Empirical Study of Relationship between Rural Finance Development and Peasant Income of Sichuan Province

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Abstract

Using to the relative data from 1989-2010 in Sichuan province, with ADF unit root test, cointegration test, error correction model and Granger causality test, we make an empirical study on the relationship of scale of rural finance development, structure of rural finance development, rural finance development efficiency and peasant income growth. The empirical results show that: there is positive correlation among peasant income and scale, structure of rural finance development, on the other hand, there is negative correlation between peasant income and rural finance development efficiency. The result of Granger causality test shows that there is no cause-and-effect among peasant income and the scale, structure, and efficiency of rural finance development.

Keywords: Rural finance, Peasant income, Empirical study

1. Introduction

Increasing peasant income is not only the core of three rural issues but also the key to construct socialistic harmonious society. Because of the Reformation and Opening policy, peasant income level of Sichuan province has been significantly enhanced. From 1978 to 2010, the per-capita net income of rural people in Sichuan province has been increased from 116.7 yuan to 4882.1 yuan, which has increased 41.8 times. At the same time, the per-capita disposable income of urban residents in Sichuan province has been increased from 338 yuan in 1978 to 15461 yuan in 2010, income gap of urban and rural residents has been widen from 2.90:1 in 1978 to 3.17:1 in 2010,the income gap difference between urban and rural residents is bigger and bigger, peasant income growing speed is badly falling behind of the speed of growth of national economy and the per-capita disposable income of urban residents, the situation of increasing peasant income is still very grim. There are many factors affect peasant income growth, one of the most important factors is the development of rural finance. Taking the past achievements as the base, this article attempts to analysis the relationship between rural finance development and peasant income growth in Sichuan province from the angle of rural finance.

The domestic and international scholars have been researched the relationship between financial development and peasant income growth, but due to the different development phase of economic and finance and other reasons, the method of their research is varied. Abroad, researching the relationship between rural financial development and peasant income growth in direct way is very limited, the scholars more research the relationship between financial development and income gap to illustrate the relationship between financial development and peasant income growth. For example, Greenwood and Jovan (1990) discussed the relationship among economic growth, financial development and income distribution by establishing the dynamic model. Analysis results showed that the relationship between financial development and income gap is inverted U curve, namely there is the Kuznets effect. Banerjee and Newan (1993) found that development of finance and economic growth couldn't always make the income gap narrowing at the imperfect financial market, the premise of financial development and economic growth narrowing the income gap is the perfect financial market. Clarke, Xu and Zou (2003) used empirical analysis to show that, if financial development can make labor into the modern industry sector, the income gap will be more widen with the rise of modern industry sector.

The scholars in China more directly research the relationship between the rural financial development and the peasant income growth through empirical analysis. Tao Wen and Guanghe Ran (2005) used Co-intergration Tests, Granger

Causality Tests and VAR to make the empirical study on the relationship between rural financial development and peasant income growth in China over the period 1952-2003, the results indicated that China financial development has definitely negative effects on the farmer income growth. Ximei Li (2006) used the actual data of Shanxi province to research the relation between rural financial development and peasant income growth and found that rural financial development could not promote the peasant income growth in Shanxi province. Wen Yang (2007) found that, there is significant correlation between the personal average savings deposit and the peasant income growth, and there is negative correlation between peasant income growth and rural financial efficiency. Jinbing Fang, Yang Cao, etc (2009) used the rural financial scale, structure and efficiency to measure the level of the rural financial development , and the research results showed that the rural financial development scale and structure have positive effects on farmer income growth, while the rural financial development efficiency has negative effects on farmer income growth. Li Jia, Hongming Wang (2010) used the related data from 1978-2008 in China's western region to research the relationship between the rural financial development and the peasant income growth, the results showed that, there is positive correlation among peasant income and scale, structure of rural finance, there is negative correlation between peasant income and rural financial development efficiency, and the rural financial development scale is the Granger reason of peasant income growth. Based the VAR model, Xingduan DU, Shaolei Yang (2011) concluded that China's rural financial development can not promote peasant income growth, and only the rural financial development efficiency is Granger cause of peasant income growth.

From the existing research, we can easily find that, the scholars use different research methods and indices and get the different conclusions about the relationship between the rural financial development and peasant income growth. But there are also some problems, such as index designing is single, not set up necessary control variables and so on. What's more, the research of the relationship between the rural financial development and peasant income growth focuses on the national level, but the research of the region level is very poor, and China's economy and society development are extremely unbalanced. Therefore, we must take deep study on the district level and it will be possible to grasp the basic reality and get the actual research conclusion. Accordingly, this paper takes advantage of the vector error correction model and Granger Causality Test by selecting scale, construe and efficiency of rural finance as the indicator reflecting the level of rural finance development of Sichuan province, and the fixed assets investment as control variable with the data ranging from 1989-2010, in hope of exploring the relationship between the rural finance development and peasant income growth and providing empirical basis for related policies making in Sichuan province.

2. Model Setting, Data Source and Research Method

2.1 Model and Index Setting

In the traditional analysis framework of total production function, based on the ways of Greenwood, Jovan (1990) and WenTao (2005), this paper introduces the development level of finance into the production process as capital, labor and other factors, and constructs production function which reflects the relation of rural financial development and economic output of Sichuan province.

$$Y=f(K, L, F) \tag{1}$$

In this function, Y is for rural total economic output, K represents the rural total capital investment, L is for the rural labor force investment, F stands for the rural financial development level. Since the emphasis of this paper is the relationship between the rural financial development level and peasant income growth in Sichuan province, according to the model analysis framework proposed by WenTao (2005), assuming that the rural labor force investment in a maximum capacity, then the economic output depends on financial development level and total capital investment. Using m represents the maximum labor input of biggest production capacity, this time (1) becomes:

$$Y=mf(K, F) \tag{2}$$

The complete differential of (2) is:

$$dY=m\frac{\partial f}{\partial K}dK+m\frac{\partial f}{\partial F}dF \tag{3}$$

In formula (3), synthesized literature research and combined with the actual status of the rural financial development in Sichuan province, this paper uses the following three index to measure rural financial development level of Sichuan: The rural financial development scale (RFIR) of Sichuan province, the rural financial development structure (RFS) of Sichuan province and the rural financial development efficiency (RLD) of Sichuan province. The rural financial development level of Sichuan province can be expressed as:

$$F=f(RFI, RFS, RLD) \tag{4}$$

Taking the complete differential of formula (4) into formula (3) can get the simplified formula:

$$\frac{dY}{m}=\frac{\partial f}{\partial K}\,\mathrm{dK}+\frac{\partial f}{\partial RFIR}\,\mathrm{dRFIR}+\frac{\partial f}{\partial RFS}\,\mathrm{dRFS}+\frac{\partial f}{\partial RLD}\,\mathrm{dRLD} \tag{5}$$

Using β_1 represent marginal output of rural financial development scale of Sichuan province, β_2 represent marginal output rural financial development structure, β_3 stand for marginal output rural financial development efficiency, β_4 represent marginal output of rural capital investment. Further simplify (5), and using rural per capita net income of Sichuan province on behalf of output per capita, we can get the following measurement model:

$$\mathrm{dFR}=\beta_0+\beta_1\,\mathrm{dRFIR}+\beta_2\mathrm{dRFS}+\beta_3\mathrm{dRLD}+\beta_4\,\mathrm{dK}+\mu \tag{6}$$

In (6), FR represents per capita net income of rural residents in Sichuan province, β_0 stands for constant term, μ is random error term. Because the statistic data of the total capital growth dK is difficult to obtain, this article uses dRFI_{t-n} which is the lag variable of the rural fixed assets investment of Sichuan province instead of dK, there is:

$$\mathrm{dFR}_t=\beta_0+\beta_1\,\mathrm{dRFIR}_t+\beta_2\mathrm{dRFS}_t+\beta_3\mathrm{dRLD}_t+\beta_4\mathrm{dRFI}_{t-n}+\mu_t \tag{7}$$

This formula shows that the early investment level and improve of rural the financial development, scale and efficiency could impact peasant income growth of Sichuan province. Obviously, FR, RFIR, RFS, RLD and their lag variables have the same stable relationship. Setting the following VAR model to do empirical analysis:

$$\mathrm{FR}_t=\beta_0^*+\sum_{i=1}^{n}\beta_{1i}*RFIR_{t-i}+\sum_{i=1}^{n}\beta_{2i}*RFS_{t-i}+\sum_{i=1}^{n}\beta_{3i}*RLD_{t-i}+\sum_{i=1}^{n}\beta_{4i}*FRI_{t-i}+\sum_{i=1}^{n}\beta_{5i}*FR_{t-i}+\mu_t^* \tag{8}$$

2.2 Data Introduction:

This paper involved variables and data are mainly covering three aspects: the farmers' income level, rural financial development level and rural investment level.

(1)The peasant income level index (FR).This paper uses the rural per capita net income of Sichuan province from 1978-2010 to measure peasant income and takes away the consumer price index from peasant income to eliminate commodity price factors at the same time.

(2) The rural financial development scale index (RFIR). Combined with the practical situation of the financial development in Sichuan province and the availability of data, in this paper, we use the ratio of the total of rural deposits and loans to rural GDP to measure rural financial development scale. Rural deposit balances is expressed by the sum of peasant savings deposits and agricultural deposits from 1978-2010 in Sichuan province, rural loan balances use the sum of agricultural loans and township enterprise loans from 1978-2010 in Sichuan province to express.

(3) The rural financial development structure index (RFS).The paper uses the ratio of agriculture loan balances to the rural loan balances of Sichuan province to measure the rural financial development structure index (RFS).

(4) Rural financial development efficiency index (RLD). This article uses the ratios of the rural loan balances to the rural deposit balances to express rural financial development efficiency index (RLD) of Sichuan province.

(5) Rural investment level index (RFI). In this article, we use the ratio of rural fixed assets investment to rural GDP to express rural investment level index.

The data of this paper mainly comes from *China statistical yearbook*, *Comprehensive statistical data and materials on 50 years of new China*, *Township enterprise statistical data* and *Sichuan statistical yearbook*.

2.3 Research Method

Because most of the time series data is non-stationary, in order to avoid spurious regression, this paper first uses ADF test to inspect the stability of variables, and then turns non-stationary variables into stationary time series. If all variables are integrated, we can use Johansen cointegration test to inspect correlated variables and ensure the long-term relationship of the rural financial development level and peasant income growth. If there is an cointegrated relation among the variables, we can build error correction model (VECM) for short causality analysis. If the variables don't have long-term stable relations, the article will take the Granger Causality Test by differentiating the variables, and then make a further analysis on the relationship of the variables.

3. Empirical Analysis

3.1 Unit Root Test

In this paper, we use ADF test to determine the stability of each variable by Eviews6.0. In order to reduce the data fluctuation range, first we take the logarithm of per capita net income of rural residents in Sichuan province, and still use FR to express. Test results as shown in table 1. ΔFR, ΔRFIR, ΔRFS, ΔRLD and ΔRFI respectively express each variable's first-order difference sequence. SIC principle has been used in the inspection process to determine lag length. Through the inspection, we find that FR, RFIR, RFS, RLD and RFI are non-stationary at the 5% significant level. However, each of their first-order difference is stationary at the 5% significant level, and also integrated of order one. Therefore, we can confirm whether they have the long-term stable relationship by further cointegration test.

<Insert Table 1 here>

3.2 Cointegration Test

This paper uses Johansen to judge whether there is co-integration relationship among the variables, and then gets the cointegration equation to illustrate these variables existing long-term equilibrium relationship. Through a series of inspection, we find two lags of VAR model is the best one. The model's goodness-of-fit is very well and residual sequence is stable. Cointegration test results as shown in table 2.

<Insert Table 2 here>

We can see from Table 2, in the sample interval from 1978-2010 there are four cointegration relationships between the five variables. One of the standardized cointegration equations as follows:

$$FR=78.74732RFIR+22.38240RFS-6.458603RLD+67.02174RFI+\mu \quad (9)$$

It has been proved that the cointegration equation's residual is stable through inspection, so the five variables have long-term equilibrium relationship. In the long term, there is positive correlation among peasant income, the rural fixed assets investment and scale, structure of rural finance development, while there is negative correlation between peasant income growth and rural financial development efficiency.

3.3 Error Correction Model (VECM)

Because FR, RFIR, RFS, RLD and RFI five variables have cointegration relationship, this paper will further define the error correction model to reflect the short-term dynamic relationship of the variables.

Using Eviews6.0 to establish VECM, the output result shows that each equation's residual meets normal distribution in 5% confidence level and doesn't have self-correlation and heteroskedasticity, so the VECM is effective. The whole model's log likelihood (260.3485) is large enough, at the same time the value of AIC (-11.40) and SC(-6.92) is fairly small, so the model has strong interpretation ability.

3.4 Granger Causality Test

This paper further uses Granger Causality Test to analysis whether peasant income and rural financial development have causal relationship. Test results as shown in table 3.

<Insert Table 3 here>

As shown in table 3, in the most optimal lag length, the rural financial development scale, structure, efficiency and the rural fixed assets investment rates aren't the Granger cause of rural peasant income growth in 10% confidence level, but the peasant income growth in the 10% confidence level is the Granger cause of rural financial development scale and fixed asset investment level. This also explains in an indirect way that the rural financial development cannot effectively promote the peasant income growth. The phenomenon may be caused by the stagnant rural financial development, the incomplete rural financial system and the rural financial resources not getting reasonable allocation and so on.

4. Conclusions and Policy Recommendations

Through empirical research on relationship between rural financial development and the peasant income growth in Sichuan from 1978-2010, this article shows that the rural financial development scale and efficiency, in the long term, have played a positive role on promoting the peasant income growth, while the rural financial development structure or agricultural loans restrained the growth of peasant income to some extent instead of becoming an important way to increase peasant income. The rural financial development scale, structure and efficiency are not the Granger cause of peasant income growth, but the peasant income growth is the rural financial development scale's Granger cause in 10% confidence level. Obviously, the results of theory and practical analysis reveal the fact that mismatch among the rural

financial development level, the rural economic development and peasant income growth actual demands in Sichuan, which is caused by the current rural financial system.

Sichuan is a big agricultural province in Southwest China. The peasant income growth is also the main goal of rural economic and financial development in Sichuan. In order to achieve the development goals, we should strengthen the following aspects of the work: (1) Continue to intensify the rural financial system reform and establish a diversity rural financial system in Sichuan province. On the basis of improving and perfecting the rural financial system in Sichuan province, we should further standardize and develop the rural folk financial, standardize and guide the healthy development of the folk lending form, forming a competitive and diversified rural financial system of supporting "three agriculture" the development as center, rural credit cooperatives as the foundation, national formal financial institutions as support, folk financial institutions as supplement. (2) Expand the rural financial scale of Sichuan province, promote the rural financial services quality. Expanding the scale of rural finance is not only increasing the rural financial infrastructure construction, the rural deposits and loans, what's more, we should base on actual situation of the rural development, constant innovate rural financial products and financial services, enhance financial service quality to meet the diversified financial needs of the rural. (3) Set up the rural capital backflow mechanism, strengthen the efficiency in support. Fully arouse the enthusiasm of various levels financial institutions loaning to countryside, increase the financial support on the rural economy. The government can take financial subsidies to positively direct funds into the rural so that forming a standardized rural financial support system.

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Table 1. ADF unit root test results

Variable	Test Type	ADF Value	5% Critical Value	Conclusion
FR	(C,L,1)	-1.654752	-3.568379	Non-stationary
ΔFR	(C,L,0)	-8.757577	-3.568379	Stationary
RFIR	(C,0,0)	-1.429019	-2.960411	Non-stationary
ΔRFIR	(C,L,1)	-5.466872	-3.574244	Stationary
RFS	(C,L,0)	-2.622662	-3.562882	Non-stationary
ΔRFS	(C,L,0)	-6.058406	-3.568379	Stationary
RLD	(C,L,2)	-3.211246	-3.574244	Non-stationary
ΔRLD	(C,L,0)	-3.916436	-3.568379	Stationary
RFI	(C,L,0)	-1.700086	-3.562882	Non-stationary
ΔRFI	(0,0,0)	-2.025351	-1.610211	Stationary

Table 2. Johansen cointegration test results (1978-2010)

Hypothesized NO. of CE(s)	Eigenvalue	Trace Statistic	5% Critical Value	Conclusion
None	0.663223	92.97682	88.80380	Refuse
At most 1	0.534469	65.32677	63.87610	Refuse
At most 2	0.476411	37.38951	42.91525	Accept
At most 3	0.294086	17.97804	25.87211	Accept
At most 4	0.221982	7.530178	12.51798	Accept

Table 3. Granger causality test results

Variable	Null Hypothesis	Lag Length	Obs	F-statistic	Prob.
RFIR	RFIR does not Granger Cause FR	1	33	0.03463	0.8537
	FR does not Granger Cause RFIR	1	33	7.61675	0.0101
RFS	RFS does not Granger Cause FR	1	33	0.29028	0.5943
	FR does not Granger Cause RFS	1	33	2.07735	0.1606
RLD	RLD does not Granger Cause FR	1	33	2.00265	0.1941
	FR does not Granger Cause RLD	1	33	2.81769	0.1044
RFI	RFI does not Granger Cause FR	1	33	0.68125	0.4161
	FR does not Granger Cause RFI	1	33	3.73868	0.0633