LIFE SATISFACTION ANALYSIS FOR RURUAL RESIDENTS IN JIANGSU PROVINCE

Yang Yu[1] and Zhihong Zou[2]*
[1]Dr., Beihang University, China, lgyuyang@qq.com
[2]Prof. Dr., Beihang University, China, zouzhihong@buaa.edu.cn
*Corresponding author

Abstract

With the rapid development of living standard in China, the life satisfaction as a significant indicator has attracted increasing focus in recent years. Rural residents accounts for 41.48% of total population in China, and their life satisfaction plays a crucial role in social progress. Taking the southern, middle and northern regions of Jiangsu Province as an example, the life satisfaction of rural residents is studied in the paper, and the impacts of income, education level and marital status on different levels of life satisfaction are analyzed respectively. The dataset is derived from the rural residents' life satisfaction survey of Jiangsu Province in 2010 and is operated by national statistical bureau Jiangsu branch. Bayesian ordinal quantile regression approach is utilized to explore the regression relationships between different levels of life satisfaction and income, education level and marital status. The regression information indicates that the increase of income, the higher education level and singlehood tend to enhance the life satisfaction when it is at the lower and median levels. At higher life satisfaction level, being married gives a push to the happiness compared with divorcement and singlehood, while the income and education level contributes little. The life satisfaction of middle and northern rural residents shows the dependence on income, while that of southern rural residents is mainly affected by education level. The analyses suggest that it is helpful to increase the income for middle and northern rural residents and motivate southern rural residents to receive higher education to improve their life satisfaction. Crucially, running a good marriage is also the key to high quality of life.

Keywords: Life satisfaction, income, education level, marital status, Jiangsu Province.

1. INTRODUCTION

Since the reform and opening-up in 1978, Chinese economy has achieved great development, and the living standard of people has improved remarkably. Basic subsistence has been no longer the primary concern for Chinese people, instead, the life satisfaction has received increasing focus in recent years. The life satisfaction is a subjective wellbeing, which measures the quality of life in respect of health, job, marriage, economic status and education etc. In China, there live more than 5.7 billion rural residents, which account

for 41.48% of total population. Hence, the life satisfaction of rural residents is a crucial issue for social progress.

Typically, Jiangsu Province is one of the most developed provinces in China, and the gross domestic product (GDP) amounts to 7738.8 billion yuan in 2016. However, the southern, middle and northern regions of Jiangsu province are imbalanced in economic development. Specifically, the southern region is the one of the wealthiest and modern regions in China, it owns large scale of import and export trade and attracts a lot of foreign capital, and the high and new technology industry occupies 41.1% of gross regional product in 2012. In contrast, agriculture is still the support for economy in middle and northern regions. The gap among the three regions appears interesting, and it is worth the investigation for life satisfaction of rural residents in the three regions of Jiangsu Province.

In recent decades, numerous scholars have been devoted to the study of life satisfaction. For example, Day (1987) analyzed the life satisfaction of U.S. residents considering family relationship, state of health, recreation and entertainment, social life, economic conditions and other 9 factors. Andrews, Abbey and Halman (1991, pp. 238-253) studied the level and structure of life satisfaction for U.S. residents from 1971 to 1988, and the evaluation indicators include self-assessment, recreation, health, job, family, economic conditions and public policy. Fu, Anderson and Courtney (2005, pp. 25-49) compared the life satisfaction of middle-aged people in China and Australia. Kasser and Sheldon (2009, pp. 243-255) stated that sufficient free time and material wealth might exert more influence on life satisfaction. Liu and Jia (2008, pp. 56-60) investigated life satisfaction of undergraduates from the perspective of environmental satisfaction and self-satisfaction. Li, Ning, Ma and Zhao (2010, pp. 76-83) studied the satisfaction for empty-nest elders' leisure life in Beijing by establishing an evaluation indicator system including 9 factors. Wu and Chen (2010, pp. 63-74) explored the relationship between income and happiness using structural equation.

Different from the above, regression model provides another effective tool to explore the relationship between life satisfaction and influencing factors. As a qualitative variable, life satisfaction is commonly described by ordinal categorical variable. Hu and Chen (2012, pp. 79-83) applied categorical logistic regression to the life satisfaction analysis of rural residents in Jiangsu Province, and the study considered the influence of income, living region, marriage status, education background and social equity on life satisfaction. Nevertheless, the analysis focused on conditional mean regression, which can only reflect the effect of influencing factors on mean level of life satisfaction and often lead to sensitivity to outliers. As an insightful supplement, quantile regression proposed by Koenker and Bassett (1978, pp.33-50) yields more comprehensive regression information. The quantile regression detects the regression relationship at any desired quantile of response variable so that it could uncover the different effect of influencing factors at various quantiles of response variable. Particularly, the Bayesian quantile regression under asymmetric laplace error distribution has quite well estimation efficiency (Yu and Moyeed, pp. 437-447). Rahman (2016, pp.1-24) developed the Bayesian quantile regression approach to estimate the ordinal model. In the paper, the Bayesian quantile regression based on asymmetric laplace distribution (ALD) is introduced to construct regression models for lower, median and higher life satisfaction of rural residents in Jiangsu Province.

In addition, not all the potential influencing factors are active to the life satisfaction. A factor that exerts positive effect on higher life satisfaction might be helpless at lower satisfaction level. Therefore, it is necessary to implement variable selection in the model. Typically, indicator model selection (IMS) technique (O'hara and Sillanpaa, pp. 85-117) is one of the most efficient variable selection methods in Bayesian term, hence it could be employed in the paper to identify truly contributing factors for different levels of life satisfaction.

Conclusively, a hybrid scheme integrating the ALD based quantile regression and IMS algorithm is utilized in the ordinal model to determine truly influencing factors for different levels of life satisfaction and explore the quantile regression relationship between life satisfaction and influencing factors, and thus the corresponding effect of influencing factors on life satisfaction can be captured accordingly.

The paper is organized as below. Section 2 introduces the data source and method, and specifies the ordinal quantile regression model. Section 3 presents the results and analysis about how the influencing factors affect life satisfaction. The last section concludes with the main work in the paper.

2. DATA AND METHOD

The dataset is derived from the life satisfaction questionnaire survey of rural residents in Jiangsu Province, which is conducted by national statistical bureau Jiangsu branch in 2010. There add up to 2100 respondents from southern, middle and northern regions involved in the survey, and we randomly select 200 respondents from each region to investigate.

In the dataset, the life satisfaction is described by an ordinal categorical variable that *Satisfaction*=1,2,3, which denotes the increasing satisfaction from low to high. In terms of previous studies, the economic conditions, education background and family relationship are vital indicators for life satisfaction, hence the following influencing factors are considered in the model: income (*Income*, yuan), education level (*Education*, 0=primary school or below, 1=junior high school degree, 2=senior high school degree, 3=bachelor degree or above), marriage status (*Marriage*, 0=divorced, 1=single, 2=married). For computational tractability, *Education* and *Marriage* are treated by dummy vectors that *Education*=(E_1,E_2,E_3), *Marriage*=(M_1,M_2), where E_j=1 if the category *j* is observed, *Ej*=0 otherwise, and M_l is similar to E_j, *j*=1,2,3, *l*=1,2.

The data in southern, middle and northern regions is fitted respectively using the following ordinal quantile regression model,

$$Satisfaction=k \leftrightarrow G_{k-1} \leq Satisfaction^* < G_k,$$

$$Satisfaction^* = \beta_0 + \beta_1 r_1 Income + \beta_2 r_2 E_1 + \beta_3 r_3 E_2 + \beta_4 r_4 E_3 + \beta_5 r_5 M_1 + \beta_6 r_6 M_2 + \varepsilon,$$

where *Satisfaction** is the continuous latent variable for *Satisfaction*, G_k is the threshold, ε is the random error term, r_j is a binary indicator variable for variable selection that r_j=1 implies the corresponding factor is active in the model, and 0 otherwise, *j*=1,...,6, *k*=1,2,3. The parameters {β_j, *j*=0,...,6} and {r_j, j=1,...,6} jointly constitute the coefficients of the model.

With the assumption that the error term follows an ALD, that is, ε~ALD(0,σ,τ), the conditional τth quantile function of *Satisfaction** could be represented as

$$Q_\tau(Satisfaction^*) = \beta_0 + \beta_1 r_1 Income + \beta_2 r_2 E_1 + \beta_3 r_3 E_2 + \beta_4 r_4 E_3 + \beta_5 r_5 M_1 + \beta_6 r_6 M_2,$$

where 0<τ<1 denotes the quantile level, and we appoint τ=0.1,0.5,0.9 to represent the lower, median and higher satisfaction levels respectively. The quantile function could be achieved via the posterior estimates of coefficients, and the effect of influencing factors on life satisfaction can also be analyzed accordingly. Assigning prior distributions on parameters, the posterior estimates for parameters are inferred from the posterior distributions, which are approximated by Markov chain Monte Carlo algorithms in Bayesian approach using data-driven correction.

3. RESULTS

Table 1 presents the quantile estimates for regression coefficients in southern, middle and northern regions. Firstly, as is seen from Table 1, at lower satisfaction level (τ=0.1), the increase of income, the higher education level and the singlehood tend to be helpful to improve the life satisfaction and might enable the individuals whom are unsatisfied with life to feel better. In detail, the rural residents in middle region and northern region appear to rely on income, whereas the southern residents seem insensitive to income. The results indicate that the appropriate rise of income could bring about the higher life satisfaction. In addition, the education level as an important influencing factor also plays a positive role in enhancing the life satisfaction. Specifically, the senior high school degree and the bachelor degree or above work significantly compared with the primary school or below, and the bachelor degree or above exerts larger effect on life satisfaction than senior high school degree. The phenomenon shows that the rural residents with higher education level might be more likely to gain happiness. The possible reasons for it include that the education could produce more employment opportunities, colorfully cultural life and wide sight, which improve the living conditions and enrich the pleasure of life. For the last influencing factor, marital status, it is interesting to find that the singlehood tends to raise life satisfaction compared with the divorcement, while the married has no obvious help. Understandably, the unmarried people could have more freedom to live the relaxed life, whereas the married people need to deal with a lot of household issues and undertake certain living pressure.

Table 1. Quantile estimates for coefficients of influencing factors in the three regions

quantile	region	$\beta_1 r_1$ (*Income*)	$\beta_2 r_2$ (E_1)	$\beta_3 r_3$ (E_2)	$\beta_4 r_4$ (E_3)	$\beta_5 r_5$ (M_1)	$\beta_6 r_6$ (M_2)
τ=0.1	southern	0	0	0.78	1.76	0.21	0
	middle	0.53	0	0.43	1.51	0.40	-0.28
	northern	1.52	0	0.12	0	0	0
τ=0.5	southern	1.09	0	0.49	1.29	0	0
	middle	2.03	0	0.25	0.97	0	0
	northern	3.54	0	0	0.33	0	0

τ=0.9	southern	0	0	0	0.19	0	0.52
	middle	0	0	0.46	0	0	0.29
	northern	0	0	0	0	0	0.47

Secondly, at median satisfaction level (τ=0.5), the impacts of income and education level are similar to that for low life satisfaction level, except that the marital status is almost inactive in the case. On the contrary, at higher satisfaction level (τ=0.9), the life satisfaction is mainly affected by marital status with the impact being positive, while income and education level barely work. That is to say, if a rural resident has been highly satisfied with the life, then being married would strengthen the happiness compared with divorcement and singlehood, which typically implies the close association between high life satisfaction and a happy marriage. Meanwhile, the rise of income and higher education level make little difference to the life satisfaction, which also manifests that the wealth cannot work all the time.

From the perspective of region, the differences among the three regions focus primarily on income and education level. Firstly, compared with the southern rural residents, the life satisfaction for middle and northern rural residents appear to depend more on income, especially the northern residents. The phenomenon might partly result from the slightly inferior economic development in middle and northern regions such that the rural residents feel not quite satisfied with their income, and the appropriate increase of income could facilitate the life satisfaction. In contrast, the southern rural residents have generally higher income which is sufficient to their lives, and therefore the effect of income is somewhat smaller. Secondly, for another influencing factor, the education level performs great help for southern rural residents, while the impact on middle and northern rural residents is less significant. The result could be attributed to the following aspects. First, the technological industry in southern region has better development in contrast with middle and northern regions, and the educated rural residents could have more advantages in employment and the realization for value of life. Second, southern region owns rich cultural life which is beneficial to the mental health of rural residents, and provides various choices for their spare time.

4. CONCLUSIONS

Life satisfaction as an important indicator has attracted great focus in China recently. The life satisfaction of rural residents in southern, middle and northern regions of Jiangsu Province is investigated in the paper, and the influences of income, education level and marital status on lower, median and higher life satisfaction are analyzed respectively. Bayesian ordinal quantile regression approach is utilized in the paper to construct the quantile regression models for life satisfaction and influencing factors.

The results show that the increase of income tends to promote the life satisfaction for middle and northern rural residents when their life satisfaction is in the lower level. Moreover, the higher education level and singlehood also contribute to the improvement of situation. Furthermore, being married is the most active factor to positively affect the higher life satisfaction, while the effect of income and education is not obvious in the case. Additionally, the higher education level is crucial to enhance the life satisfaction for southern rural residents.

The analyses suggest that it is helpful to appropriately increase the income for middle and northern rural residents and encourage southern rural residents to receive higher education to improve their life satisfaction. Crucially, managing a good marriage is the key to high quality of life.

5. ACKNOWLEDGEMENT

This research was financially supported by the National Natural Science Foundation of China (Grant NO. 51478025).

REFERENCE LIST

Andrews, F. M., Abbey, A. and Halman, L. J. (1991). Stress from Infertility, Marriage Factors and Subjective Well-being of Wives and Husbands. Journal of Health & Social Behavior, vol. 32.

Day, R. L. (1987). Relationship between Life Satisfaction and Consumer Satisfaction, in Samli, A. C. (ed.). Marketing and Quality of Life Interface, Greenwood Press, Westport.

Fu, S. Y. K., Anderson, D. and Courtney, M. (2005). The Relationship between Country of Residence, Gender and the Quality of Life in Australian and Taiwanese Midlife Residents. Social Indicators Research, vol. 79.

Hu, R., Chen, Y. (2012). Analysis of the Influential Factors on Rural Residents' Life Satisfaction. Statistical Research, vol. 29.

Kasser, T., Sheldon, K. M. (2009). Time Affluences as a Path towards Personal Happiness and Ethical Business Practices: Empirical Evidence from Four Studies. Journal of Business Ethics, vol. 84.

Koenker, R., Bassett, G. (1978). Regression quantiles. Econometrica, vol. 46.

Li, X., Ning, Z., Ma, H. and Zhao, P. (2010). A study on the satisfaction about "empty-nest" elders' leisure life in Beijing urban area: a case study of three typical communities in Beijing. Tourism tribune, vol. 25.

Liu, Y., Jia, Z. (2008). Empirical study on life satisfaction of graduates' school life. China Youth Study.

O'Hara, R. B., Sillanpaa, M. J. (2009). A review of Bayesian variable selection methods: what, how and which. Bayesian Analysis, vol. 4.

Rahman, M. A. (2016). Bayesian quantile regression for ordinal models. Bayesian analysis, vol. 11.

Wu, L., Chen, H. (2010). Structural equation about income and happiness index. Chinese Rural Economy.

Yu, K., Moyeed, R. A. (2001). Bayesian quantile regression. Statistics and Probability Letters, vol. 54.