

Study on the Influence of Inclusive Finance Development Level on Urban-Rural Income Gap in Guizhou Province

Baiyun Chen^{1,2,*}, Ying Ni^{1,2}

¹Guizhou University of Finance and Economics

²College of Big Data Application and Economics
Guiyang Guizhou, 550025, China

Abstract—The relationship between inclusive finance and urban-rural income gap has become a social concern. In this paper, VAR vector autologous regression model was adopted to construct the inclusive finance index system. Data from Guizhou Province from 2007 to 2017 were selected to analyze the relationship between inclusive finance and urban-rural income gap in Guizhou through Granger test, Impulse response and Variance decomposition. The results showed that the development level of inclusive finance in Guizhou Province improved year by year, but the development level was not high and the development was not stable. Inclusive finance is a One-way causal relationship between urban and rural income gap; in the fourth order of the optimal lag order, inclusive finance has a negative impact on the urban-rural income gap. At the same time, when the urban-rural income gap lags for four periods, it falls under its own influence and rises under the influence of inclusive finance.

Keywords—Inclusive finance; Income gap between urban and rural areas; Vector autoregressive model

I. INTRODUCTION

Guizhou Province is located in the southwest of China. Uneven economic development and a large number of poor people are the basic conditions of Guizhou Province. Up to 2018, Guizhou still has 65 poor counties, making it one of the Provinces with the greatest difficulty and the heaviest task in targeted poverty alleviation. In 2017, the disposable income of urban residents in Guizhou Province was 29,080 yuan, and the per capita disposable income of rural residents was 8,869 yuan. The disposable income of urban residents was 3.27 times that of rural residents. It is important to study that level of financial development of Guizhou Province and to further analyze its influence factors for reduces the income gap between Guizhou Province and China, so as to achieve the goal of total poverty alleviation and overall prosperity in Guizhou Province.

In the past, there's a lot of research on the concept of financial concepts and measures in the world. Regarding the definition of inclusive finance, Sarma (2008)[1], Kunt and Klapper(2012)[2] et al. believe that inclusive finance is targeted at vulnerable groups and low-income groups, but Sarma emphasizes that the core content of inclusive finance is the availability of finance. Kunt and Klapper(2012)[2] believe that inclusive finance has always been committed to providing

a wide range of financial services for all social classes at a price acceptable to vulnerable groups and low-income groups. In terms of measuring degree of general financial development, Beckl (2007) first established a precurbed financial system for every 1000 square kilometers of banking institutions, the ratio of deposits and GDP, the ratio of loans and GDP, the number of ATM per 1,000 square kilometers, the number of banking institutions every 100,000, and the number of ATM machines for every 100,000, and found that general benefits had certain restraints on the increase of income gap between urban and rural residents. Then, Sarma (2008) [1], on the basis of Beck et al., measures the level of financial development in terms of geographic permeability, product contact finance, use of utility finance, and the general financial index (IFI). In recent years, domestic scholars have mainly explored the internal mechanism between the two based on panel data or time series data. Xu mei and zhang xiaolin (2014) [4] and li jianwei et al. (2015) [5] used VAR model and VEC model to explore the relationship between GSP finance and the income gap between urban and rural residents, and then li jianwei (2017) [6] continued to use spatial econometric model to empirically test the impact of the development of inclusive finance in Provinces on the income gap between urban and rural residents. Whether at the national level or at the provincial level, inclusive finance plays a significant role in reducing urban and rural income.

On the basis of these studies, the innovation of this study is mainly based on the fact that the first is that the former scholars are focused on the development of the Pratt financial development in the national Province of the country, and it's not rich enough to study a particular region or a Province, particularly in the state of Guizhou that has a very low economy in the economy of the economy. This paper selects relevant data of Guizhou Province to discuss the influence of inclusive finance on urban-rural income gap. The second is that this is different from the main ingredient analysis and the hierarchy of analysis that the scholars used to measure and evaluate the way in the world, but by using the variation factor method to give the weighting to the index, it has a strong objectivity.

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II. MEASUREMENT METHOD OF INCLUSIVE FINANCE LEVEL

A. Index selection and weight determination

This paper USES the inclusive finance development index IFI established by Sarma et al. (2008), an Indian scholar, to build an evaluation system of inclusive finance service level. Three dimensions are adopted to measure the development level of inclusive finance, that is, the geographical penetration dimension of financial services, the contact financial dimension of products and the utility financial dimension of use. The three dimensions are divided into eight secondary indicators, and the inclusive finance index system is constructed in this paper by referring to other scholars' methods for the construction of inclusive finance.as shown in TABLE I.

TABLE I. INCLUSIVE FINANCE DEVELOPMENT LEVEL INDICATOR SYSTEM

| Different dimensions | Specific indicators |
|--------------------------|--|
| Geographic permeability | Number of outlets per million kilometers financial institutions (X1) |
| | Number of employees per million kilometers of financial institutions(X2) |
| | Number of financial institution outlets per million owned(X3) |
| | Number of employees per million owned by financial institutions(X4) |
| Availability of services | Financial institution deposit balances per person(X5) |
| | Each financial institution loan balance(X6) |
| Utility | Deposit balance of unit income financial institution(X7) |
| | Loan balance of company income financial institutions(X8) |

In order to better reflect the different contribution rates of various index variables to the development of inclusive finance, the coefficient of variation method is used to determine the index weight. The coefficient of variation of inclusive finance index in each dimension is

$$CV_i = \frac{S_i}{\bar{X}_i}, i = 1,2,3,4...n$$

Where, s_i is the standard deviation of each index, \bar{x}_i is the average of each index, cv_i is the variation coefficient of each index, and the variation coefficient calculated by the above formula reflects the absolute variation degree of each index.

Then, normalization is carried out for each indicator to further obtain the weight formula of each financial dimension in the development level of inclusive finance as follows:

$$W_i = \frac{CV_i}{\sum_{i=1}^n CV_i}$$

B. Construct inclusive finance development index

There are different index dimensions among different dimensions, and each index needs to be normalized. The process of "dimensionalization" of each indicator is as follows:

$$d_i = w_i * \frac{A_i - MIN_i}{MAX_i - MIN_i}$$

Where, W_i represents the weight of the i th dimension (0 is less than or equal to 1), A_i represents the actual observed value of the i th financial dimension, MIN_i represents the minimum value of the i th financial dimension, and MAX_i represents the maximum value of the i th financial dimension. To evaluate the development level of inclusive finance, the larger the level of d_i is, the higher the level of inclusive finance represented by this index is; on the contrary, the smaller the level of d_i is, the lower the level of inclusive finance is. Therefore, the inclusive financial development index IFI of a country or region can be expressed by the following formula:

$$IFI = 1 - \frac{\sqrt{(w_1 - d_1)^2 + (w_2 - d_2)^2 + \dots + (w_n - d_n)^2}}{\sqrt{w_1^2 + w_2^2 + \dots + w_n^2}}$$

IFI is between 0 and 1, and according to Sarma et al. (2008) [1], when IFI is less than 0.3, it indicates a low level of inclusive finance development; when IFI is greater than 0.5, it indicates a high level of inclusive finance development.

C. Calculate inclusive finance development index

Due to the availability of relevant data, the development index of inclusive finance in Guizhou Province from 2007 to 2017 was calculated to measure the development level of inclusive finance in Guizhou Province. The original data of each index are mainly from the financial operation report of Guizhou Province and statistical yearbook of Guizhou Province published by the statistics bureau of Guizhou Province in relevant years. The weights of each index of inclusive finance are calculated according to the above formulas, and the results are shown in TABLE II.

TABLE II. EVALUATION INDEX WEIGHT OF INCLUSIVE FINANCE DEVELOPMENT LEVEL

| | Average | Standard deviation | Coefficient of variation | The weight |
|----|---------|--------------------|--------------------------|------------|
| X1 | 0.0122 | 0.0105 | 0.0710 | 0.0348 |
| X2 | 0.0219 | 0.0126 | 0.0913 | 0.0447 |
| X3 | 0.0318 | 0.0205 | 0.1236 | 0.0605 |
| X4 | 0.1145 | 0.0462 | 0.3473 | 0.1700 |
| X5 | 0.1139 | 0.0928 | 0.5751 | 0.2816 |
| X6 | 0.1098 | 0.0909 | 0.5734 | 0.2807 |
| X7 | 0.0280 | 0.0199 | 0.1320 | 0.0646 |
| X8 | 0.0324 | 0.0193 | 0.1288 | 0.0631 |

According to the above formula, relevant data of Guizhou Province from 2007 to 2017 are used to calculate the inclusive finance development index of Guizhou Province over the years, as shown in TABLE III.

TABLE III. DEVELOPMENT INDEX OF INCLUSIVE FINANCE IN GUIZHOU PROVINCE FROM 2007 TO 2017

| Year | IFI |
|------|--------|
| 2007 | 0.0704 |
| 2008 | 0.0951 |
| 2009 | 0.1563 |

| Cont.to TABLE III | |
|-------------------|--------|
| 2010 | 0.2311 |
| 2011 | 0.2796 |
| 2012 | 0.3469 |
| 2013 | 0.4721 |
| 2014 | 0.5805 |
| 2015 | 0.7202 |
| 2016 | 0.5989 |
| 2017 | 0.9375 |

From the perspective of Guizhou Province as a whole, from 2007 to 2017, although the development level of inclusive finance in Guizhou Province improved year by year, the development level was not high and the development was not stable. According to the research results of Sarma et al. (2008) and the classification criteria of international inclusive finance. Combining TABLE II and TABLE III, we find that the inclusive finance development index from 2007 to 2011 is less than 0.3, which is at a low level of development. 2012 and 2012, IFI is in the range of 0.3 to 0.3, in the medium level, and from 2014 to 2017, IFI level is greater than 0.5, IFI level of financial development is good, even nearly 2017 to 1, but in Guizhou Province special geographical environment determines the situation of Guizhou Province, Guizhou Province in financial resource allocation is relatively difficult to achieve, so the financial services industry is relatively backward to IFI development and geographical location Provinces still has certain gap.

III. EMPIRICAL ANALYSIS

A. Selection of variables and data

Urban and rural income GAP (GAP): most scholars prefer to use gini coefficient, thiel coefficient or the ratio of per capita disposable income of urban residents to disposable income of rural residents when measuring the urban-rural income GAP. In this paper, the ratio of the per capita disposable income of urban residents to the disposable income of rural residents is used to measure the urban-rural income GAP, which is expressed by GAP. GAP is directly proportional to urban-rural income GAP. The larger the GAP value is, the larger the urban-rural income GAP is, and the smaller the GAP is, the smaller the urban-rural income GAP is.

Inclusive financial development index (IFI). Refer to the foregoing for the calculation of specific indexes.

B. Measurement Method

In order to measure the effect coefficient of scale and efficiency on income gap respectively, these indicators are fused together from the perspective of the overall system, so as to make the prediction function of the model more comprehensive. In this paper, VAR model is a non-structured vector autoregressive model, which can be expressed as:

$$Y_t = \Gamma_0 + \Gamma_1 Y_{t-1} + \Gamma_2 Y_{t-2} + \dots + \Gamma_p Y_{t-p} + \Pi_1 X_t + \dots + \Pi_q X_{t-q} + U_t$$

C. Test and Estimation

1) Stationarity test

The data used in this empirical study are all time series data, which may lead to pseudo-regression in the process of model construction due to the non-stationarity of the model. Therefore, we first carried out ADF unit root test on the

original sequence of the three indicators and the time series after the difference to avoid the emergence of pseudo-regression. The results are shown in TABLE IV As can be seen from the TABLE, under the 5% significant level, the original sequence of the variables of ADF statistics was not significant, how each variable of the original sequence are unit root, to deal with variable, after the first order difference under the 5% significant level rejected the original variables exist primitive root's original hypothesis, therefore each variable is a single whole.

TABLE IV. ADF TEST RESULTS

| Variable | The ADF statistics | The critical value | | | P values | Conclusion |
|----------|--------------------|--------------------|---------|---------|----------|----------------|
| | | 1% | 5% | 10% | | |
| GAP | -0.9469 | -4.2971 | -3.2126 | -2.7476 | 0.7271 | non-stationary |
| DGAP | -3.4036 | -4.4205 | -3.2598 | -2.7711 | 0.0408 | stationary |
| IFI | 1.9593 | -4.4205 | -3.2598 | -2.7711 | 0.9988 | non-stationary |
| DIFI | -5.1496 | -4.4205 | -3.2598 | -2.7711 | 0.0040 | stationary |
| GAP | -0.9469 | -4.2971 | -3.2126 | -2.7476 | 0.7271 | non-stationary |

2) select the optimal lag order

On the one hand, the higher the lag order, the stronger the explanatory ability of the model. On the other hand, higher lag order will affect the degree of freedom. Therefore, it is necessary to select an appropriate lag order. This paper comprehensively considers the common AIC criterion, BIC criterion and HQIC criterion to determine the optimal lag order. According to the TABLE, the optimal lag order of VAR is order 4.

TABLE V. SELECTION OF LAG ORDER

| Lag order | AIC | BIC | HQIC |
|-----------|-----------|-----------|-----------|
| 1 | -2.23055 | -2.27691 | -2.80359 |
| 2 | -6.55024 | -6.62751 | -7.50529 |
| 3 | -123.311 | -123.42 | -124.648 |
| 4 | -125.338* | -125.447* | -126.676* |

3) granger causality test

Further, the Granger causality test was used to verify the specific relationship among the three. The results obtained through the Granger causality test with a lag of one order are shown in TABLE VI. As can be seen from TABLE VI, under the significance level of 5%, there is a one-way causal relationship between finance and income gap, that is, we can think that inclusive finance is the granger cause of urban-rural income gap.

TABLE VI. GRANGER CAUSALITY TEST RESULTS

| The null hypothesis | F statistic | P values |
|--------------------------------|-------------|----------|
| IFI does not Granger Cause GAP | 7.3102 | 0.0461 |
| GAP does not Granger Cause IFI | 2.0769 | 0.2406 |

D. Impulse Response Analysis

Through testing the characteristic roots of VAR model, it was found that all of them were in the unit circle, which also showed that the system was stable and could be further analyzed for impulse response function. In this paper, the dynamic relationship between the two is analyzed by using the

Impulse response function. Impulse response function diagram analysis shows that the pratt & whitney financial information shock response of the income gap between urban and rural areas units in 1-2) positive effect, starting from the 3 response smaller and become negative effects, no. 4 and then finance for pratt & Whitney information shock response of the last unit of the income gap between urban and rural areas is positive effect, and the degree of response increases gradually.

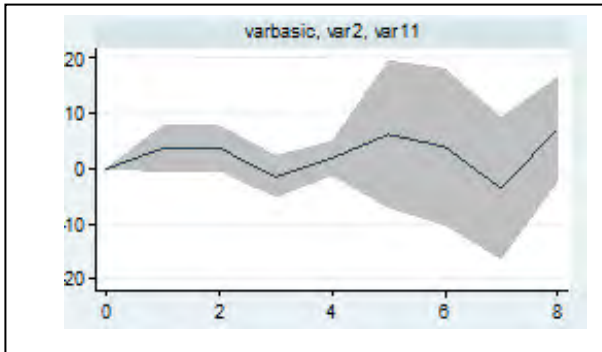


Fig. 1. Pulse diagram

E. Variance Decomposition

The variance decomposition results in TABLE VII show that, in the first period, the main reason for the change of urban-rural income gap is its impact, and inclusive finance has little impact on it. However, with the passage of time and change, the impact of the new interest rate shock itself becomes smaller and smaller, and in addition, the variable of inclusive finance plays a more and more important role. In the fourth period, the fluctuation of urban-rural income gap was reduced to 60.67% by its own influence, and the influence of inclusive finance increased to 39.33%.

TABLE VII. VARIANCE DECOMPOSITION

| Period | S.E. | GAP | IFI |
|--------|------|-------|-------|
| 1 | 0.05 | 77.13 | 22.87 |
| 2 | 0.05 | 74.45 | 25.55 |
| 3 | 0.06 | 61.96 | 38.04 |
| 4 | 0.06 | 60.67 | 39.33 |
| 5 | 0.12 | 67.97 | 32.03 |
| 6 | 0.14 | 75.89 | 24.11 |
| 7 | 0.17 | 71.15 | 28.85 |
| 8 | 0.19 | 69.23 | 30.77 |
| 9 | 0.32 | 67.69 | 32.31 |
| 10 | 0.43 | 75.54 | 24.46 |

IV. CONCLUSION

Based on previous research results, the development index of inclusive finance in Guizhou Province was calculated and its evolution process was analyzed. Use of Guizhou Province in 2007-2017, nearly 10 years of data, through the pulse vector autoregressive model function and variance decomposition to the region pratt & whitney financial in-depth analysis was carried out on the income gap between urban and rural areas to the following conclusion: pratt & whitney level of financial development in Guizhou has obvious rising trend, especially rising fast in recent years, thanks to the national policy of the western region; Granger causality test shows that inclusive finance is granger causality between urban-rural income gap; The impulse function shows that, in the long run, there is a dynamic response relationship between inclusive finance and urban-rural income gap. To give inclusive finance a positive impact, the response value of urban-rural income gap in the first two periods of lag period increased rapidly, and the range of decline to the fourth period showed a steady upward trend. Variance decomposition shows that inclusive finance has a strong lag effect on urban-rural income gap.

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