Residents

2.3.1. Direct Action Mechanism

The direct action mechanism is divided into threshold reduction effect, poverty reduction effect and resource allocation effect.

(1) Lower the threshold effect. The threshold reduction effect refers to the phenomenon that low-income groups or small and micro enterprises are excluded because they do not meet the conditions for financial institutions to provide services. Low-income people have unstable income sources and insufficient financial literacy. The low credit indicators of small and micro enterprises lead to the failure of loan interest rates to obtain preferential treatment. These groups are unable to afford high costs and have lost touch with financial services, which to some extent exacerbates the income gap between urban and rural areas. The purpose of inclusive finance is to allow vulnerable groups excluded by the traditional financial system to smoothly enter the financial market and enjoy equal financial services. The development of inclusive finance can guide the rational allocation of financial resources, effectively eliminate the impact of threshold effect on the urban-rural income gap, and improve the income level of low-income people.

(2) Poverty reduction effect. Targeted poverty alleviation is a key strategy put forward by the country in recent years, and rural areas have also become the focus of our government. Inclusive finance can be said to be a good response to the call of the country to help rural areas

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achieve income growth. The development of inclusive finance can make farmers more convenient to enjoy financial services and help farmers out of poverty. At the same time, village banks and new financial institutions provide credit support to small and micro enterprises, which will help enterprises attract more labor force and increase residents' income, so that inclusive finance can play a role in poverty reduction.

(3) Resource allocation effect. Limited financial resources will lead to unbalanced allocation of financial resources in the process of financial development. Because the income of residents in rural areas is low and unstable, and there is no relevant credit record, the operating cost of financial institutions in rural areas is higher than that in urban areas, so financial institutions are more willing to set up more outlets in urban areas, and institutions may also reduce credit supply or increase credit prices in rural areas, As a result, rural areas are dominated by savings and microcredit, while urban areas can enjoy more advanced financial services, resulting in regional deviation in the distribution of financial institutions and financial services. The resource allocation effect of inclusive finance can improve the unbalanced distribution of financial resources in urban and rural areas, and adjust the unbalanced distribution of financial institutions and financial services.

2.3.2. Indirect Action Mechanism

The indirect mechanism of inclusive finance is mainly to promote economic growth and affect the income gap between urban and rural residents. With the development of inclusive finance, the level of financial development will continue to improve, and social resources will be more effectively utilized. The reduction of enterprise financing costs can enable enterprises to absorb idle labor to meet the expansion needs, and also enable enterprises to have sufficient funds to research and develop and innovate, improve production efficiency to achieve the purpose of maximizing profits, and improve the current development situation of enterprises. Kuznets (1955) believed that in the process of economic development, the urban-rural income gap presented an "inverted U-shaped" development path, that is, in the early stage of economic development, the income of residents in rural areas was low, while the income gap in urban areas was high, and the income gap was increasing. At this time, the curve was in the rising stage. When the economy develops to a certain extent, due to income distribution, policy support and other factors, the urban-rural income gap will continue to narrow, and the curve is at a declining stage. From this point of view, inclusive finance plays different roles in the urban-rural income gap in different periods and regions, and needs specific analysis.

3. Analysis of the Current Situation

3.1. Development Status of Inclusive Finance in Anhui Province

3.1.1. The Inclusive Financial System is Gradually Improved

In recent years, the inclusive finance in Anhui Province has been developing steadily. In the Opinions on Comprehensively Deepening the Comprehensive Reform of Rural Finance issued by the Anhui Provincial Government in May 2015, it clearly expressed its support for Huishang Bank to carry out the pilot of inclusive finance in rural areas and promote the financial resources to tilt towards "agriculture, rural areas and farmers", small and micro enterprises and counties. The Opinions on Financial Support Services for the Development of the Real Economy issued in December 2015 stated that we should increase the number of service providers, broaden financing channels, optimize financing structure, improve financing efficiency, and dredge the channels for finance to enter the real economy. In the Implementation Opinions on Promoting the Financial Poverty Alleviation Project issued in March 2016, it was stated that we should improve the financial service system and vigorously promote targeted poverty alleviation and targeted poverty alleviation. The Implementation Opinions on Promoting Inclusive Financial Development, issued in September 2016, put forward specific

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requirements from two aspects, namely, the geographical penetration of financial institutions and the availability of financial services. The Notice on Printing and Distributing the 13th Five-Year Plan for the Development of Financial Industry in Anhui Province, issued in April 2017, established a knowledge framework for the development of inclusive finance, and vigorously promoted the development of inclusive finance from the aspects of strengthening financial support, improving the financial organization system, and accelerating the construction of inclusive financial system. The Detailed Rules for the Management and Implementation of the Special Fund for Inclusive Financial Development in Anhui Province, issued in March 2021, clearly defined the establishment of an inclusive financial indicator system.

3.1.2. The Financial Institution System is Gradually Improved

As far as Anhui Province is concerned, the distribution of financial network institutions in Anhui Province is uneven, there are few rural areas in general, and the structure type is also very single. There are basically no financial institutions in remote areas, and there are still gaps in financial services. The rise of social platforms has not effectively improved the level of financial services in rural areas. The reason is that people's financial awareness in rural areas is not synchronized with information technology. They rarely obtain financial services through Internet platforms, but prefer to consult financial products and services through traditional financial service networks. The author believes that analyzing the development of banking industry can more scientifically reflect the development of regional inclusive finance.

From 2015 to 2020, various financial institutions in Anhui Province showed a trend of stability. As shown in Table 3-2, the number of large commercial banks declined from 2015 to 2018, but the number of banks rose sharply in 2019, up 4.7% from 2015, and then decreased by 5.0% in 2020; Generally speaking, joint-stock commercial banks are on the rise.

3.2. Analysis of the Current Situation of Urban-Rural Income Gap in Anhui Province

In recent years, with the efforts of the state and the government, the economy of Anhui Province has achieved vigorous development, but although the income of residents has increased significantly, the income gap between urban and rural areas is still very wide. The government should strengthen its efforts, actively promote relevant policies, achieve coordinated development between urban and rural areas, and narrow the income gap between urban and rural areas.

From a regional perspective, the narrowing degree of the urban-rural income gap in Anhui Province is quite different. Take southern, central and northern Anhui for example. From 2012 to 2020, the three major regions of Anhui Province generally showed a downward trend. In 2012, the urban-rural income gap ratios in southern Anhui, central Anhui and northern Anhui were 2.51, 2.82 and 2.91 respectively. In 2020, the urban-rural income gap ratios in southern Anhui, central Anhui and northern Anhui were 2.11, 2.23 and 2.34 respectively. It can be seen that the urban-rural income gap in central Anhui decreased significantly, and the urban-rural income gap in southern Anhui was the lowest.

4. Inclusive Financial Development Level and Urban-rural Income Gap Index

4.1. Calculation of Inclusive Financial Development Level in Anhui Province

4.1.1. Construction of Indicator System

Based on the construction method of Becket, the geographical penetration of financial institutions can be measured by the number of financial institutions' outlets per 10000 square kilometers. The availability of financial services is analyzed from two aspects: the number of

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financial institutions per 10000 people and the proportion of per capita deposits in GDP. The utility of financial services is analyzed from the proportion of loan balance to GDP, insurance depth and insurance density. See Table 1 for details.

Table 1. Measurement index system of inclusive financial development

Dimension	Specific indicators	Computing method	Unit of measurement
Availability of financial services	Number of financial institution outlets per 10000 square kilometers	Number of outlets/area of financial institutions	1/100 square kilometers
	Number of financial institution outlets per 10000 people	Number of financial institution outlets/regional resident population	1/10000 persons
	Number of employees of financial institutions per 10000 square kilometers	Number of employees/area of financial institutions	People/100 square kilometers
	Number of employees of financial institutions per 10000 people	Number of employees of financial institutions/resident population in the region	Person/10000
Effectiveness of financial services	Proportion of deposit balance in GDP	Deposit balance/GDP	%
	Proportion of loan balance in GDP	Loan balance/GDP	%
	Insurance depth	Premium income/GDP	%
	Safe density	Premium income/permanent population	Yuan/person

4.1.2. Calculation Method

In this paper, Sarma (2008)'s calculation model is used. The model analysis is divided into three steps:

(1) Determine the indicator weight. The term "weight" can well reflect the contribution of each indicator to the development of inclusive finance. Each indicator has its own degree of differentiation and difference. Therefore, the coefficient of variation method can be used to properly determine the indicator weight. The specific formula is as follows:

$$V_i = \frac{\sigma_i}{\bar{X}_i}(i = 1,2,3,\cdots,n) \quad (1)$$

Where, V_i is the coefficient of variation of the ith index, σ_i is the standard deviation, $\bar{X}_i$ is the average. Then calculate the weight of each indicator, and the specific formula is as follows:

$$W_i = \frac{V_i}{\sum_{i=1}^{n} V_i}(i = 1,2,3,\cdots,n) \quad (2)$$

Where, W_i is the weight of each indicator. The larger W_i is, the higher the contribution of the ith indicator to the development of inclusive finance.

(2) Normalization of indicators. Because the dimensions of the reference data for indicator measurement are not uniform, which may affect the results of subsequent data analysis and easily lead to misjudgment, so the linear threshold method needs to be used to de-dimension the indicators. The specific formula is as follows:

$$S_i = \frac{W_i(A_i - MIN_i)}{MAX_i - MIN_i}(0 \le S_i \le W_i, 0 \le W_i \le 1, i = 1,2,3,\cdots,n) \quad (3)$$

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Where, W_i is the weight of the ith index, A_i is the actual observation value of the ith index, and MAX_i and MIN_i are the maximum and minimum values of the ith index.

(3) Calculate the inclusive financial index. This paper uses the European distance method to calculate the inclusive financial index, and the specific formula is as follows:

$$IFI = 1 - \frac{\sqrt{(W_1-S_1)^2+(W_2-S_2)^2+\cdots+(W_n-S_n)^2}}{\sqrt{{W_1}^2+{W_2}^2+\cdots+{W_n}^2}} (i = 1,2,3,\cdots,n) \quad (4)$$

4.1.3. Analysis of Calculation Results

This paper collects relevant data of Anhui Province from 2012 to 2020, including geographical area, population structure, GDP, balance of deposits and loans of financial institutions, insurance income, etc. According to the above calculation methods, the results are shown in Table 2.

Table 2. Statistics of the weights of various indicators of Anhui Inclusive Financial Development Index from 2012 to 2020

Dimension	Specific indicators	Average weight
Availability of financial services	Number of financial institution outlets per 10000 square kilometers	0.1464
	Number of financial institution outlets per 10000 people	0.1282
	Number of employees of financial institutions per 10000 square kilometers	0.2147
	Number of employees of financial institutions per 10000 people	0.1347
Effectiveness of financial services	Proportion of deposit balance in GDP	0.0688
	Proportion of loan balance in GDP	0.0836
	Insurance depth	0.1173
	Safe density	0.1063

Among them, the availability of financial services represents the service supply of financial institutions, and the utility of financial services represents the service demand of financial institutions. According to the table data, the availability of financial services accounts for 62.4%, while the utility of financial services only accounts for 37.6%, reflecting the relatively low efficiency and large development space of inclusive financial services in Anhui Province.

Table 3. List of inclusive financial development index of all cities in Anhui Province

Region	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average IFI of each city
Hefei	0.6725	0.6767	0.6611	0.6798	0.692	0.7075	0.6802	0.7054	0.6921	0.6853
Ma'anshan	0.5538	0.5531	0.5729	0.5629	0.5161	0.4836	0.482	0.4891	0.3035	0.5019
Huaibei	0.4606	0.4427	0.4661	0.4799	0.4547	0.4597	0.445	0.5141	0.2834	0.4451
Huainan	0.509	0.4552	0.4612	0.3708	0.4683	0.4565	0.4484	0.4806	0.2901	0.4378
Bengbu	0.4437	0.3923	0.4796	0.535	0.5063	0.462	0.4329	0.3777	0.2157	0.4273
Fuyang	0.3537	0.3553	0.4324	0.4782	0.4765	0.5032	0.5136	0.4833	0.206	0.4225
Wuhu	0.4548	0.4425	0.4523	0.454	0.4323	0.4405	0.4357	0.4096	0.2118	0.4148
Tongling	0.4111	0.3866	0.375	0.2536	0.3812	0.3648	0.371	0.3922	0.301	0.3596
Huangshan	0.2842	0.3206	0.3182	0.3012	0.2973	0.2886	0.2919	0.2286	0.2062	0.2819
Chizhou	0.2875	0.2837	0.2649	0.238	0.2546	0.2636	0.2865	0.2489	0.1748	0.2558
Bozhou	0.2001	0.2184	0.2747	0.3089	0.2808	0.2971	0.3116	0.1854	0.1344	0.2457
Anqing	0.2081	0.2041	0.2258	0.2728	0.2854	0.2463	0.2301	0.2722	0.1974	0.238
Suzhou	0.1439	0.1511	0.1774	0.1996	0.1849	0.1978	0.2218	0.2499	0.1594	0.1873
Xuancheng	0.1713	0.1721	0.1805	0.1793	0.2274	0.2191	0.2226	0.1735	0.1321	0.1864
Chuzhou	0.1552	0.1528	0.1414	0.1675	0.2014	0.2005	0.1937	0.1214	0.077	0.1568
Lu'an	0.0696	0.0629	0.0682	0.1173	0.1147	0.1135	0.1167	0.1284	0.1761	0.1075
Average IFI over the years	0.3362	0.3294	0.347	0.3499	0.3609	0.3565	0.3552	0.3413	0.2351	0.3346

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According to the weight of the above table, the above inclusive financial development index calculation method is used to calculate the list of inclusive financial development indexes of all cities in Anhui Province, as shown in Table 3. Note that IFI is only a relative index, and its size cannot reflect the true level of inclusive financial development in the region.

(1) Analysis of the overall level of inclusive financial development in Anhui Province. The overall development level of inclusive finance in Anhui Province over the years is in the range of 0.2-0.5. According to the criteria of inclusive finance, it belongs to the medium and low level of development. Only Hefei and Ma'anshan are at a high level of inclusive financial development in the province, and Hefei's inclusive financial development index is far higher than other cities. In order to further understand the comprehensive development strength of each city, this paper measures the comprehensive development strength of each city by comparing the economic strength of each city (GDP per capita) and the IFI index. The analysis results roughly show that the higher the economic strength, the higher the level of inclusive financial development in cities, reflecting the economic law that inclusive financial development can drive the economic development of cities.

(2) Analysis of the development level of inclusive finance in various regions of Anhui Province. The development level of inclusive finance in all regions of Anhui Province is at a medium and low level, with the highest level in northern Anhui, followed by southern Anhui and the lowest level in central Anhui. In central Anhui, only Hefei has a high level of inclusive financial development, while other cities are very low, and the allocation of urban financial resources is extremely unbalanced. The allocation of financial resources in southern Anhui is relatively reasonable; Although the per capita GDP of northern Anhui is not high, the level of inclusive financial development is high, and the gap between cities is not as large as that of central Anhui. Financial resources will close to the economically developed regions. Therefore, the level of economic development and inclusive financial development of Hefei is far higher than that of other cities. Other cities will raise the threshold of urban financial development due to the loss of financial resources, which is not conducive to the overall development of individual cities and regions.

Central Anhui should narrow the gap in the development level of inclusive finance. As the provincial capital city, Hefei should fully tap the development potential of surrounding cities and rationally allocate financial resources. Cities with better development of inclusive finance in southern Anhui should drive the coordinated development of cities with lower development level of inclusive finance, and develop inclusive finance while developing economy. Northern Anhui should vigorously develop its own economy and give full play to the coordination work of the government to promote the development of regional inclusive finance.

4.2. Calculation of Urban-Rural Income Gap Index in Anhui Province

4.2.1. Construction of Indicator System

According to the previous literature analysis, the urban-rural income gap is generally measured using relative indicators, including the ratio of urban and rural residents' disposable income or Gini coefficient. However, the former did not consider the impact of the proportion of urban and rural population distribution, while the latter did not fully reflect the impact of income level changes of income groups at both ends. The Thiel index can measure the income gap in various regions. It can also fully reflect the changes in income levels of income groups at both ends. This paper uses the Thiel index. The calculation formula is as follows:

$$\mathrm{Ter}_{i,t} = \sum_{j=1}^{2} \frac{I_{i,j,t}}{I_{i,t}} * ln[\,(\frac{I_{i,j,t}}{I_{i,t}})/(\frac{P_{i,j,t}}{P_{i,t}})] \quad (5)$$

Where, $j = 1$ represents urban, $j = 2$ represents rural, I represents income, P represents population, i represents regions, and t represents period. For statistical convenience, here

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represents year, $Ter_{i,t}$ represents the Tyle coefficient of region i in year t. $I_{i,1,t}$ represents the disposable income of urban residents in area i in year t, $I_{i,2,t}$ represents the disposable income of rural residents in area i in year t, $I_{i,t}$ represents the disposable income of urban and rural residents in year t. $P_{i,1,t}$ represents the number of urban permanent residents in area i in year t, $P_{i,2,t}$ represents the number of rural permanent residents in area i in year t, $P_{i,t}$ represents the total number of urban and rural permanent residents in area i in year t.

4.2.2. Analysis of Calculation Results

According to the above calculation formula and the relevant data of each city in Anhui Province, the Taier index of each city in Anhui Province from 2012 to 2019 is calculated. The overall Tal index of Anhui Province shows a trend of continuous reduction. The urban-rural income gap in central and northern Anhui has shrunk significantly, while the urban-rural income gap in southern Anhui has shrunk slightly. However, the urban-rural income gap in northern Anhui is still higher than the provincial average.

5. Empirical Analysis

5.1. Variable Selection and Data Description

The panel regression model is used to conduct empirical analysis on cities in Anhui Province, and the specific variables involved are shown in Table 4:

Table 4. Related variables

Variable type	Variable symbol	Variable name	Variable description
Interpreted variable	GAP	Income gap between urban and rural residents	Theil index
Explanatory variable	IFI	Development level of inclusive finance	Inclusive financial development index
Control variable	PGDP	Economic development level	GDP per capita
	UR	Urbanization level	Proportion of urban population
	GOV	Government expenditure level	Financial expenditure/GDP
	IS	Industrial structure level	Added value of secondary and tertiary industries/GDP

5.1.1. Explained Variable

The explanatory variable of this paper is the level of income gap between urban and rural residents (GAP). According to the previous analysis, the Thiel coefficient can measure the income gap in various regions. It can also fully reflect the changes in income levels of income groups at both ends, so this paper uses the Thiel coefficient to describe the urban-rural income gap.

5.1.2. Explanatory Variables

The explanatory variable of this paper is the level of inclusive financial development (IFI), which is calculated by the previous article.

5.1.3. Control Variables

(1) Economic development level. The Kuznets effect believes that the level of economic development and the urban-rural income gap have an inverted "U" relationship. In order to eliminate the impact of the level of economic development on the empirical analysis and

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promote the empirical research scientifically and effectively, this paper takes the level of economic development as the control variable.

(2) Urbanization level. Scholars have no unified opinion on the level of urbanization on the income gap between urban and rural residents. The level of urbanization has improved. On the one hand, more and more rural labor force have poured into cities, making rural labor force have more choices. However, because urban residents have more initial endowment, the income level is often higher than rural residents, widening the income gap between urban and rural residents, so this paper uses the proportion of urban population as the control variable.

(3) The level of government expenditure. The development of inclusive finance and the implementation of the government's preferential agricultural policies have narrowed the urban-rural income gap. This paper uses the proportion of local government fiscal expenditure in local GDP as the control variable.

(4) Industrial structure level. The development of non-agricultural industries can narrow the urban-rural income gap, but there is a big gap between the economic benefits of non-agricultural sectors and agricultural sectors, and the urban-rural income gap has widened. This paper measures the level of industrial structure by the proportion of the added value of the secondary and tertiary industries in GDP.

This paper takes the urban-rural income gap (GAP) of cities in Anhui Province from 2012 to 2021 as the research object to explore the impact of inclusive financial development on the urban-rural income gap. The descriptive statistical results of each variable are shown in Table 5. It can be seen from the table that the maximum income gap between urban and rural areas in Anhui Province is 0.1654, and the average income gap is 0.0853, indicating that there is still a certain gap between urban and rural income levels in Anhui Province; The average IFI of Anhui Province is 0.347, which is still at the middle and low level; The IFI index of southern Anhui, central and northern Anhui is different, which indicates that there are certain differences in the development level of inclusive finance in different regions of Anhui Province.

Table 5. Descriptive statistics of each variable

Variable name	Number of samples	Average value	SD	Min	Max
GAP	128	0.0853	0.0271	0.0338	0.1654
IFI	128	0.347	0.157	0.0629	0.707
PGDP	128	43107	21881	12617	115623
UR	128	53.09	11.05	33	78.70
GOV	128	0.214	0.0587	0.118	0.356
IS	128	0.880	0.0618	0.741	0.982

5.2. Model Construction

In order to eliminate the impact of heteroscedasticity on empirical research, this paper will logarithmize each statistical variable, and the specific model formula is as follows:

$$ln\,G\,AP_{i,t} = \alpha_i + \beta_1\,ln\,I\,FI_{i,t} + \beta_2\,ln\,P\,GDP_{i,t} + \beta_3\,ln\,U\,R_{i,t} + \beta_4\,ln\,G\,OV_{i,t} + \beta_5\,ln\,I\,S_{i,t} + \varepsilon_{i,t} \quad (6)$$

Where, i represents each city and t represents different periods, α_i is a constant term, $\varepsilon_{i,t}$ is a random disturbance term.

5.3. Empirical Test

5.3.1. Unit Root Test

In order to avoid the "false regression" problem in panel analysis, it is necessary to carry out the stability test on the model data. Only the model data can be further analyzed if it is stable. Common panel unit root tests include the following methods: ADF-Fisher test, IPS test and LLC

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test. This paper will use the above test methods to carry out the panel unit root test. The test results are shown in Table 6.

In ADF-Fisher test and IPS test, the original sequence is partially stable, while in LLC test, the original sequence is stable. The first-order difference sequence is almost completely stable in the three test methods and can be used for the next panel cointegration test.

Table 6. Panel data unit root inspection table

Variable	Original sequence			First-order difference sequence		
	ADF-Fisher	IPS	LLC	ADF-Fisher	IPS	LLC
lnGAP	78.1080***	-1.5723*	-55.0809***	58.8704***	-4.5403***	-1.2e+02***
lnIFI	4.2629***	0.1112	-10.5405***	7.9831***	-1.8998**	-22.2095***
lnPGDP	2.2724**	0.5559	-7.0825***	34.6655***	-0.9267	-79.4546***
lnUR	-3.0811	-1.4035*	-3.3851***	60.8790***	-3.5333***	-2.2e+02***
lnGOV	-0.8220	-2.3322***	-4.2405***	21.9566***	-2.1925**	-3.1e+02***
lnIS	-2.0258	-2.0666**	-3.4798***	22.6059***	-3.4852***	-42.0262***

Note: * p<10%, * * p<5%, * * * p<1%. The table results are obtained by STATA 17 processing the relevant data.

5.3.2. Co-integration Inspection

Before panel regression analysis, it is necessary to carry out cointegration test for each variable in panel data. In this paper, Pedroni cointegration test method is used for cointegration test, and the results are shown in Table 7. According to the test results, there is a cointegration relationship between independent variables and dependent variables.

Table 7. Pedroni cointegration test of panel data

Test name	Hypothesis	Statistic	Statistical value	P value
Pedroni test	H0: No cointegration relationship exists	Augmented DFuller	-10.5671	0
	H1: There is a cointegration relationship			

5.4. Panel Model Regression and Result Analysis

5.4.1. Panel Model Identification

Before panel regression analysis, it is necessary to determine the regression model category of panel data. In this paper, F test and Hausman test are used to determine the regression model, and the results are shown in Table 8. Since the P value of both test methods is 0, that is, the original hypothesis is rejected, so the fixed effect model is used.

Table 8. Results of two inspection methods

F Test		Hausman Test	
F value	P value	F value	P value
65.98	0	6.81	0

5.4.2. Analysis of Panel Regression Results

(1) All regression results. According to the previous regression model and relevant data, the relationship between the variables is analyzed from the perspective of full sample, as shown in Table 9.

According to Table 9, for all of Anhui Province, inclusive financial development plays a significant role in promoting economic development.

In terms of explanatory variables, the regression coefficient of lnIFI is -0.1476, which indicates that if the development level of inclusive finance in Anhui Province increases by 1%, the urban-rural income gap in Anhui Province will be reduced by 0.1476%, which is a negative correlation, and a significant negative correlation at a significant level of 1%, reflecting the remarkable

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effect of policies related to the development of inclusive finance in Anhui Province in recent years.

Table 9. Full-sample regression results

Full sample (lnGAP)	Coefficient	T value	Adj R-squared
lnIFI	-0.1476***	-3.32	0.719
lnPGDP	-0.685***	-9.08	
lnUR	-0.2937*	-1.7	
lnGOV	-0.2956***	-2.93	
lnIS	1.7372***	3.53	
_cons	-2.6384	-1.36	

Note: * p<10%, * * p<5%, * * * p<1%. The table results are obtained by STATA 17 processing the relevant data.

In terms of control variables, the regression coefficients of lnPGDP (economic development level) and lnGOV (government financial expenditure level) are -0.685 and -0.2956, respectively, indicating that if the economic development level and government financial expenditure level of Anhui Province increase by 1%, the urban-rural income gap in Anhui Province will decrease by 0.685% and 0.2956% respectively, and the significant negative correlation at the 1% level reflects that the improvement of government financial expenditure level of Anhui Province can reduce the urban-rural income gap, The preferential agricultural policies of Anhui Provincial Government also have obvious effects.

At the same time, the regression coefficient of lnIS is 1.7372, which is significantly positively correlated at the significance level of 1%, indicating that the higher the proportion of the secondary and tertiary industries in GDP in Anhui Province, the higher the urban-rural income gap in Anhui Province will be, which can widen the urban-rural income gap in Anhui Province.

(2) Group regression results. The relationship between variables is analyzed from the perspective of sub-samples, as shown in Table 10.

Table 10. Sub-sample regression results

lnGAP	Southern Anhui			Central Anhui			Northern Anhui		
	Coefficient	T	Adj R-squared	Coefficient	T	Adj R-squared	Coefficient	T	Adj R-squared
lnIFI	-0.9289***	-3.16	0.3980	-0.1195	-1.04	0.8606	-0.1053*	-1.6	0.8391
lnpGDP	-1.7273***	-3.92		-0.5265**	-2.29		-0.7385***	-8.86	
lnUR	1.0378	1.39		-0.8762	-1.51		-0.273*	-1.83	
lnGOV	-0.6391**	-2.59		-0.3574*	-1.72		-0.3172**	-2.49	
lnIS	7.7352***	3.27		1.3144	1.48		1.7946***	2.95	
_cons	-25.3333***	-2.69		-0.2089	-0.05		-2.419	-1.06	

Note: * p<10%, * * p<5%, * * * p<1%. The table results are obtained by STATA 17 processing the relevant data.

According to Table 10, the development of inclusive finance in southern, central and northern Anhui has a significant impact on the urban-rural income gap. Among them, southern and northern Anhui have passed the significance test, and their regression coefficients are -0.9289 and -0.1053 respectively, indicating that if the development level of inclusive finance increases by 1%, the urban-rural income gap in the two regions will be reduced by 0.9289% and 0.1053% respectively; The regression coefficient of central Anhui is -0.1195, but the regression coefficient is not significant. The reason is that Hefei, as the capital of Anhui Province, has an early development start, a relatively mature financial market, a high per capita income, an early

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development of financial institutions, a more mature business, and people have more yuan of financial products to choose from, so the development of inclusive finance has a small impact on its urban-rural income gap.

Except Wuhu and Ma'anshan, the development level of inclusive finance in southern and northern Anhui is relatively high, and the development level of other cities is generally low. Therefore, the development of inclusive finance has a great impact on the urban-rural income gap in southern and northern Anhui. Therefore, we should vigorously develop inclusive economy, help low-income groups and small and micro enterprises obtain financial services, balance regional economic development, and significantly improve the urban-rural income gap in various regions.

6. Conclusion and Suggestions

6.1. Conclusion

This paper, referring to the relevant literature of domestic and foreign scholars, carefully elaborates the relevant theories and mechanisms of inclusive financial development and urban-rural income gap, selects appropriate reference indicators to build an evaluation system based on the literature conclusions of domestic and foreign scholars, calculates relevant indicators according to the relevant data of Anhui Province from 2012 to 2019, and conducts empirical research on the whole and various regions of Anhui Province, and draws the following conclusions:

(1) The development level of inclusive finance in Anhui Province is moderately low. According to the previous calculation results of the IFI development index, the development level of inclusive finance in most cities in Anhui Province has reached medium or above, but the development level of inclusive finance in Hefei is far higher than that in other cities, and there are large differences in the development level of inclusive finance. However, the analysis follows the law of positive correlation between the development level of inclusive finance and the level of economic development. In the empirical study, it is found that the allocation of financial resources in southern Anhui is relatively balanced, however, the allocation of financial resources in central Anhui is extremely uneven. According to the weight of inclusive financial index, the number of financial institutions' outlets and the number of financial institutions' employees have a high contribution rate to the development of inclusive finance.

(2) The income gap between urban and rural areas in Anhui Province has narrowed year by year. According to the previous statistical calculation of the Tell Index (GOV) of cities in Anhui Province, the Tell Index of cities in Anhui Province has declined year by year, and the decline trend in central and northern Anhui is relatively obvious, and the urban-rural income gap is significant.

(3) The empirical study shows that the overall inclusive financial development in Anhui Province can significantly reduce the urban-rural income gap, but the impact of the three regions is different. The impact of southern and northern Anhui is significant, but the impact of central Anhui is not significant. The reason is that Hefei, as the capital city of Anhui Province, started its development earlier, the financial market is relatively mature, and people have more yuan of financial products to choose from, so the development of inclusive finance has less impact on its urban-rural income gap.

(4) The level of inclusive financial development and government financial expenditure is significantly negatively correlated with the level of urban-rural income gap, but the level of industrial structure development is positively correlated with the level of urban-rural income gap. Therefore, the urban-rural income gap in northern Anhui, which is dominated by agricultural production, is small, while the urban-rural income gap in central and southern

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Anhui, which is dominated by secondary and tertiary industries, is large. The government expenditure in the three regions can significantly improve the urban-rural income gap.

6.2. Suggestions

(1) The development of inclusive finance is differentiated. Since the development level of inclusive finance varies from city to city, the government should adopt differentiated inclusive finance development policies. The one-size-fits-all policy measures obviously cannot adapt to the current stage of inclusive finance development. Such measures may widen the urban-rural income gap in some regions, and should be tailored to the situation. For regions with low level of inclusive finance development, the government should support the development of local inclusive finance through policies, such as preferential agricultural policies, etc, Balance regional development and narrow the income gap between urban and rural areas. Southern Anhui should continue to maintain the positive effect of inclusive financial development and explore a more perfect inclusive financial development system. There is a wide gap in the development level of inclusive finance in central Anhui. Hefei, as the provincial capital city, should fully tap the development potential of surrounding cities. Northern Anhui should increase government support, lower the threshold of financial services, and adopt loose fiscal and monetary policies to help local inclusive financial development.

(2) Increase the supply of financial services. The overall level of inclusive financial development in Anhui Province is medium and low. From the previous empirical analysis, it can be seen that the number of financial institutions' outlets and the number of financial institutions' employees have a high contribution rate to the development of inclusive financial. However, the number of financial institutions' outlets in the relatively underdeveloped areas of Anhui Province is very rare, which is in the desertification of financial services. The threshold of financial services is high, and the effectiveness of financial services is low. The government should increase the supply of financial services, improve the coverage of financial outlets in remote and backward areas, and implement the active policy of anti-desertification in financial services.

(3) Digital inclusive finance. Now is the era of the Internet and big data. Financial institutions provide financial services through the Internet to improve the efficiency of financial services and reduce the threshold of financial services. The use of big data-related technologies can quickly deal with problems that cannot be solved in the process of traditional inclusive financial services. The digitalization of inclusive financial services can undoubtedly improve the level and efficiency of inclusive financial services and press the fast-forward key for the development of inclusive financial services. At the same time, we should also do a good job in popularizing financial knowledge. Urban residents have relatively rich financial knowledge and can catch up with the financial services provided by financial institutions. However, rural residents lack financial knowledge. They often provide a variety of financial services and do not know how to distinguish and choose. This artificially hinders the development of inclusive finance. The popularization of financial knowledge can break this information asymmetry, and the Internet can more easily bring financial knowledge and financial information to ordinary people's homes. Therefore, the digitalization of inclusive finance can bring a qualitative leap to the development of inclusive finance.

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