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Influence of Education on Labor Income of Urban and Rural Residents Based on Quantile Regression

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Abstract. With the development of economy, the labor income of urban and rural residents in China has increased, but there is still a gap between the income of urban and rural residents. Therefore, the factors that affect the labor income of urban and rural residents need us to conduct research.This paper uses data from the 2015 Chinese General Social Survey to examine the impact of the individual's education on this variable, and uses a quantile regression model to work on urban and rural residents at the five quantiles of 0.1, 0.25, 0.5, 0.75, and 0.9. Analysis of the factors affecting income,the differences in the factors affecting labor income of urban and rural residents at each quantile are compared.The empirical results show that for urban residents and rural residents, the variable of education also has a very significant positive effect at the selected five quantiles. For low-income people, increased education can lead to more income growth;The age variable has a significant negative effect at the five quintiles selected; gender, health status, and hukou status have significant positive effects at different quantiles; marital status is only in the 0.5 quintile has a significant positive impact;For the number of underage children in the family, this variable has a significant positive effect only at the 0.5, 0.75, and 0.9 cents.

Introduction

Income has always been a key concern and discussion of people. With the rapid development of China's economy in recent years, the income of urban and rural residents has also increased by a large margin [1]. According to statistics, the per capita disposable income of urban residents in 2017 was 36,396 yuan,the growth rate is 6.5%, the per capita disposable income of rural residents has reached 13,432 yuan, the growth rate is 7.3%, and the per capita income difference between urban and rural residents is 2.71, which is 0.01 less than the previous year. The per capita disposable income of the national residents is 25,974 yuan. It also has a substantial increase from the previous year. Although the income of urban and rural residents has been significantly improved compared with the previous ones, there is still a gap in income between urban and rural residents. Therefore, from the scientific point of view, the factors affecting the income of urban and rural residents and their differences are used to improve the income level of different groups and narrow the income gap. It is of great significance.

In recent years, more and more scholars have begun to study the factors affecting the labor income of urban and rural residents [2]. From the relevant research results, we can see that many factors will affect the labor income of urban and rural residents [3]. However, in the previous study, in the process of selecting variables, people usually judge according to their own experience or refer to the variables used in previous studies, but rarely pay attention to and examine a certain variable. The impact and specific in-depth analysis of the variable. Based on this, this paper selects the individual's education as the explanatory variable of the main investigation, because the degree of education of a person will affect the labor he is engaged in and the labor income corresponding to the labor.

Therefore, this paper will analyze the influencing factors of labor income of urban and rural residents and the influence of various factors at different quantiles from the micro level [4]. Through the use of the 2015 Chinese General Social Survey data, the annual labor income of urban and rural residents is taken as the explanatory variable, and the individual's education is taken as the main investigation and interpretation variable. In addition, the respondent's age, gender, marital status, and health status will be used. The number of underage children in the family and the status of the household as a control variable [5], the five quantiles of 10%, 25%, 50%, 75% and 90% were selected [6], using the quantile regression model to analyze. In addition, this paper will conduct relevant analysis from two levels. At the first level, it will mainly examine the factors affecting the labor income of urban and rural residents in different quantiles [7], in the second level, urban and rural households will be divided according to the status of households, and whether there are differences in the factors affecting the labor income of urban and rural residents in different households and rural households.

Literature Review

Many scholars have given their research conclusions on the factors affecting the labor income of urban and rural residents. At present, there are many documents on the factors affecting labor income at home and abroad. Domestic research on the factors affecting labor income is divided into two major blocks, one of which analyzes the factors affecting labor income from the macro and micro perspectives [8], and the other focuses on the labor income of residents in a certain region.

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Y. Liu and J.M. Zhang used the Tyre index and Fei Jinghan-Lannis decomposition method to use the data of urban residents in Guangdong to study the influence of personal characteristics and institutional factors on the income gap of residents. The influence is still the lightest, and the individual post-factors become the most important factor causing the income gap of the residents. The influence of institutional factors on the income gap is suppressed to a certain extent [9]; D.Q. Chai uses the relevant measurement model to apply 1997-2007 The provincial panel data to study the influencing factors of rural residents' wage income, and found that urbanization level, non-nationalization level, urban income level, legal perfection degree and rural residents' wage income are positively correlated, urban-rural gap, financial development and Marketization is negatively correlated with the wage income of rural residents [10]; J.T. Zhang and P. Wang used the quantile regression model to analyze the family population, the districts and counties where the family is located, the age of the main household income, the employment status and other factors for the S city. The effect of disposable income of low- and middle-income families was found to be at the bottom of the conditional distribution. Residents, there is a certain gender gap in the working ability of residents. As the average income shifts to a high level, the gender gap gradually weakens [11]; J.H. Duan and J.B. Chen used quantile regression to use CGSS 2004 data to calculate the income of urban and rural households in China. The analysis of the factors influencing the differences found that the per capita income of urban households was generally higher than that of rural households, and the influencing factors played different roles in households with different income levels [12]. T.H. Pham and B. Reilly used the quantile regression analysis to analyze the gender differences in income distribution [13].

For those studies from a macro perspective, because the relationship between macro variables is more complex, the results of such studies are not more instructive and practical, and those from microscopic perspectives will be due to differences in research data. Different variables are chosen to arrive at different conclusions. The accuracy of the research results of the research on the labor income of residents in a certain area will be affected by data and survey methods to a large extent. Although some scholars have used the quantile regression to analyze the influencing factors of residents' income in recent years, the differences in the selected variables and the selected quantiles often lead to different conclusions.

Data, Variable and Method

Data and Variable

The data used in this study is the data of the 2015 Chinese General Social Survey. The survey conducted a sample survey of nearly 10,000 households across the country through rigorous scientific sampling. The survey covers various aspects such as respondents and their families. Various basic information, the economic status of the respondent and his family, and the working conditions of the respondent. The issue of personal labor income is also involved in the survey. This study will also use this issue as an entry point to explore in depth which factors will affect the labor income of urban and rural residents and the factors affecting the income of urban and rural residents.

Regarding the variables involved in this paper, the dependent variable is the annual labor income of urban and rural residents, which is a continuous variable. In the subsequent analysis process, the logarithm of the annual labor income is used for analysis; The labor income will be affected by the individual's education and education level. Therefore, the individual's education is mainly used as the independent variable. For the control variables, the following variables are selected by referring to the relevant literature and according to relevant theories: Respondents' age, gender, marital status, health status, number of minor children in the family, and registered residence.

In the data processing process, the sample with personal labor income less than or equal to 0 is removed and the personal labor income is logarithmically used for subsequent analysis. In addition, for explanatory variables and control variables, samples older than 18 years old are removed. A sample that matches the actual situation. After processing, a total of 5,783 samples were obtained, of which 2,300 were from urban households and 3,348 from rural households.

Table 1 Descriptive statistics of major variable indicators

Variable	Samples	Mean	Standard deviation	Minimum	Maxmum
Residents' annual labor income	5783	33496.55	89930.46	160	5000000
Logarithm of annual labor income of residents	5783	9.75	1.22	5.08	15.42
Age	5783	49.67	13.16	18	93
Gender	5783	0.53	0.50	0	1
Marital status	5783	0.99	0.09	0	1
Health status	5783	3.69	1.02	1	5
Number of minor children in the family	5783	0.56	0.77	0	5
Registered residence	5783	0.40	0.49	0	1
Education	5783	4.78	2.88	1	13

Table 1 gives descriptive statistics for each of the main variable indicators including the mean, standard deviation, minimum and maximum values of each variable. From the values in the table, we can see that the average value of personal labor income is at 33496.55 and there is a large standard deviation. From this we can see that the individual's labor income is characterized by uneven distribution. The average age of the head of the household is 49.67 years old, including males. The proportion of heads of households is 52.81%, and the average number of children in the family is 0.56, indicating that most families have no minor children or only one minor child. From the perspective of education, the average value of education At 4.78, this indicates that the education level of most household heads is not very high, and the situation of heads of households receiving higher education is not very common. From other control variables, we can also see that most of the heads of the household are married and have good health. In addition, it can be seen from the household registration that the urban household sample accounts for about 40%, and the rural household sample is about accounted for 60%.

Method

The quantile regression is proposed by Koenker and Bassett, which is an extension of the classical least squares method, which extends the least squares method from the estimated conditional mean model to the model of the estimated conditional quantile combination, for the median regression estimator. It is the sum of the absolute errors minimized, while the estimation method for other conditional quantile functions is by calculating the asymmetric weighted sum that minimizes the absolute error.

Mean regression studies are the average trend of dependent variables after given explanatory variables, while quantile regression attempts to comprehensively describe the variation of each quantile of conditional random variables with explanatory variables [14]. The advantage of quantile regression is that it can more fully describe the overall condition of the conditional condition distribution of the explanatory variables [15], which is conducive to a more detailed and comprehensive analysis of the regression relationship between phenomena, and the quantile regression error. The term does not require strong assumptions, so for non-normal distributions, the quantile regression coefficient estimator behaves more robustly.

This paper uses the quantile regression to analyze the influencing factors of labor income of urban and rural residents, and establishes the following quantile regression model:

$$Quant_q(C \mid X) = b_0^q + \sum b_i^q X_i^q \tag{1}$$

Among them, C represents the logarithm of the annual labor income of urban and rural residents, and Xi is the various factors affecting the labor income of urban and rural residents. The following variables are mainly selected: the age, gender, marital status, health status of the respondent, and the family. The number of adult children and the status of education, q represents the quantiles, this paper selects 10%, 25%, 50%, 75% and 90% of the five quantiles for the relevant analysis, bi refers to It is the regression coefficient of the relevant variable that affects income at the q-digit. Next, this paper will use this model for further analysis.

Results

Analysis of Factors Affecting Labor Income of Urban and Rural Resident

Using the quantile regression to analyze the factors affecting the labor income of urban and rural residents, and select the 0.1, 0.25, 0.5, 0.75 and 0.9 quantiles of the individual's annual labor income to return, they represent the low-income group, the lower income group, medium Income groups, higher income groups, and high-income groups, thereby clarifying the impact of relevant variables on different income distribution segments.

Table 2 Quantile Regression Result of Factors Affecting Labor Income

Variable	q10	q25	q50	q75	q90
Age	-0.020***	-0.020***	-0.015***	-0.012***	-0.011***
	（0.004）	（0.002）	（0.001）	（0.001）	（0.001）
Gender	0.469***	0.447***	0.408***	0.321***	0.368***
	（0.042）	（0.030）	（0.027）	（0.029）	（0.034）
Marital status	0.078	0.113	0.341*	0.232	-0.085
	（0.218）	（0.125）	（0.151）	（0.173）	（0.453）
Health status	0.209***	0.163***	0.136***	0.107***	0.107***
	（0.027）	（0.029）	（0.016）	（0.013）	（0.020）
Number of minor children in the family	-0.006	0.019	0.046**	0.038*	0.063**
	（0.042）	（0.028）	（0.018）	（0.018）	（0.021）
Registered residence	0.970***	0.793***	0.601***	0.440***	0.367***
	（0.049）	（0.030）	（0.033）	（0.025）	（0.039）
Education	0.140***	0.123***	0.115***	0.108***	0.102***
	（0.008）	（0.005）	（0.004）	（0.006）	（0.005）
_cons	7.396***	8.321***	8.710***	9.457***	10.203***
	（0.233）	（0.185）	（0.191）	（0.202）	（0.477）
Pseudo R2	0.2780	0.2603	0.2201	0.1846	0.1747

Note: The numbers in parentheses are standard errors,***,**,* are significantly at 0.1%, 1%, 5% confidence level

Table 2 shows the quantile regression results of the factors affecting labor income of urban and rural residents. Here, we mainly examine the age, gender, marital status, health status, the number of underage children in the family, and the education status at different quantiles. The impact of income. From the results, we can see that for the variable of education, there are extremely significant positive effects on the selected five quantiles. In different income groups, the improvement of education can make individuals Labor income has increased, corresponding to 0.1, 0.25, 0.5, 0.75 and 0.9 points. For each unit of education increased by one unit, the logarithm of individual labor income will increase by 14%, 12.3%, 11.5%, 10.8%. , 10.2%, it can be seen that the variable of education level plays a very important role in determining the amount of labor income of a person. The improvement of education level in low-income groups can bring more income growth.

For other control variables, the age variable has a significant negative effect on the selected 5 quantiles. Corresponding to each quantile, the logarithm of the individual's annual labor income is also increased for each age. It will be reduced by 2%, 2%, 1.5%, 1.2%, and 1.1%. It can be seen that age is also an important factor in determining a person's labor income. The younger a person is, the labor income he receives. The more will be, the greater the impact in low-income and lower-income groups. Similar to age, gender has a significant effect on different quantiles, but its impact is positive, so it can be known that men have higher labor income, different quantiles than women. The logarithm of labor income will increase by 46.9%, 44.7%, 40.8%, 32.1%, and 36.8%, respectively. For marital status, this variable has only a significant impact on the 0.5-point scale, so we can find that among middle-income people, married couples will bring 34.1% of the labor income logarithm compared to unmarried. improve. The health status has a significant impact on the selected five quantiles. For each person's health status, the logarithm of personal labor income will increase by 20.9%, 16.3%, 13.6%, 10.7%. 10.7%, for low-income people, having better health can lead to more income increases. For the number of underage children in the family, we can see from the table that the variable

has a significant effect only on the 0.5, 0.75, and 0.9 quantiles. For each increase in the number of minor children in the family, the personal labor income The logarithm will also increase by 4.6%, 3.8%, and 6.3%, which means that in the middle-to-high income group, they need more income to raise and care for the minor children in the family. For the status of household registration, we can see that this variable also has a significant impact on each quantile. The logarithm of urban household income compared with rural households will increase by 97%, 79.3%, 60.1%, 44%. 36.7%, a person's hukou status will affect his labor income and this effect is more obvious in low-income groups.

Analysis of the Differences in the Influencing Factors of Labor Income

In the previous analysis, we found that the household registration status variable is a significant variable in the selected five quantiles. Considering that the personal labor income of urban and rural residents in China may be affected by different factors, the next step will be establish relevant models for urban and rural residents and compare and analyze them.

Table 3 Quantile Regression Result of Factors Affecting Labor Income of Urban Residents

Variable	q10	q25	q50	q75	q90
Age	0.003	0.001	0.005**	0.002	0.001
	（0.003）	（0.002）	（0.002）	（0.001）	（0.003）
Gender	0.283**	0.292***	0.187***	0.201***	0.349***
	（0.095）	（0.057）	（0.039）	（0.032）	（0.044）
Marital status	0.034	-0.011	-0.058	0.073	0.254
	（0.525）	（0.287）	（0.191）	（0.090）	（0.544）
Health status	0.136**	0.073***	0.051**	0.055**	0.099***
	（0.047）	（0.023）	（0.017）	（0.018）	（0.029）
Number of minor children in the family	0.062	0.041	0.085**	0.106***	0.108**
	（0.064）	（0.042）	（0.030）	（0.032）	（0.040）
Education	0.156***	0.124***	0.116***	0.111***	0.110***
	（0.008）	（0.006）	（0.006）	（0.006）	（0.009）
_cons	7.603***	8.674***	9.099***	9.528***	9.511***
	（0.521）	（0.349）	（0.248）	（0.157）	（0.693）
Pseudo R2	0.1730	0.1554	0.1577	0.1590	0.1694

Note: The numbers in parentheses are standard errors, ***, **, * are significantly at 0.1%, 1%, 5% confidence level

Table 3 shows the quantile regression results of the factors affecting the labor income of urban residents. From the results, we can see that for urban residents, the variable of education has the same significant positive impact on the selected five quantiles. Among the different income groups, the education level Raising will bring about an increase in personal labor income, corresponding to 0.1, 0.25, 0.5, 0.75 and 0.9 points. For each unit of education increased by one unit, the logarithm of individual labor income will increase by 15.6%, 12.4%, 11.6. %, 11.1%, 11%. It can be seen that the variable of education plays a very important role in determining the income of urban residents. For low-income people, the increase in education can bring more income.

Table 4 Quantile Regression Result of Factors Affecting Labor Income of Rural Residents

Variable	q10	q25	q50	q75	q90
Age	-0.040***	-0.042***	-0.040***	-0.031***	-0.025***
	（0.003）	（0.002）	（0.002）	（0.002）	（0.003）
Gender	0.599***	0.575***	0.570***	0.453***	0.411***
	（0.077）	（0.045）	（0.032）	（0.038）	（0.066）
Marital status	0.018	-0.055	0.306	0.069	-0.343
	（0.478）	（0.224）	（0.199）	（0.275）	（0.481）
Health status	0.200***	0.195***	0.174***	0.159***	0.132***
	（0.047）	（0.034）	（0.026）	（0.023）	（0.030）
Number of minor children in the family	-0.116	-0.088*	-0.059*	-0.044	-0.036
	（0.061）	（0.043）	（0.024）	（0.033）	（0.030）
Education	0.147***	0.125***	0.097***	0.112***	0.110***
	（0.017）	（0.019）	（0.013）	（0.014）	（0.017）
_cons	8.467***	9.462***	9.811***	10.273***	11.045***
	（0.663）	（0.355）	（0.255）	（0.283）	（0.489）
Pseudo R2	0.1807	0.2071	0.2031	0.1705	0.1420

Note: The numbers in parentheses are standard errors, ***, **, * are significantly at 0.1%, 1%, 5% confidence level

Table 4 shows the quantile regression results of the factors affecting rural labor income. From the results, we can be similar to the analysis results of urban residents. The variable of education has a very significant positive influence on the selected five quantiles, corresponding to 0.1, 0.25, 0.5, 0.75 and 0.9 points. At the same place, for each unit of education, the logarithm of personal labor income will increase by 14.7%, 12.5%, 9.7%, 11.2%, and 11%. This shows that the educational level is also an important variable for rural residents. It is also plays an important role in determining the amount of their labor income. For low-income rural residents, the increase in education will bring about a greater increase in income.

Conclusion

Based on the data of Chinese general social survey in 2015, this paper uses the method of quantile regression to analyze the factors affecting the labor income of urban and rural residents and their differences in different quantiles. From the analysis results, the following conclusions are drawn: education The situation variable has a very significant positive impact on the five quantiles of 0.1, 0.25, 0.5, 0.75 and 0.9. For low-income people, the increase in education can bring more income growth; age has a significant negative impact on the selected 5 quantiles; gender, health status and hukou status have significant positive effects at different quantiles; marital status is only 0.5 There is a significant positive impact on the quintile; for the number of underage children in the family, this variable has a significant positive effect only at the 0.5, 0.75, and 0.9 quantiles.

Through the comparison and analysis of the quantile regression model of the factors affecting the labor income of urban residents and rural residents, it is found that the factors affecting the labor income of urban residents and rural residents are not exactly the same at different quantiles. For urban residents and rural residents, the variable of education also has a very significant positive impact on the selected five quantiles. For low-income people, the education level can bring more Income growth; gender, health status has a significant positive impact on different quantiles; for urban residents, the age variable has a significant positive impact only on the 0.5-digit scale, minors in the family The number of children has a significant positive impact on the 0.5, 0.75, and 0.9 quantiles, while for rural residents, the age variable has a significant negative impact on the selected quantiles. The number of underage children has a significant negative impact at 0.25 and 0.5 quantiles.

According to the above conclusions, the labor income of urban and rural residents will be affected by different factors and the influence of variables in different quantiles will be different. Whether it is for urban residents or rural residents, the educational level is an important influence. Factors that improve one's education level, especially for low-income people, can raise the level of labor income.

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