

The Analysis of Sustainable Development Capacity of Regional Differences in Chinese Rural Credit Cooperatives Based on Panel Data Model

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Abstract: We analyzed the sustainable development of China's rural credit cooperatives in each region by constructing a panel data model, which constructed regional indicators of sustainable development of rural credit cooperatives, And we analyzed various indicators which led role in the development of rural credit cooperatives of difference factors in the meantime changed in the time factors which affected to differences of the sustainable development of rural credit cooperatives. Number of rural credit cooperatives come on profitable growth in rural credit cooperatives play an important role, We draw the number of rural credit of rural credit cooperatives which played an important role to profit growth This shows that the main business of lending is still mainly rural credit cooperatives, which mainly concerned loans for farmers. So less active of the sustainable development of the region should learn experiences and approaches which the capability of sustainable development are strong in some regionals combined with the actual situation to improve their capacity for sustainable development.

Introduction

In rural areas, Private banks expanded market segmentation competition with rural credit cooperatives with policy changes and technological advances as well as the gradual opening up of the financial markets which the banking industry reduced to barriers to entry to gradually, so that the rural credit cooperatives that monopoly of the business structure in the rural financial market were broken. The face of competition, the sustainable development of rural credit cooperatives and regional differences are particularly important. The researches of rural credit cooperatives were in rural areas as a whole that ignored the difference which could not reflect regional differences between the region. the paper depth studies of the regional differences of the rural credit cooperatives sustainable development.

For regional differences in sustainable development for rural credit cooperatives, the most of the articles were usually cross-sectional data to study the development of rural credit cooperatives, and there is no panel data to study the regional differences of the rural credit cooperatives and regional development areas factors which could not reflect the changes in the characteristics of each region. Panel data model in this paper is not only analyze the differences in a certain period of the provinces of rural credit cooperatives sustainable development and time factors are also taken into account; panel data model is able to distinguish between the development of the provincial rural credit cooperatives individual differences.

The Analysis of sustainable development of regional differences in rural credit cooperatives

The general form of the panel data model

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$$y_{it} = \alpha_{it} + \sum_{k=1}^p \beta_{kit} x_{kit} + \mu_{it} \quad (i = 1, 2, \dots, n; t = 1, 2, \dots, T)$$

Including y_{it} is the dependent variable which is i cross-section of individuals in the t observations; α_{it} is i cross-section of individuals in the t Intercept; β_{kit} is to be estimated k explanatory variable corresponding to t coefficient of i of the cross-section of individuals; n is the number of cross-section of individuals, T is the individual timing sample size of each cross-section; p is the number of explanatory variables; $\mu_{it} : IID(0, \delta^2)$ is the random disturbance term.

Identification of the model form

Variable coefficients panel data model and variable intercept model is divided into two types of determined and random effects model, which respectively has the method of different estimates the parameters. Hausman in 1978 advanced effects model test, including the null hypothesis and alternative hypothesis:

H_0 : suitable for the establishment of the random effects model

H_1 : suitable for the establishment to determine effects model

Which determine the effect of model parameter is $\hat{\beta}_F$, the parameter of the random effects model is $\hat{\beta}_R$, If the data is suitable for random effects model, $\hat{\beta}_F$ and $\hat{\beta}_R$ are consistent estimators which the difference between the two is very small; If the data is suitable for determining the effects model, the $\hat{\beta}_F$ is a consistent estimator, and $\hat{\beta}_R$ is not which has a great difference between the two. So if both estimates the difference is small, accept H_0 , or accept H_1 . Hausman test statistic:

$$H = \frac{(\hat{\beta}_F - \hat{\beta}_R)^2}{\left[Se(\hat{\beta}_F)\right]^2 - \left[Se(\hat{\beta}_R)\right]^2} : \chi_{0.05}^2(p)$$

Where in p is the number of explanatory variables in the model. The establishment of the H_0 , r degrees of freedom of p the test statistic χ^2 distribution.

And for determining the coefficients α and β of the specific form, which can be configured covariance statistics F to identify the model, the following two assumptions test:

$$H_{02} : \alpha_1 \neq \alpha_2 \neq \dots \neq \alpha_n, \beta_1 = \beta_2 = \dots = \beta_n$$

$$H_{03} : \alpha_1 = \alpha_2 = \dots = \alpha_n, \beta_1 = \beta_2 = \dots = \beta_n$$

If H_{03} was accepted, the sample data were consistent with constant coefficient model, which didn't require the next test, if H_{03} was rejected, they would have to test the hypothesis H_{02} , if H_{02} was accepted, the sample data were consistent with variable intercept model, otherwise the data would be considered in line with variable coefficients models.

According to H_{02} and H_{03} the assumptions which could be constructed as follows statistics F_2 and F_3 :

$$F_2 = \frac{(ES_2 - ES_1) / [(n-1)p]}{ES_1 / [nT - n(p+1)]} : F(f_1, f_2) = F((n-1)p, n(T-p-1))$$

If the value of the statistic F_2 was not less than the critical value for a given level of significance, the hypothesis was rejected, then the sample suitable for variable coefficient model, or else it was given and accepted the assumption, then the sample data suitable for the establishment of variable intercept model.

$$F_3 = \frac{(ES_3 - ES_1) / [(n-1)(p+1)]}{ES_1 / [nT - n(p+1)]} : F(f_1, f_2) = F((n-1)(p+1), n(T-p-1))$$

If the value of the statistic F_3 was not less than the critical value for a given level of significance,

the hypothesis H_{03} was rejected, we would continue to test the hypothesis H_{02} ; otherwise accepted the assumption H_{03} that the sample was suitable to establish constant coefficient models.

Index selection and set of panel data model

Sustainable developments of rural credit cooperatives influenced by their profits, input elements, output elements and risk variable, which explanatory variable is the total profit y , explanatory variables were input factors, the output to table and risk variable. which Input factors were labor costs x_1 (employee wages and benefits and training costs), net fixed assets x_2 ; output elements are loans x_3 (the total loans in the year), deposits x_4 (the total deposits in the year) and non-interest income x_5 (the total non-interest income in the year); risk variables for non-performing loans x_6 (the total non-performing loans in the year). Taking all these factors, available to the following functions::

$$y = f(x_1, x_2, x_3, x_4, x_5, x_6)$$

In order to eliminate the heteroscedasticity, the data changes in the logarithm (ln). The specific form of the model is:

$$\ln y_{it} = \alpha_{it} + \beta_{1it} \ln x_{1it} + \beta_{2it} \ln x_{2it} + \beta_{3it} \ln x_{3it} + \beta_{4it} \ln x_{4it} + \beta_{5it} \ln x_{5it} + \beta_{6it} \ln x_{6it} + \mu_{it}$$

which y_{it} is the total profits of i provinces of rural credit cooperatives in period t , this indicator represents the level of development of the rural credit cooperatives; x_{1it} is the i provinces in the t of the rural credit cooperatives workers wages and benefits and training cost; x_{2it} is t of rural credit cooperatives for the i provinces in net fixed assets; x_{3it} is the provinces i in period t the rural credit cooperatives total loans; x_{4it} is total deposits of the provinces i in period t , x_{5it} is i provinces total non-interest income in the period t ; x_{6it} is total non-performing loans of rural credit cooperatives i provinces in period t ; β_{1it} is measure that in i province labor costs impact the total profits of the rural credit cooperatives in period t ; β_{2it} is measure that in i province net fixed assets impact the total profits of the rural credit cooperatives in period t ; β_{3it} is measure that in i province loans impact the total profits of the rural credit cooperatives in period t ; β_{4it} is measure that in i province deposits impact the total profits of the rural credit cooperatives in period t ; β_{5it} is measure that in i province non-interest income impacts the total profits of the rural credit cooperatives in period t ; β_{6it} is measure that in i province risk variables for non-performing loans impact the total profits of the rural credit cooperatives in period t , μ_{it} is random disturbance.

Description of the data

The data comes from the 2007 to 2014 calendar year Financial Statistics Yearbook and China Statistical Yearbook, in the meantime Some Statistical Yearbook statistical standards are not uniformed which are collated and calculated.

Empirical Analysis of the regional differences of the rural credit cooperatives sustainable development

Hausman effects model test results are as follows:

Table 1 panel data model Hausman test results

Test Summary	Chi-Sq. Statisti Prob.	Chi-Sq. d.f
Cross-section random	41.325613 0.0000	3
Period random	40.365941 0.0000	3
Cross-section and Period random	40.963251 0.0000	3

The model at the 1% level of significance rejected the null hypothesis of random effects model, so we may use determine effects model. Determining the effect model can be F test, the test results are as follows: calculating results are as follows:

$ES_1 = 1.035, ES_2 = 3.967, ES_3 = 3.423$ calculating results are as follows $F_2 = 0.48794, F_3 = 0.34059$, at the 1% level of significance, checked F distribution table has:

$F_{2\alpha}(0.99, 210, 31) = 0.952, F_{3\alpha}(0.99, 180, 31) = 0.0985$, because of $F_3 > F_{3\alpha}$, then reject the hypothesis H_{03} , because of $F_2 < F_{2\alpha}$ then accept the hypothesis H_{02} , we should select to determine the effect of variable intercept model. In order to reflect the impact of time on the rural credit cooperatives, this model added to the individual period of constant γ_t , the expression of model is:

$$\begin{aligned} \ln y_{it} = & 0.3256 + \alpha_i^* + \gamma_t + 0.00359 \ln x_{1it} - 0.09721 \ln x_{2it} \\ & (1.8561) \quad (0.5642) \quad (-1.4256) \\ & + 0.01326 \ln x_{3it} + 0.0091 \ln x_{4it} + 0.0076 \ln x_{5it} - 0.0063 \ln x_{6it} + \mu_{it} \\ & (1.0023) \quad (0.9031) \quad (0.8136) \quad (-0.7132) \end{aligned} \quad (1)$$

$F = 81.9621$, so model has passed the test of significance, $R^2 = 0.8169$, so fitting is high, $DW = 1.9421$, the residuals of the model there is no autocorrelation, the coefficients of the model passed the test. from the coefficients, the total loans is an important factor affecting the total profits of the various regions of the rural credit cooperatives, followed by the total deposits of each of the various regions of the rural credit cooperatives and next is non-Interest income, the smallest of the degree of influence is employee wages and benefits and training costs; net fixed assets and non-

performing loans of rural credit cooperatives with the total profit is an inverse relationship. α_i^* is i the rural credit cooperatives in the profit level of the deviation with the level of development of the rural credit which reacts regional differences of sustainable development of

the rural credit cooperatives. $\sum_{i=1}^n \alpha_i^* = 0$. the estimated results of α_i^* are shown in Table 2:

**Table 2 rural credit cooperatives sustainable development
of regional differences α_i^* of the results**

N0.	region	estimated value	N0.	region	estimated value	N0.	region	estimated value
1	Beijing	0.20253	12	Anhui	0.03666	23	Sichuan	0.19068
2	Tianjin	0.19487	13	Fujian	0.52110	24	Guizhou	0.11019
3	Hebei	0.22496	14	Jiangxi	0.03772	25	Yunnan	-0.06901
4	Shanxi	0.16808	15	Shandong	1.82135	26	Xizang	-6.22128
5	Nei meng	-1.80596	16	Henan	-1.22272	27	Shanxi	0.13024
6	Liao ning	0.60795	17	Hubei	2.06135	28	Gansu	-0.03529
7	Jilin	-1.50993	18	Hunan	0.13048	29	Qinghai	-2.32224
8	Heilongjiang	0.64184	19	Guangdong	1.06788	30	Ningxia	-3.79643
9	Shanghai	0.75030	20	Guangxi	-0.31202	31	Xinjiang	-0.12724
10	Jiangsu	1.26987	21	Hainan	-1.68284			
11	Zhejiang	8.66141	22	Chongqing	0.27119			

the value of α_i^* of the region is the higher this region ,deviated from the basic level of development of the rural credit cooperatives is the farther, the level of development of this region's rural credit cooperatives is the higher, the sustainable development is the greater; the value of the region is the higher this region ,deviated from the basic level of development of the rural credit cooperatives is the farther, the level of development of this region's rural credit cooperatives is the higher, the sustainable development is the greater;

As can be seen from Table 2 is the degree of deviation the Zhejiang (8.66141), followed by Hubei (2.06135), Shandong (1.82135) the Guangdong (1.06788), sustainable development is relatively weakest Xizang(-6.22128). Rural credit cooperatives in Zhejiang service coverage and the number of agencies which service "three rural" and small and medium-sized enterprises; In Hubei Province, rural credit cooperatives promote the construction of the "four modernizations" and outstanding service "three rural" direction and increase the variety of innovative services.

Conclusion

Through the above analysis, the following conclusions:

(1) From a national perspective, the number of loans is an important factor affecting the development of rural credit cooperatives.

From equation (1) we can see that the number of loans of rural credit cooperatives play an important role in the profitable growth of rural credit cooperatives, which the main activities of the rural credit cooperatives are still loans mainly which farmers loans relating to the business. The number of non-performing loans of rural credit cooperatives profits has less affected that indicates a declining trend in non-performing loans of rural credit cooperatives, so it is visible that the reform is success, Employee benefits and training costs with the profits of the rural credit cooperatives is positive that employee benefits and training costs for each additional 1% , the profits of the rural credit cooperatives is increase 0.00359%. This also explains the increase in workers' wages and benefits which the staff of the rural credit cooperatives have higher positive to feel at ease in their own work, so this can improve service levels, in the meantime increase in training costs which cultural level and quality of the staff of the rural credit cooperatives has the corresponding improve ,so that the level of profitability of rural credit cooperatives has a positive role in promoting.

(2) there is the significant differences of sustainable development of rural credit cooperatives in the provinces.

The reason why there is such a sustainable development reasons for the differences is that different from each province the development of the rural credit cooperatives, rural credit cooperatives in Zhejiang Province, the sustainable development of strong mainly because the local government policy support play a significant role, and Hubei rural credit the community owns financial innovation diverse, and so on. Innovation is

the core driving force of development of rural credit cooperatives, which strengthen the institutional innovation, business innovation, service innovation, to enhance the overall competitiveness of rural credit cooperatives to service rural .

In the meantime sustainable development of the weaker areas should take the initiative to learn the experience and methods of the region with a strong sustainable development which combine with their own actual situation to improve competitiveness.

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