The Analysis of Rural Income in Heilongjiang Province Was Analyzed by The Surplus Labor Transfer Perspective

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Abstract: Based on the view of increasing rural income by transfer of surplus labor force, this study took partial elements as independent variable to build partial least-squares regression (PLS) model. According to the statistic data from 2001 to 2015 in Heilongjiang province, we analyzed the prechose variable about route of rural income increased by PLS method using matab 7.0 to analysis the data. The research suggested that all chosen variables have positive effect, such as value of agriculture production, value of forestry animal husbandry and fishery, number of rural workers, number of rural migrant workers, the total power of agricultural machinery, agricultural production investment, non-agricultural income and rural per capita net income. Based on analysis of result, this study proposed the effective transfer of surplus of labor force is the policy suggestion for realizing rapid growth in rural income.

1 INTRODUCTION

China is a typical country with surplus labor force. The 'Three agriculture-related issues' is the most prominent problem during the process of modernization and coordinated development of urban-rural economy. However, the core to solve the 'Three agriculture-related issues' is to solve the issue of increasing the rural income well. Based on the No.1 document of central government in year 2015, China will be rich in the near future, and farmer must be rich. To increase the rural income, it must promote farmer transfer employment and entrepreneurship. Domestic research showed that rural poverty problem must take reduction rural labor as the main strategic objectives, transferring rural surplus labor could promote to increase rural family income (Zhishui Piao, 2003), at the same time, which is the precondition of food production scale (Tianlong Jiang, 2012) and has become a new growth point of underdeveloped rural areas' income (zhong-dong Ma, etc., 2004).It has a positive correlation between farmers' income and the number of labor force engaged in the secondary industry (Shanjun Wang, 2006). The degree of transferring rural labor force makes an important contribution to society economic development, while it also brings the negative impact on development of agricultural production (Shilan Qi, etc., 2009). For example, a large number of transferring rural labor would make the land derelict, which woud be serious detrimental to agricultural sustainable development, and even affect food security (Qing-song Ruan, 2010). The importance of agricultural income from the income of farmers is gradually weakened, while the importance of non-agricultural income from the income of farmers is increased (Shuli Song, 2014).

Through the literature review, it was found that more studies are qualitative research on the relationship between surplus labor transfer and farmers' income, and most of them are intuition judgment and general description, while relatively few systematic research are from a quantitative view. In addition, many of them are from national macro-level, and less research on micro-level of single provinces and cities, where especially the study of Heilongjiang province is quite few.

2 MODEL BUILT AND ANALYSIS

2.1 Variables and variable description

Peasant income consists of agriculture part and non-agriculture part. According to the impact factors of these two parts, it combined income source with components of Heilongjiang province peasant, According to expert's point of view who is devoted

to research transfer of surplus labor force and peasant income, it was selected parts of variable as researching index.variable type, variable symbol (variable name, variable unit, variable description) such as：Dependent variable y(Rural per capita net income, Yuan, From Statistical yearbook indicators),Independent variable x1(Agriculture output, Thousand Yuan, Total value-Agriculture output),x2(Forestry and fishery output, Ten Thousand Yuan, Total valu- Forestry and fishery output),x3(The number of people entering farming, Ten Thousand Person, The number of people performing farming at current year),x4(The number of rural migrant workers, Ten Thousand Person, Rural labor force leaving countryside and living on wage income),x5(Total power of agricultural machinary, Ten Tousand KW, From Statistical yearbook indicators),x6(Agricultural production investment, Yuan, Original value of fixed assets per capita),x7(The average non-agricultural income per capita ,Yuan, Rural migrant workers income in the employ of enterprise or individual household, based on wage income of statistical yearbook).

2.2 Principle of Model

We assumed y as dependent variable, $p\{x_1,x_2,\ldots x_p\}$ as Independent variable, n as sample quantities, and $X=[x_1,x_2,\ldots x_p]_{n\times p}$ as independent variable and $Y=[y]_{n\times 1}$ as dependent variable For the requirement of regression analysis as extracting components.After extracting t_1, u_1, we performed the regression of X vs t_1 and Y vs u_1 by the method of PLS. If the regression equation get a satisfied accuracy, and the operation be terminated, otherwise we will perform the second operation using residual X, Y to be resolved by t_1. Looping computing fuction until we get the satisfied accuracy(Wang huiwen, Wu zaibin etc. 2006).

2.3 PLS Analysis

2.3.1 Data statistics, Multiple correlation test and Data normalization processing

This paper collected Time-series data influencing rural income from 《*Heilongjiang province statistical yearbook*》, 《*China Statistical Yearbook*》2000-2016, multiple correlation test use Variance Inflating Factor.Using maltab7.0 to make the analysis to original data,showed serious multiple correlations are existed both among dependent variables and among independent variables.In order to remove adverse effects due to differences between test units

and ensuring eaching variable own the same expression, we used maltab7.0 to make normalization treatment for dependent variables and independent variables and got normalization data.

2.3.2 Extracting principal component

1) Extracting the first principal component:

W_1^*=(-0.3936,-0.3949,-0.3466,0.3207,-0.3943,-0.3912,-0.3970)

P_1=(-0.3804，-0.3911，-0.3673，0.3490，-0.3907，-0.3818，-0.3860)

$t_1=E_0W_1^*$=-0.3936E_1-0.3949E_2-0.3466E_3+0.3207E_4-0.3943E_5-0.3912E_6 -0.3970E_7

Regression Equation F_0 to t_1:

$F_0=r_1t_1$=-0.3878t_1=0.1526E_1+0.1531E_2+0.1344E_3-0.1244E_4+0.1529E_5+0.1517E_6+0.1540E_7 $\qquad$ (1)

Cross validation judgement:

Q_1^2=0.9576>(1-0.95^2)=0.0975, it was demonstrated that adding component is valid to improve modeling quality and continue to extract principal component.

2) Extracting the second principal component:

W_2^*=(0.3251,0.0956,-0.5096,0.6990,0.0899,0.2351,0.2711)

P_2=(0.3228,0.0849,0.5238,-0.4849,0.0815,0.2628,0.2662)

$t_2=E_0W_2^*$=0.3251E_1+0.0956E_2-0.5096E_3+0.6990E_4+0.0899E_5+0.2351E_6+0.2711E_7

Regression Equation F_0 to t_1, t_2:

$F_0=r_1t_1+r_2t_2$=-0.3878t_1+0.2354t_2

=0.2291E_1+0.1756E_2+0.0144E_3+0.2889E_4+0.1739E_5+0.2070E_6+0.2178E_7 $\qquad$ (2)

Cross validation judgement:

Q_2^2=0.2341>(1-0.95^2)=0.0975,which demonstrateadded component is valid to improve modeling

quality and continue to extract principal component.

3) Extracting the third principal component

W_3^*=(0.0634,0.2894,0.3812,0.3790,0.2261,-0.7448,0.1322)

P_3=(0.0807,0.2279,0.2742,0.2935,0.3423,-0.8214,0.1654)

$t_3=E_0w_3^*$=0.0634E_1+0.2894E_2+0.3812E_3+0.3790E_4+0.2261E_5-0.7448E_6+0.1322E_7 $\qquad$ (3)

Cross validation judgement:

Q_3^2=-0.4573<(1-0.95^2)=0.0975, it was demonstrated that added component is not valid to improve modeling quality and terminate extracting principal component.

2.3.3 Building PLS Regression equation

As above calculation and ratiocination showed, it is only to extract two principal components for

satisfying modeling quality, and the regression equation for normalization variable as follows:

$F_0 = r_1 t_1 + r_2 t_2 = -0.3878 t_1 + 0.2354 t_2$
$= 0.2291 E_1 + 0.1756 E_2 + 0.0144 E_3 + 0.2889 E_4 + 0.1739 E_5 + 0.2070 E_6 + 0.2178 E_7$ (2)

Regression equation y to x={x_1, x_2, …,x_p}:

$y = 0.8345 x_1 + 0.8342 x_2 + 6.4500 x_3 + 10.6437 x_4 + 0.1147 x_5 + 0.0326 x_6 + 1.6716 x_7 - 8325.1270$ (4)

As we can see from the equation(4), that x_j is negative to showed x_j and y are negative correlation, that x_j is positive showed that x_j and y are positive correlation. For $x_1, x_2, x_3, x_4, x_5, x_6, x_7$, the degree of positive correlation in a descending order as $x_4 > x_3 > x_7 > x_1 > x_2 > x_5 > x_6$, That x_4 is maximum indicated x_4 is the biggest influence for y.

2.3.4 Results analysis

From the PLS model regression equation (4) and figure 1, it was concluded that each variable xj's has influence on per capita net income of farmers y: through the establishment of the regression equation, it showed that the larger independent variable regression coefficient absolute value, and the greater this variable's influence on per capita net income of farmers. The results showed that the agricultural output value and value of forestry, animal husbandry and fishery havethe same influence on per capita net income of farmers to some degree. The reason is that all output values should deduct production costs of farming, forestry, animal husbandry and fishery, then the farmers' income. Agricultural mechanization level and the investment of agricultural production both affect per capita net income of farmers, but the impact is not significant. Non-farm income plays obvious promoting effect on increasing of per capita net income of farmers. In thisstudy, In order to emphasize the relationship between the surplus labor transfer and the farmers' income, we took non-agricultural income which only take salary income earned in the form of engaging in non-agricultural industries after labor transfer to work as an example. In fact, the farmers' income of non-agricultural income partly also include the incomes from operating of the second and third industry and property transfer income and so on, so when we took the salary income as example to explain the influence of non-agricultural income from per capita net income of the farmers, and there is also gearing effect by property income and transfer income of the, etc. together with salary income.

Among these, how much the number of migrant rural labor directly shows the transfer of rural surplus labor, and non-agricultural income is the manifestation of earned income by engaging in non-agricultural industries in form of wages after the rural surplus labor transfer. Therefore, the research results showed that with the improvement of modern agricultural mechanization, agricultural output value increased at the same time and also produced a large number of surplus labor force. Retention of surplus labor force in agriculture will cause a decline in agricultural labor productivity, so agricultural production is improving but it does not affect much on the increase in per capita net income of farmers. At the same time, in the context of fixed land acreage and improving degree of agricultural mechanization, the effect to promoting farmers' income by increasing the number of workers for the agricultural will be limited.

3 CONCLUSIONS AND SUGGESTIONS

Through previous results analysis, we can reach the following conclusions: (1) Adoption the PLS model can make the results more intuitively and it accurately reflect the influence of various influence factors to farmers' income, according to this, it was found that the smoothly and orderly transfer of rural surplus labor is the realization of the effective ways to increase farmers' income. (2) on the basis of the limited planting land area, it allocates rationally the agricultural workforce and the proportion of the number of rural migrant workers, which further increases the non-agricultural income and improves output value of forestry, animal husbandry and fishery industry to realize per capita net income of farmers and effective way.

For increasing farmers' income, it combined with the present situation of the rural population in China and surplus labor transfer long-term characteristic, the following policy suggestions have been put forward: (1) To accurately position the government in the labor transfer work, actively promote institutional innovation, change from directly management to indirectly control the economic, unblock external environment of rural labor force transfer. (2) To improve the training ability of training institutions and government should strengthen the support to training institutions, and increase training for farmers to enhance working skills and cultural quality of rural labor force, therefore. (3) To guide the establishment of rural labor transfer institutions or organizations,it

improves the rural labor transfer information service and gradually establish the coordinated development of urban and rural labor market.

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