
Application Research of "Minimum living standard" Based on Multiple Linear Regression

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Abstract – Subsistence allowance is divided into urban subsistence allowance and rural subsistence allowance. The urban subsistence allowance is based on the system of basic living security and unemployment insurance for laid-off workers of state-owned enterprises in the city. Therefore, the system of implementing minimum living security is established. The rural minimum living security is the life guarantee system of the rural residents of the Chinese government for the annual per capita net income of the family is lower than the local minimum living security standard. Taking Liaoning Province as an example, this paper analyzes the correlation between the low-protection line and related variables by SPSS, finds the main indicators that affect the minimum living standard, and establishes a multiple linear regression model. The finalization of the establishment of rural minimum living standards is a question of establishing a multivariate model. Quantify the minimum living standard in the case of determining the impact indicator. The aim is to establish a more complete "low standard of protection".

Keywords – Factor Analysis, Stepwise Regression Model, Multivariate Function, Model Minimum, Living Standard.

I. INTRODUCTION

Subsistence allowance is a kind of guarantee policy for poor income families. At present, in China, both urban residents and rural residents can apply for minimum living security as long as they meet the minimum living security requirements. With the establishment and continuous development of China's urban and rural subsistence allowances, more and more people benefit. Regional development is uneven and there are certain differences in the "low-income standards" of each province and city and even county-level towns. In order to protect the basic life of the people in need and narrow the income gap of the residents, this paper solves this problem through mathematical modeling and establishes a more perfect "low standard of protection".

In [1], we study the low-income standard under the new normal and the five-level survival line obtained by the ELSE model. It can be seen that the minimum living standard is between the food line and the basic survival line, which can enable the poor to maintain basic living expenses. In [2], according to the 2016-2018 subsistence allowance standard of all regions in Jilin province, it is concluded that the determination of the subsistence allowance line is often affected by multiple factors. SPSS is used to apply the multiple linear regression model to find multiple main influencing factors as independent variables to explain the changes of dependent variables. Article [3] used SPSS clustering to select four provinces and cities with similar situation of urban subsistence allowance in Shanxi Province when describing the current situation of urban subsistence allowance standard in Shanxi Province. The introduction of relative indexes is conducive to the comprehensive and detailed analysis of the current situation of the subsistence allowance in Shanxi Province. Three adjustment methods of the subsistence allowance standard, namely, linkage with the consumer price index, linkage with the per capita income level, linkage with the consumer price index and the per capita income ratio, are proposed to provide suggestions for the development of more scientific adjustment of the urban subsistence allowance standard. Article [4] standardizes and improves the formulation, calculation, dynamic adjustment, supervision and

assessment of the minimum living allowance standard, speeds up the integration of urban and rural subsistence allowance standard, and promotes the construction of a fair and unified minimum living allowance system for urban and rural residents. Article [5] established a mathematical model by using multiple regression analysis, extended linear expenditure system and other methods, studied the standard of subsistence allowance, and solved the formulation of important standards of subsistence allowance in different regions. Through SPSS factor analysis, this paper establishes a mathematical model of the "subsistence allowance standard" and GDP, engel's coefficient (rural and urban), per capita expenditure (urban and rural) and per capita income (urban and rural), and calculates the correlation coefficient through data analysis. Taking the "subsistence allowance standard" (rural area) as the dependent variable, principal component analysis (pca) is conducted through SPSS, so as to calculate the specific model function and obtain the specific model of the subsistence allowance standard.

II. THE ESTABLISHMENT OF THE LOW-SECURITY MODEL

(1) Determination of the Factors Affecting the Standard of Subsistence Allowance

We assume that the data from the National Bureau of Statistics of China are accurate. According to China's national regulations, the relevant regulations for subsistence allowances: the subsistence allowance standard is based on the people's service and demand for various commodities, and is appropriately adjusted according to local prices and economic development levels. Collecting statistics on the subsistence standard GDP, Engel coefficient, per capita expenditure and per capita income of residents in the Bureau of Statistics to do factor analysis.

Table 1. Factor Analysis of main Indicators.

Analysis Project	Person Correlation	Significant	N	Correlation
GDP - low security	0.988	0.000	9	Significantly correlated at the 0.01 level
Engel coefficient (agriculture) - low security	0.756	0.019	9	Significantly correlated at the 0.01 level
Engel coefficient (city) and subsistence allowance	0.0131	0.737	9	
Per capita income and subsistence allowance	0.992	0.000	9	Significantly correlated at the 0.01 level
Per capita expenditure and subsistence allowance	0.988	0.000	9	Significantly correlated at the 0.01 level

From the analysis data in **TABLE 1** it can be known that the main indicators affecting the "low standard of protection" are GDP, Engel coefficient (agriculture), per capita income, and per capita expenditure.

(2) Establishment of Multiple Linear Regression

Extract six related variables under the selected 4 major indicators. Through the statistical information network of Liaoning Province, the data is queried, and the specific values of the "low standard" and other related

variables from 2007 to 2016 are obtained[6][7]. Then perform principal component analysis, find the common factor variance, and see the relationship between variables:

Table2. Principal Component analysis of Related Variables.

	initial	extract
GDP	1.000	0.578
Engel coefficient	1.000	0.830
Per capita gross income	1.000	0.987
Total expenditure per capita	1.000	0.954
Household consumption level	1.000	0.975
Residential expenditure	1.000	0.970
Minimum living standard	1.000	0.992

It is found from TABLE 2 that the extracted components are all high, and thus it is concluded that the variables are not independent but related. In order to find a suitable model, we used SPSS stepwise regression to select the elements. And the variables to be moved are: per capita total income and household consumption level; the variables that are removed are: GDP, Engel coefficient, per capita total expenditure and living expenses. The software provides two models:

Model 1 takes per capita gross income x as the independent variable and low standard y as the dependent variable. The model is:

$$y = -5.201 + 0.013x \tag{1}$$

Model 2 takes per capita total income x_1 and household consumption levels x_2 as an independent variable, the standard of subsistence allowance y as the dependent variable. The model is :

$$y = -3.517 + 0.081x_1 + 0.010x_2 \tag{2}$$

Table3. Comparison of two Models.

model	Negative correlation coefficient	decisive factor	Correction coefficient	Estimated random error
Model 1	0.994	0.987	0.985	8.501
Model 2	0.998	0.995	0.993	5.704

As shown in TABLE 3, it is better to choose the second model. The indicators of “low standard of protection” are the per capita total income of rural areas and the level of household consumption. The model obtained from the above results is:

$$y = -3.517 + 0.081x_1 + 0.010x_2 \tag{2}$$

Among them x_1 as the per capita total income of the rural population, x_2 as the level of consumption of residents.

From this result, the following comparison chart is obtained, and it can be seen from the figure that the fitting effect is good, and the rural “low standard of protection” can be accurately estimated.

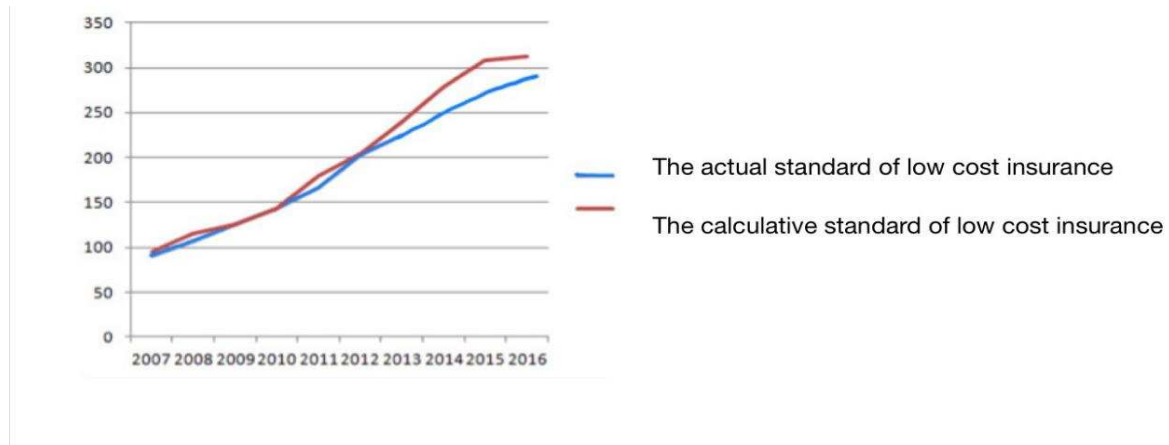


Fig. 1. Comparison of Actual and Predicted Values.

III. STATISTICAL TEST OF REGRESSION MODELS

(1) Fitness Test

The goodness of fit refers to the degree to which the regression line fits the observations. Metric coefficient when measuring the statistic of goodness of fit R^2 . The closer R^2 gets to 1, the better the fit of the regression curve to the observations. The model is $R^2 = 0.995$. It shows that the regression curve has a good fitting degree to the observed values.

(2) Significance Test of Variables (p test)

Through the significance test of the variables, it can be determined whether the influencing factors have a significant linear effect on the interpreted variables. The p values of the two independent variables of the model are 0.01 and 0.03, respectively, less than 0.05. It is shown that both factors can have a significant linear effect on the variables being interpreted, and the model is established reasonably.

IV. CONCLUSION

The model of LiaoNing rural minimum living standard calculated by the model has a certain gap with the reality, indicating that the low living standard in rural LiaoNing is low, which means that the minimum security system does not completely balance the basic living needs of the rural poor. Government departments are increasing financial input to the rural poor and raising the minimum living standards. The difference between the calculated amount and the actual value is reduced.

The low-income level in rural areas of LiaoNing is generally low, and the basic living security of the rural poor is not meeting the needs of their minimum living standards. In this regard, we can make relevant suggestions to the government departments: according to the changes in the living structure of rural residents, the concept of changing subsidies is sufficient, considering the needs of people's basic needs and the needs of

development. At the same time, we must also conduct strict screening on the minimum living allowances to ensure that the poor people who are insured can get the minimum living allowance for the state, and on this basis, raise the minimum living standard, so that the poor in China can get the most basic living security and meet the needs. Minimum demand.

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