

## Influence of Degree of Restriction on Widening Channels of Increasing Farmers' Income: Example from Leshan City in Sichuan Province

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### Abstract

China serves as a typical agricultural country and its agricultural population plays a leading role, so it is absolutely necessary to solve its farmers' income problems timely as in many other agricultural countries. In this paper, a proper quantitative analysis of this problem was done to lay out both the causes and a set of affordable solutions. Firstly, rational evaluation indexes which can represent the essence of farmers' income problems were summarized, analyzing their influence on widening channels of increasing farmers' income qualitatively. Next, to reflect the influence of the degree of restriction on widening channels of increasing farmers' income, a predicting model was constructed by using multivariate-linear regression, adopting backward-elimination analysis and integrating with Eviews3.0. Moreover, the model showed that urbanization level, scale of agricultural production and degree of putting value on supporting agriculture in finance were closely linked with farmers' income in Leshan city. However, urbanization level was the most significant factor. If the urbanization rate raised 1% in Leshan city, its rural per capita net income can increase 51-yuan. So raising urbanization rate can be a long-term goal for increasing farmers' income in many underdeveloped areas.

**Key words:** Quantitative analysis; Rural per capita net income; Multivariate-linear regression; Urbanization rate

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### INTRODUCTION

Increasing farmers' income is a global problem (Alexander Downer, 2000). However, the land resources are relatively abundant in the western countries but the labor resources are reversely sufficient in China. Therefore, China has to seek its personalized solutions. Especially, in year 2011, for the year is a bureau year of Chinese twelfth "Five-Year Plan" (2011~2015). And the new "Five-Year Plan" definitely points out that to speed up the process of constructing a new socialist countryside, the channels of increasing farmers' income need to be broadened continually. Meanwhile, to guarantee farmers a steady income, the channels of increasing farmers' income also need to be widened endlessly, establishing a long-term and timely mechanism (CHEN, LIU, 2007). And the effect of widening channels of increasing farmers' income can well and truly measure rural economic development, it can directly affect agricultural input, output and markets simultaneously in the coming year. In addition, it can also stimulate the national economy and its social development (ZHANG, WANG, ZHANG, ZHANG, 2010). Therefore, widening channels of increasing farmers' income should be regarded as a essential jumping-off place of developing agriculture and rural economy at present. Furthermore, Leshan is an emblematic western city and its rural per capita net income stands on the head of the rest of approximately 200 western cities, but the gap between the level in Leshan city and the national average is widening. Hence, there is a pressing need for researching farmers' income problems quantitatively in Leshan city, and we should find out the relationship between farmers' income

and its restriction factors to help with formulating policy in Leshan city and other similar western cities.

## 1. CONSTRAINTS ON WIDENING CHANNELS OF INCREASING FARMERS' INCOME IN LESHAN CITY

There are many constraints on widening channels of increasing farmers' income in Leshan city, and they can be summarized as follows. Firstly, the infrastructure at small town has lagged behind apparently. For example, the urbanization rate in Leshan city is only 38.3% in 2008, but it has come to 93.1% in Beijing at the same time. Secondly, the advantage of tourism resources has not been transformed into the advantage of economy at maximum capacity in Leshan city. And sightseeing is the major tourism product, lack of change. Meanwhile, the mutual-support relationships between tourism resources and cities around have not been established, so the tourists generally go to the scenic spots directly and visit in a hurry (CHEN, ZHENG, 2008). Thirdly, there are many surplus laborers in rural areas in Leshan city. Most of the rural surplus laborers, especially the mid-aged ones, whose education level is on the low side, and tends to be conservative; those people are at inferior positions in employment competitiveness outwards, and the channels of transferring employment inwards are comparatively narrow since rural second and third industries progresses there are backward, which lead large amounts of unemployment (XIAO, 2009). Fourthly, the level of deep processing industry for agricultural products is low. For example, the rate of deep processing industry for agricultural products in Leshan city is only 43% in 2007, but that in the developed countries in the same period is over 70% basically.

## 2. CONSTRUCTION OF REGRESSION MODEL

### 2.1 Evaluation Indexes and Research Methods

Y: Effect of widening channels of increasing farmers' income represented by rural per capita net income. It can depict the average income level in a rural area, and the change amplitude and continuity of farmers' income can be used as a direct evaluation index of picturing the effect of widening channels of increasing farmers' income in this area.

X<sub>2</sub>: Urbanization level, namely Urbanization rate. It can represent the impact of changing urbanization rate on farmers' income, and it is also a relatively accurate measurement of regional urban infrastructure.

X<sub>3</sub>: Condition of agricultural industrial structure represented by Proportion of the non-agricultural production value in the total production value of agricultural herd fishery. It can clearly delineate the

situations of agricultural industrial structure and sideline, and it is a comprehensive reflection of regional agricultural economy.

X<sub>4</sub>: Employment condition of rural laborers represented by Proportion of the rural laborers engaged in second and third industries in all rural laborers. It can describe the capacity of transferring rural surplus laborers and the status of transforming the mode of economic development, namely from labor intensive to capital-technology intensive. In short, it is a reflection of farmers' income channels.

X<sub>5</sub>: Scale of agricultural production, namely Total production value of agricultural herd fishery at current market price. It can portray the total dimension of manufacturing industry and the total production of agricultural herd fishery, and it is a reflection of how agricultural economy relies on traditional agriculture.

X<sub>6</sub>: Status of industrial structure represented by Proportion of regional production value of first industry in all GDP. It can reveal the regional economy structure, and can also draw the mode of expanding urban second and third industries.

X<sub>7</sub>: Degree of putting value on supporting agriculture in finance, namely Local general-budget expenditure. It can limn how the regional government values its economy development, and can also sketch the regional economic trends.

X<sub>8</sub>: Crop structure represented by Proportion of non-food crops area in the total crops area. It can delineate the effect of planting structure on farmers' income.

The methodology adopted in this thesis is as follows. Firstly, referring to Leshan Statistical Yearbook (2001~2009), collect the dates which indicate farmers' income level and its impact-factors from 2000 to 2008 in Leshan city. Next, construct a predicting model which revealed the influence of the degree of restriction on widening channels of increasing farmers' income, using multivariate-linear regression, adopting backward-elimination analysis (ZHU, YIN, 2007), applying least square (OLS) (SUN, 2010), choosing 0.05 as the significance level of this model checking and integrating with Eviews3.0.

### 2.2 Constructing Regression Model

The research starts with a model which contains the whole selected variables (X<sub>2</sub>~X<sub>8</sub>). Then, adopting backward elimination analysis, remove the selected variable whose biased correlation coefficient (BCC) is the smallest and the Prob. (F-statistic) value is greater than 0.05 (removing standard) one by one until the model don't contain any selected variables which correspond with the removing standard. Finally, X<sub>4</sub> (BCC=0.064), X<sub>3</sub> (BCC=0.577), X<sub>8</sub> (BCC=0.703) and X<sub>6</sub> (BCC=0.732) four selected variables are removed orderly, and obtain a linear regression model which contains X<sub>2</sub>, X<sub>5</sub> and X<sub>7</sub> three significant independent variables and whose three

variables form an optimal combination. The regression equation as follows:

$$Y = -62.45288 + 51.04105 \times X_2 + 0.000808 \times X_3 + 0.001346 \times X_7$$

$$t_2 = 7.993070; t_3 = 4.005722; t_7 = 7.613292$$

$$R^2 = 0.999509; D.W = 2.406909; F = 3393.067$$

**Table 1**  
**Results of the Regression Analysis of Restriction Factors on Farmers' Income in Leshan City**

Variable	Coefficient	Std. Error	t-Statistic	Prob.	Correlation
constant (C)	-62.45288	125.9501	-0.495854	0.6410	-
Urbanization Rate (X <sub>2</sub> )	51.04105	6.385663	7.993070	0.0005	0.970
Total Production Value of Agricultural Herd Fishery (X <sub>3</sub> )	0.000808	0.000202	4.005722	0.0103	0.966
Local General-budget Expenditure (X <sub>7</sub> )	0.001346	0.000177	7.613292	0.0006	0.886

R-squared=0.999509  
Durbin-Watson stat=2.406909; F-statistic=3393.067; Prob.(F-statistic)= 0.000000

Adjusted R-squared=0.999214

**T-test:** Based on the significance level of this model checking  $\alpha=0.05$ , we get t-test critical value t-statistic=2.5706 by checking the t-test distribution list. And the whole above parameters (X<sub>2</sub>, X<sub>3</sub> and X<sub>7</sub>) passed the t-test. It means that Urbanization rate, Scale of agricultural production and Degree of putting value on supporting agriculture in finance have outstanding linear effect on farmers' income in Leshan city.

**Test of goodness of fit:**  $R^2=0.999509$ . It shows that X<sub>2</sub>, X<sub>3</sub> and X<sub>7</sub> three variables can account for the 99.95% total variation (TSS) of rural per capita net income.

**F-test:** Based on significance level of this model checking  $\alpha=0.05$ , we get F-test critical value F-statistic=2.5706 by checking the F-test distribution list. However, F=3393.067, is far larger than the critical value F-statistic. Therefore, this model passed the F-test, and the regression equation we established is extremely correct.

## 2.3 Results and Analyses

### 2.3.1 Main Restriction Factors

The model's results show that urbanization rate, total production value of agricultural herd fishery and local general-budget expenditure are the main factors that influencing the channels of increasing farmers' income in Leshan city.

### 2.3.2 Rural Per Capita Net Income Increases Linearly with the Raising of Urbanization Rate in Leshan City

Under the designated conditions of excluding the effect of total production value of agricultural herd fishery and local general-budget expenditure, if urbanization rate raises 1% in Leshan city, its rural per capita net income can increase 51-yuan. However, the urbanization rate is only 38.3% in Leshan city in 2008, but that it has come to 93.1% in Beijing in the same period. Therefore, raising urbanization rate can be an extremely valuable way to increase farmers' income in Leshan city.

### 2.3.3 Rural Per Capita Net Income Increases Linearly with the Rising of Total Production Value of Agricultural Herd Fishery in Leshan City

Under the designated conditions of excluding the effect of urbanization rate and local general-budget expenditure, if total production value of agricultural herd fishery rises

10-thousand-yuan in Leshan city, its rural per capita net income can only increase 0.0008-yuan. Hence, expanding the scale of agricultural production blindly is an ineffective behavior to solve farmers' income problem in essence in Leshan city.

### 2.3.4 Rural Per Capita Net Income Increases Linearly with the Growing of Local General-budget Expenditure in Leshan City

Under the designated conditions of excluding the effect of urbanization rate and total production value of agricultural herd fishery, if local general-budget expenditure grows 10-thousand-yuan in Leshan city, its rural per capita net income can increase 0.0013-yuan. However, the growth rate of local general-budget expenditure is comparatively high. For example, the local general-budget expenditure in 2008 decreases 257637-yuan compared with that in 2007 in Leshan city, so the rural per capita net income can increase 347-yuan. Thus, adding the local general-budget expenditure is a relatively efficient way of guaranteeing a considerable income in Leshan city.

## CONCLUSIONS AND SUGGESTIONS

### • Raising Urbanization Rate Can be Used as the Long-term Goal of Increasing Farmers' Income Continuously in Leshan City

The contribution of urbanization rate to the growth of farmers' income is per-unit increase of 51-yuan in Leshan city, and its urbanization level is still relatively inferior at present. Obviously, raising urbanization rate is of long-term significance to the continuous growth of farmers' income in Leshan city. Meanwhile, its inferior urbanization rate results in its inferior capacity of employing agricultural surplus laborers and these farmers' marginal income based on the angle of labor economics may be near zero according to the element-reward decline law. Apparently, if we raise urbanization rate endlessly and encourage these surplus laborers to transfer employment towards the cities surrounding, the total income of the whole farmers will not depress and the rural per capita net income will grow for the falling of the number of farmers. Therefore, to raise the urbanization

rate in nature, we need to improve the condition of urban infrastructure constantly and speed up the process of urban second and third industries.

**• Expanding the Scale of Agricultural Production Blindly is an Ineffective Behavior to Solve Farmers' Income Problem in Essence in Leshan City**

The contribution of total production value of agricultural herd fishery to the growth of farmers' income is per-unit increase of 0.0008-yuan in Leshan city. Obviously, expanding the scale of agricultural production blindly from the traditional viewpoint can't settle farmers' income problem well. Based on the angle of the agricultural economics and the features of different agricultural development stage, most of the areas in Leshan city is still in the traditional stages of modern agriculture development. For example, its agricultural productions rely on the guide of experiment more, and science-and-technology can't be effectively transformed into production capacity. In addition, the comparative advantages and interests will not be significantly highlighted. Therefore, we should incorporate relevant experiences in agricultural economy development from developed countries like the United States, Japan and European countries, especially place emphasis on biotechnology and mechanical technology. Besides, Modern science-and-technology achievement should be selectively used and agricultural industrialization should be pursued largely, realizing the integration of organic and inorganic agriculture, and the integration of specialized production and the development of agricultural herd fishery in an all-round way. And we should also view agriculture getting out of agriculture, promote agriculture established in industry, and scheme agricultural development based on the philosophy of industrialization.

**• Putting Value on Supporting Agriculture in Finance has Good Effect on Farmers' Income in Leshan City at the Moment**

The contribution of local general-budget expenditure to the growth of farmers' income is per-unit increase of 0.0013-yuan in Leshan city. However, the growth rate of local general-budget expenditure is comparatively high. Hence, it serves as an ideal way to increase farmers' income in Leshan city at present. The possible causes are that China added the input of Issues Concerning Agriculture in recent years and issued seven Central First Documents continuously. Which, to a great extent, greatly increase the confidence of increasing farmers'

income? Therefore, to realize the increasing of farmers' income at present, the nation needs to increase the total of local general-budget expenditure and further optimize the expenditure structure. Currently, clarifying the status of hill, water, field, glazier, industry in rural economy development is a top priority in Leshan city, and we also need to add the expenditure to guarantee farmers a steady income.

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