Study on the Hierarchical Difference among Credit of Rural Household, Fiscal Expenditure and Farmers' Income Growth in Counties of China

Wen Tao[1], Wang Xiaohua[1], Wang Dingxiang[1], Wang Yuyu[2], Yi Hongpan[3]
[1] Southwest University, Chongqing 400715, China
[2] Southwest University of Political Science and Law, Chongqing 401120, China
[3] Chongqing Academy for Economic Research, Chongqing 401147, China
Corresponding author: Wang Dingxiang, e-mail: wdx6188@126.com

Abstracts

In this article, using the county-sectional data of 2,037 counties in 30 provinces in China in 2010 and the method of quantile regression, we analysis the influencing factors empirically which have effect farmers' income from Chinese county range. The results show that: firstly, the farmers credit elastic coefficient in the lowest quantile point of QR_10 is significantly negative, and they are significantly positive in QR_50 and QR_90, but not remarkable in QR_25 and QR_75 which are positive, meanwhile, along with conditions changed in distribution from low to high, the elastic coefficient was gradually reduced after the first rapid increase; Secondly, in terms of fiscal expenditures, except for the quantile point of QR_90 which shows a significant positive correlation between farmers' income and county budget expenditures, the correlation between counties' budget expenditures and other quantile points of farmers' income is significant negative, at the same time, the elastic coefficient performance feature of the "J" shaped curve, along with conditions changed in distribution from low to high.

Keywords: Quantile regression, credit of rural household, fiscal expenditures, farmers' income

1. Introduction

The county economy is the economy of the agriculture, the rural to be the mainstay. It is not only an important part, but also the basic running unit of national economy. Currently, county economic development has become the weakest link in China's economic development, along with regional county economic development also not being balanced, and thus has become the most important regulation object of national economic policies. The nature of county economic development is to improve the livelihood of people, and the primary safeguard of livelihood improvement is undoubtedly to promote rapid and stable growth of farmers' income. Of it the capital formation and accumulation is critical to eliminate the county economic disadvantages. So to increase farmers' loans and financial input has become an indispensable strategic measure for developing countries to promote rural economic development and farmers' income level. According to estimation, since the late 90s of last century, the average annual funds flowing from the rural to the city through various channels of financial institutions reaches about 1 trillion yuan, and in each county the average annual outflow funds is more than 300 million yuan. Nowadays the rate of outflow of rural funds is not significantly reduced. An important reason is that the financial system leaded by large-scale state-owned commercial banks is an urban, industrial and commercial oriented financial system, a big business, big project, big customer oriented agent system, making loan to farmers and township enterprises hard for a long time. Therefore, by farmers' credit funds stimulus and financial funds induce, county economic development urgently needs to change the capital allocation pattern by industrial and agricultural price scissors making the rural funds flow back to the city, though financial institutions absorbing the rural funds to the city, and thus to

realize stable growth of farmers' income.

In the mid-20th century, Hasody had put forth a typical perspective that to improve farmers' income level should develop governments and organize loans to farmers as most of them belong to small ones. Since then a large number of economists have analyzed the positive role of agriculture loans, farmers loans and financial expenditure in agricultural development, rural development of developing countries (Nurkse,1953; Gonzalea-Vega,1984; Bencivenga and Smith,1991; Munnel,1992; Darrat,1999). Some studies have discussed the mechanism that governments promote rural development by financial and fiscal instruments (Hayami and Ruttan,1985; Barro,1992; Tatom,1993; Gramlich,1994; Garcia-Mila,1996). Recently, many scholars have thought that accelerating the development of rural finance and increasing agricultural, rural investment will help improve farmers' income and reduce poverty (Matin et al.,2002; Fan et al.,2008; Jayne and Boughton,2011). Well, does the current county farmers credit and financial expenditure have become a key factor for the growth of farmers' income in China? If not, how to sound fiscal and financial supporting system to strengthen agriculture and benefit farmers, promoting credit resources and financial funds reasonably to be configured to rural areas and changing the pattern of long-term urban and rural financial resources distorted configuration? These are the problems to be solved urgently in China's current county economic development.

2. **Variables、Research methods and Model**

2.1 **Variables**

The variable that involved in the paper include: rural per capita net income; credit of Rural Household; budget expenditures; fixed asset investment in rural; rural employment rate; industrial structure; total power of agricultural machinery; food output and meat output. The variable in the paper are not displayed in total level value but in average level value, this measure can eliminate the effect of population gross and also its structure.at the same time, to get rid of the heteroscedasticity, muliticollinearity that might be existed, we do log processing on the data. The definition, code and measure method of variables are showed in the table 1.

Table 1 the definition and measure method of variables

Variables	Code	Measure method of variables
rural per capita net income	FR	rural per capita net income in Counties
Credit of Rural Household	LOAN	Farmers' loan balance in countries at the end of the year / the number of rural laborers
Budget expenditures	FISCAL	Countries' general budget expenditures of the local finance / total counties' population
Fixed asset investment in rural	INVEST	(Total investment in fixed asset in rural areas - investment in fixed assets in urban areas) / the number of rural laborers
Rural employment rate	REMP	（the number of rural Laborers / total population in counties）*100%
Industrial structure	STRU	（The gross output of primary industry/GDP）*100%
total power of agricultural machinery	POWER	Total agricultural machinery power in countries/ the number of rural laborers
Food Output	FOOD	Total countries grain output / the number of rural laborers
Meat Output	MEAT	Total countries meat output / the number of rural laborers

The data of credit of rural household in the paper are come from The China banking regulatory commission website （ http://www.cbrc.gov.cn/ index.html ） ,the rural financial service section.the atlas compile the 31provinces,2861counties of the basic economic and financial data,its fully reflects the coverage situation and distribution of banking's business network ,deposits and loans in each city area of the city and county. The data of other variable are county units main statistical indicators from 《China's

regional economic statistical yearbook》(2011) ,《China County (city) social economic statistical yearbook》(2011),to ensure the original data that the empirical analysis used completeness and comparability, the paper has cleaned all the data, and have get rid of singular data, abridge missing data or interpolation, for other variables section missing data, we use 2010 China's rural financial services atlas data that come from the China banking regulatory commission official website to interpolate, Finally we collected 2010 China 30 provinces (except Shanghai) 2037 counties (cities) of the basic economic and financial data. The descriptive statistical results of the variables used in empirical analysis are shown in table 2.

Table 2 The descriptive statistical of the variables used in empirical analysis

code	obs	mean	Std.Dev	Min	Max	Skewness	Kurtosis
FINC	2037	8.5500	0.4379	6.5367	9.9081	-0.2500	3.2298
LOAN	2037	7.8914	2.0228	-0.7441	13.118	-3.0474	12.427
FISCAL	2037	8.1152	0.5692	6.5975	10.579	0.8791	4.2584
INVEST	2037	7.9605	2.3784	-0.3488	14.707	-2.117	7.8668
REMP	2037	3.9710	0.2916	-0.6342	4.6137	-9.4875	124.20
STRU	2037	2.9321	0.6901	-2.8917	4.3787	-1.4459	7.3887
POWER	2037	0.5092	0.7876	-2.8965	5.7959	0.3127	4.8682
FOOD	2037	6.8330	1.1370	-2.3461	11.868	-2.5994	18.282
MEAT	2037	5.0756	0.7917	-3.2182	9.3849	-.12418	6.5528

Note: all the data in table 1 are calculated by STATA12.0

2.2 **Research methods**

Because the parameter of the OLS regression is the marginal effect that the independent variable has on the dependent variable's conditional expectation, The decomposition results can only describe the concept of "average", So we can not consider different effects of peasant household credit and fiscal expenditure when the farmers' income distribution are in different interval. while,compare with OLS regression, QR regression can select any quantile for parameter estimation. Therefore, this paper uses quantile regression method, aim to examine the difference that the county farmers' income distribution in different locations is affected by factors such as farmer credit and fiscal spending.

QR regression was first raised by Koenker and Bassett （1978）, In theory, QR regression is a kind of regression methods based on the conditional distribution of variable y linear function that fitting the independent variable x, is a extension on OLS regression. In the different levels of quantile, we can get different quantile functions. With quantile values from 0 to 1, we can get all y's distribution of path on the conditional of x, that is a bunch of curves and rather than OLS method only to get a curve.so ,when you want to do some research on the data points that in different locations in a collection of data, it's a good choice to choose QR regression. The following is a brief introduction of the quantile regression method.

Assumes that the general q quantile $y_q(x)$ of the conditional distribution $y|x$ is the linear function of x.that is

$$y_q(x_i) = x_i'\beta_q \qquad (1)$$

Among them, β_q is called the coefficient of quantile regression, and estimator $\hat{\beta}_q$ can be defined with the following minimization problem:

$$\min_{\beta_q} \sum_{i:y_i \geq x_i'\beta_q}^{n} q\left|y_i - x_i'\beta_q\right| + \sum_{i:y_i < x_i'\beta_q}^{n} (1-q)\left|y_i - x_i'\beta_q\right| \qquad (2)$$

If $q = 0.5$， that means Median Regression, at this time the objective function can be simplified to:

$$\min_{\beta_q} \sum_{i=1}^{2} \left| y_i - x_i' \beta \right| \qquad (3)$$

Clearly，Quantile regression is better than the mean regression (OLS)for it is not easily affected by extreme value， So the result is more robust。When examining factors affecting farmers' different income levels, using QR regression method can lead us to find the effect on direction, size and trend when in conditional distribution on different position.

2.3 Model

A theoretical model[①] of fiscal and financial supports for agriculture is established:

$$FINC_i = \beta_0 + \beta_1 Fiscal_i + \beta_2 Loan_i + \beta_3 Investi + \Theta CON + \mu_i \qquad (4)$$

FINC is the indicator of rural economic development, *Fiscal* and *Loan* reflect the fiscal and financial supports for agriculture respectively, *Invest* is the indicator of farmer-owned financial input and *CON* is the appropriate controlling variables, i represents for region, μ_i stands for random interference items.

3. Empirical analysis of the results

Because each quantile is able to describe the situation of income distribution to the full, and it makes it visual to show the marginal returns of the various elements at the different income levels when the quantiles of income distribution act as explained variables, we will use STATA12.0 Software to finish empirical analysis in this article. This will be more clearly to reflect farmers' loans and fiscal expenditures, as well as other factors impact on farmers' income under different quantiles conditions. According to Zhang and xue' practices (2008), we will also select the five representative quantile, namely QR_10, QR_25, QR_50, QR_75 and QR_90.

Table 3 Factors affecting farmers' income quantile regression results

The explained variable :FINC						
	OLS	**QR_10**	**QR_25**	**QR_50**	**QR_75**	**QR_90**
LOAN	.0103593 (0.014)**	-.010718 (0.083)**	.0001562 (0.963)	.0136725 (0.002)***	.0096903 (0.156)	.0156423 (0.009)***
FISCAL	-.1320402 (0.000)***	-.2658183 (0.000)***	-.2732792 (0.000)***	-.2116771 (0.000)***	-.0750703 (0.002)***	.0882024 (0.004)***
INVEST	.0110747 (0.002)***	.0286394 (0.001)***	.0168095 (0.006)***	.0102376 (0.011)**	.0058671 (0.220)	.0012019 (0.845)
FOOD	.0093504 (0.300)	.042713 (0.232)	.0321882 (0.128)	.0261301 (0.009)***	.0234 (0.074)*	.0302848 (0.183)
MEAT	.1375043 (0.000)***	.1946796 (0.000)***	.2092494 (0.000)***	.1992406 (0.000)***	.1106353 (0.000)***	.0282844 (0.152)
REMP	.2752819 (0.000)***	.5704841 (0.000)***	.3278514 (0.000)***	.2205933 (0.000)**	.1826581 (0.001)***	.1656005 (0.086)*
POWER	.0693335 (0.000)***	.0992098 (0.001)***	.0816964 (0.000)***	.0571873 (0.000)***	.0379018 (0.010)**	.0526524 (0.015)**
STRU	-.2984588 (0.000)***	-.2981936 (0.000)***	-.3147905 (0.000)***	-.338198 (0.000)***	-.3010267 (0.000)***	-.26202 (0.000)***
C	7.958438 (0.000)***	6.731874 (0.000)***	8.140477 (0.000)***	8.580166 (0.000)***	8.418659 (0.000)***	7.518477 (0.000)***
Pseudo R^2	——	0.2908	0.3386	0.3192	0.2676	0.2854
Adj R^2	0.4033	——				
F value	108.34***					

Notes：“*”、“**”、“***” respectively stand for 10%, 5% and 1% significance level，and the value inside parentheses represent P values.

According to Table 3 and Figure 1 , the following conclusions can be obtained: (1)Farmers' credit elastic coefficient in the QR_10 sub-sites is significantly negative, not significant in the QR_25 and QR_75, but in the QR_50 and QR_90 are

[①]Due to space limitations， this article has omitted the derivation process of the theoretical model. If readers are interested in this ， please be obtained from the author. Contact details are as follows：Wang Xiaohua，E-mail: 55693028@163.com

significantly positive, and with conditional distribution from low-end to high-end movements. The elastic coefficient is gradually reduced after the rapid increase trend (as shown in Figure 1). In QR_10, QR_25, QR_50, QR_75 and QR_90 sub-sites, the elasticity values are -0.01072, 0.000156, 0.01367, 0.00969 and 0.015642.Our conclusion illustrates very well the farmers at different income stages might face different capital constraints, resulting in different income level of farmers affected by farmers' loans are significantly different.(2)In addition to the 90% quantile of the farmers' income and the counties' budget expenditures is a significant positive correlation , counties' budget expenditures have a marked inhibitory effect in other sub-median level of the farmers' income and with the conditional distribution from low-end to high-end movements, and its elasticity coefficient is "J" shape curve changes (as shown in Figure 1). This result demonstrates that for China's rural areas, the farmers with lower income are more difficult to achieve its revenue growth by government's fiscal expenditures.(3)Rural employment rate and the elasticity coefficient of the total power of agricultural machinery at the various percentiles are significantly positive. With the conditional distribution from low-end to high-end movements, rural employment elasticity is on a decreasing trend and the elasticity coefficient of the total power of agricultural machinery shows a trend of decreases and then increases.(4)The elasticties of the fixed asset investment in rural areas, food production and meat production in the study of various sub-sites are at positive. The elasticity coefficient of the rural fixed assets investment only in the top three percentile are significant and changes in distribution from low to high, the coefficient is progressively decreasing (as shown in Figure 1). The elasticity coefficient of food production in QR_50 and QR_75 two sub-sites show significant and as conditions change from low to high, the coefficient is progressively decreasing (except for the QR_90 quantile). The elasticity of the meat production at all the percentiles is significant except the QR_90, and presents the trend of the inverted "J" shaped curve with conditions change from low to high.(5)The elasticity coefficient of industrial structure (the proportion of primary industry) at the various percentiles are significantly negative and the elasticity coefficient presents "U" shaped curve.

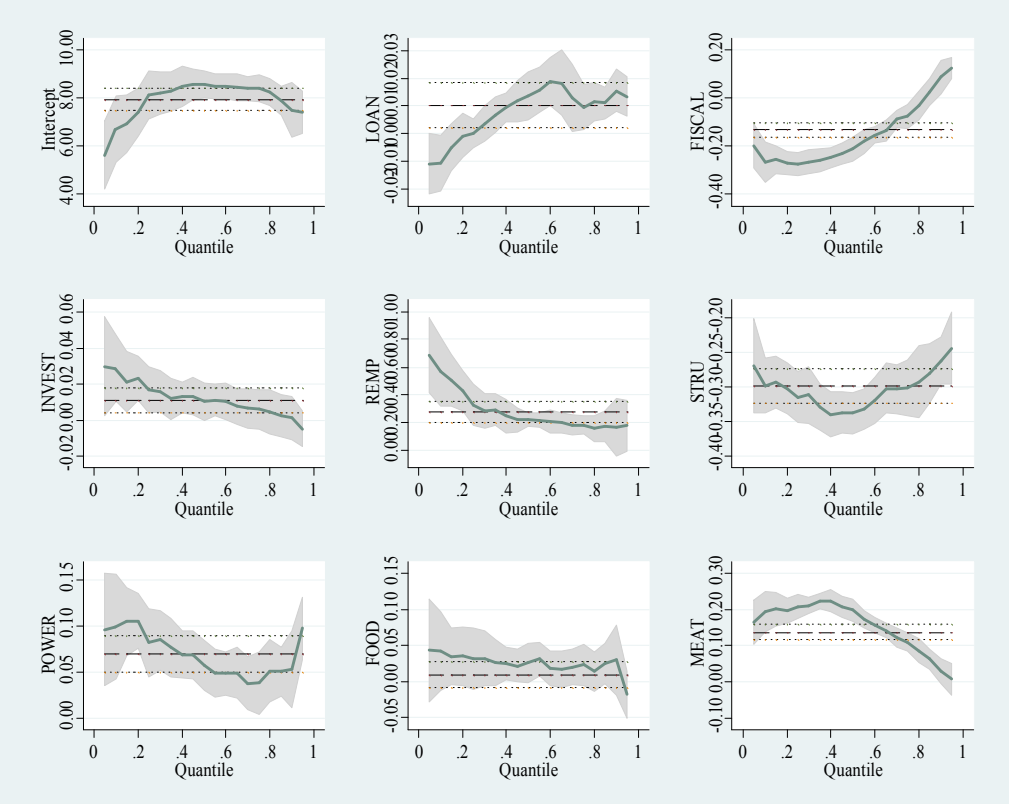

Figure 1: The changes of explanatory variables and the coefficients of the constant term in quantile regressions

The conclusions tell us that the economic gains which is made by increasing the investment in farmers' credit (this paper refers to the county farmers' income levels increase) is not necessarily a low. This paper argues that financial institutions will make a difference in accelerating the development of the county economy and improves farmers' income level. In addition, for the different income levels of farmers, their financial supply should also be different: at the lowest income group stage and the stage of low and middle income, country-led policy loans to rural households would have an active role; at the medium and high income stage, reasonable loans, policy-oriented as well as some commercial farmers' loans could play an active role; at the highest income stage, its capital supply mainly comes from formal commercial financial institutions.

4. Conclusions

Theoretically, the county government can be moderate to rural configuration of the limited financial and credit resources through policy guidance expand the capital supply for rural economic development, thereby driving rapid growth in farmers' income. In this article, using the county-sectional data of 2,037 counties in 30 provinces in China in 2010 and the method of quantile regression, we analysis the influencing factors empirically which have effect farmers' income from Chinese county range. The results show that:

Firstly, the farmers credit elastic coefficient in the lowest quantile point of QR_10 is significantly negative, and they are significantly positive in QR_50 and QR_90, but not remarkable in QR_25 and QR_75 which are positive, meanwhile, along with conditions changed in distribution from low to high, the elastic coefficient was gradually reduced after the first rapid increase; Secondly, in terms of fiscal expenditures, except for the quantile point of QR_90 which shows a significant positive correlation between farmers' income and county budget expenditures, the correlation between counties' budget expenditures and other quantile points of farmers' income is significant negative, at the same time, the elastic coefficient performance feature of the "J" shaped curve, along with conditions changed in distribution from low to high. Moreover, the first three coefficient of rural fixed assets investment quantile are significantly positive, the latter two are positive but not significant and along with conditions changed in distribution from low to high, the elastic coefficient showed a progressively decreasing trend. The results indicate that the farmers' credit, financial expenditure in counties and rural fixed assets investment has hierarchical differences on farmers' income. It means that farmers with higher income are easier to get the support from credits for rural households and financial funds. Although the farmers with lower income would fall into the dilemma of "poverty vicious cycle" owing to the lack of financial and credit supports and their own capital accumulations inadequate, there is no doubt that it is beneficial to increase farmers' income by enlarging the rural investment in fixed assets.

References[②]

Barro, R.J., X.Sala.I.Martin. (1992) "Public Finance in Models of Economic Growth," *Review of Economic Studies*, 59, 645-661.

Bencivenga,V.R.,Smith,B,D.(1991) "Financial Intermediation and Endogenous Growth," *Review of Economic Studies*, 2,195-209.

Darrat,A. (1999) "Are financial deepening and economic causally related? Another look at the evidence," *International Economic Journal*, 13, 19-35.

Fan Shenggen.,Johnson Michael.,Saurkar Anuja. and Makombe Tsitsi.(2008) " Investing in African Agriculture to halve poverty by 2015," *IFPRI Discussion Paper00751.*

[②] Due to space limitations, We are very sorry for failing to list all the references.