Correlation Analysis of Influencing Factors of Labor Education Level Based on Neural Network Model

Lu Yuliang*

College of International Exchange, Shandong Management University, Jinan, Shandong 250357, China

*Corresponding author: 2849840669@qq.com

Abstract. Based on the neural network model, this paper analyzes the correlation of influencing factors of labor education level. This paper compares the income changes of 23-30-year-old workers before and after receiving labor education and the changes of income influencing factors. The results show that the new labor market and the whole labor market show a trend of differentiation before and after education. In the background of the increasing role of the whole labor market education into income, the "value" of the education of the new labor force has declined. Among the various factors that affect the income of the new labor force, some of the education types with the same education level are greatly affected by the negative impact. Gender and work area play a more prominent role, while work experience and other factors have no significant correlation with income. The results have a certain reference value for the correlation study of influencing factors of labor education level.

Keywords: Neural Network, Labor Education, Influencing Factors, Correlation Analysis

1. Introduction

China is a country with a large population. How to transform the heavy population burden into a rich human resource advantage, develop a large education country into an education power, and build a large population country into a powerful country of human resources has always been the concern of governments at all levels, experts and scholars and relevant parties [1]. Especially in today's building a well-off society in an all-round way, the Chinese government will be committed to building the world's largest learning society, and these problems are more prominent. At present, the basic situation of human resources in China is as follows [2]: the overall national quality is low, the middle and high-level talents are seriously lacking, and there is a big gap between the overall level of human resources and the developed countries and newly industrialized countries. Industrial and industrial human resources structural contradictions are prominent, the overall cultural quality of labor can not adapt to the industrial development and continuous improvement of labor productivity, and the imbalance of labor cultural quality between urban and rural areas and regions is very prominent.

Such a huge human resources, the overall quality of the population compared with developed countries gap is obvious. Education undertakes the mission of improving the quality of human resources (human capital). In this paper, BP model is used to predict the average years of education of
the labor force in China, because the average years of education is a key indicator to measure human capital.

2. Establishment of Dynamic Labor Education Level Model

The number of years of education per capita of the working population is often used by people [3]. We can use this index and economic growth in empirical analysis. The average length of education is an important variable to reflect the quality of workers, and it is also recognized as an indicator to reflect the quality of workers. Because the education years per capita of the labor force in a region can not only reflect the education status of the region, but also reflect the current situation of human capital in this region, that is, the factors directly affecting the economy. Therefore, we use the per capita education years of the labor force as the index to measure China's human capital.

According to the definition: "the number of years of education per capita of the labor force population = the total number of years of general education received by the labor force population / the total number of labor force population", and the hypothesis method in "China's education green paper 2000", the following formula can be used to obtain the per capita education years \( E_t \) of the labor force in year \( t \) [4-6]:

\[
E_t = \frac{\sum_k \omega_k L_k(t)}{L(t)} - k
\]

Where \( k \) is noted as the type of the education and \( \omega \) is noted as the period of education (year).

2.1 Data Source

The data in this paper are from the China General Social Survey (CGSS) project [7-11]. The CGSS adopts strict stratified sampling technology and covers 31 provinces and autonomous regions in China. CGSS is the first national, comprehensive and continuous large-scale social survey project in China. The data collected include a large amount of information such as residents' basic information, working conditions and political attitudes. The personal survey sample data of cgss2003 is 5894 people, all of them are urban population. After the logical deletion of income and age, a total of 4489 samples meet the requirements, including 520 samples aged 23-30 years old. In the personal survey sample data of CGSS 2010, the urban population is 7233, and after screening, there are 5393 samples met the requirements, of which 662 were aged 23 to 30.

2.2 Method Design

Thus, the correlation function of the two variable units is as follows [12]:

\[
\rho(p_1, p_2) = \frac{\frac{a_i + a_z + I}{2}}{\sqrt{\Gamma(a_i + I)(a_z + I)}} \frac{2a_i + a_z + b_1 + b_z}{2} \frac{a_i + I}{2} \frac{a_z + I}{2} \frac{b_1 + b_z}{2}
\]

The parameters \( a_i = \left( \frac{u_i}{\sigma_i} \right)^2 - I \), \( b_i = \frac{\sigma_i^2}{u_i} \), \( u_i \) and \( \sigma_i \) are the RMS mean and variance of the i-th detection unit.

Thus, the distribution distance between the two detection units before and after the i-th detection unit can be defined [13]:

\[
D_i = 1 - \rho(p_{i-1}, p_{i+1})
\]
The normalized distance formula is given:

\[ D_n(i) = \frac{D(i)V(i)}{D_m(i)} \]  

(4)

\[ V(i) = D(i) - \text{mean} \left( D(i-1), D(i-2), D(i+1), D(i-1) \right) \]  

(5)

\[ V(i) = \begin{cases} 0, & V(i) < 0 \\ V(i), & V(i) \geq 0 \end{cases} \]  

\[ D_m(i) = \max \left( D(i-1), D(i-2), D(i+1), D(i-1) \right) \]  

(6)

Where the related variables are treated as follows:

1. Revenue value. The income comes from the annual income data (including bonus and other income) of urban population in the questionnaire, excluding the samples with annual income more than 1 million and less than 0.

2. Education type. The classification of education levels and categories in CGSS survey is complex. For the convenience of discussion, this paper combines the education levels into six categories, namely primary school education and below, junior high school education, high school education, secondary vocational and technical education, adult higher education and general higher education.

3. Regional division. The East includes Beijing, Tianjin, Hebei, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, Guangdong, Hainan, Liao Ning, Jilin and Heilongjiang in the East, Shanxi, Anhui, Jiangxi, Henan, Hubei and Hunan in the middle, and Inner Mongolia, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Tibet, Shaanxi, Gansu, Qinghai, Ningxia and Xinjiang in the West.

4. The nature of the unit. In this paper, the state administrative organs, state-owned enterprises and institutions (including collectively owned enterprises) and social organizations are defined as state-owned units, while other types of employment units are classified as non-state-owned units.

5. Length of service. It can't be obtained directly from the survey data. This paper uses the difference between the current age and the age at the time of completion of education. The specific calculation method is the current age minus the working age. The working age is set as follows: the working age of people with primary school education or below is set as 14 years old, the working age of workers with junior middle school education is set as 16 years old, the working age of higher vocational high school and adult specialty is 19 years old, the working age of general specialty is 22 years old, and the working age of adult undergraduate is set as 21 years old, the working age for general undergraduate is set at 23 years old, and the working age for graduate students and above is set at 26 years old. Gender and other relevant data are directly obtained from the survey data.

3. Results and Discussion

Considering the heterogeneity of the impact of educational expansion on different samples, this paper makes a comparative analysis between the labor force aged 23-30 and the whole labor force. As shown in Table 1, the first and second columns are the results of the regression of the new labor force, and the third and fourth columns are the results of the whole labor force regression. The first and third columns of model regression based on 2003 data represent the labor market status before vocational education, and the third and fourth columns based on 2019 data represent the market state after vocational education.

Based on the regression results, this paper analyzes the new labor market and the change of income factors. First of all, from the regression coefficients of the four models with different education levels,
we can see that the development of the new labor market and the whole labor market before and after vocational education presents a trend of differentiation. Among the 23-30-year-old labor force, compared with 2003, the return on education of all education levels of workers is declining compared with that before vocational education. The income of high school, secondary vocational education, adult higher education and general higher education is 0.921, 0.916, 1.228 and 1.482 higher than that of primary school and below 642, 0.438, 0.806, 1.077.

However, the performance of the whole labor market is quite different, and the rate of return on education of workers with different education levels has increased significantly after vocational education. Under the background of the increasing role of the whole labor market education transforming into income, the educational value of the new labor force has declined, which indicates that there are significant differences in the influence of vocational education on different labor markets, and the impact of vocational education on the new labor market is much more obvious than that of other labor markets. That is to say, while the overall employment market has been consolidated and improved with the economic development, the return on education of the new labor force is declining compared with that in 2003.

Table 1. The Regression Results of Labor Vocational Education

| Education level (excluding those below primary school) | Labor force aged 23-30 | All labor |
|--------------------------------------------------------|------------------------|----------|
| Junior middle school (excluding those below primary school) | 0.478 | 0.394* | 0.286*** | 0.398*** |
| Ordinary high school | (1.87) | (2.29) | (6.64) | (10.69) |
| Secondary vocational high school (including vocational high school, technical secondary school and technical school) | 0.921** | 0.642*** | 0.433*** | 0.572*** |
| (3.30) | (3.35) | (8.80) | (12.85) |
| Adult Higher Education | 0.916** | 0.438* | 0.594*** | 0.690*** |
| (3.29) | (2.26) | (12.43) | (16.17) |
| General higher education | 1.228*** | 0.806*** | 0.849*** | 0.970*** |
| (5.01) | (5.52) | (19.34) | (23.58) |
| Gender (1 = female) | -0.188** | -0.349*** | -0.170*** | -0.328*** |
| (2.66) | (5.71) | (7.07) | (13.94) |
| Party member status (1 = Party member) | 0.0214 | 0.0925 | 0.175*** | 0.195*** |
| (0.22) | (1.10) | (6.51) | (6.67) |
| Central region (excluding East) West | -0.283*** | -0.513*** | -0.427*** | -0.457*** |
| (3.32) | (7.38) | (15.51) | (17.64) |
| hands-on background | -0.383*** | -0.412*** | -0.367*** | -0.374*** |
| (4.35) | (4.72) | (11.98) | (11.76) |
| Work experience square | -0.0319 | 0.0693 | 0.00178 | -0.00165 |
| (0.75) | (1.79) | (0.47) | (0.56) |
| Nature of unit (1 = state-owned organs, enterprises and institutions) | 0.00284 | -0.00353 | 0.0000796 | 0.00000441 |
| (1.01) | (-1.40) | (1.24) | (0.10) |
| Constant term | -0.0357 | 0.00616 | 0.320*** | 0.117*** |
| (0.48) | (0.08) | (11.84) | (4.26) |
| Number of samples | 8.496*** | 9.377*** | 8.505*** | 9.489*** |
| R squared | (28.62) | (40.62) | (121.83) | (159.97) |

Note: * is significant on 0.05, ** is significant on 0.01, *** is significant on 0.001, and is t statistic in brackets.
The model verifies the hypothesis in the previous paper that the main group affected by the expansion of higher education is the new labor force group. The differentiation of the new labor market and the whole labor market before and after vocational education can provide an explanation for the contradiction between theoretical research and practical experience of China's education value change since the new century: in recent years, the theory of reading useless has risen again among the people, at the same time, a large number of studies have shown that the return rate of China's education investment continues to rise [14] The results of quantitative studies did not match. The results show that the income level of high education level labor force and low education level labor force is getting closer and the gap is narrowing. In 2019, the relative income level of a college graduate (1.077) has been pulled down to the relative income level of a high school graduate in 2003 (0.921), and even the relative income level of adult college graduates (806) is not as high school graduates in 2003, the promotion effect of education on income is greatly reduced, and the new labor force is facing the reality of relative devaluation of education; however, from the regression results of the relative education level of all labor income, the relative income level of labor force at different education levels in 2019 has increased, which means that all workers are regarded as one As time goes on, the positive effect of education on the income of workers becomes more obvious. This is also the reason why a large number of studies [15-19] show that the return rate of education in China in the new century is still increasing after vocational education. Therefore, it is precisely because vocational education has a more direct impact on the new labor market. However, the influence of Vocational Education in the whole labor market is less than that of other more important macro factors, resulting in the partial and overall development differentiation of the labor market, which makes people's realistic sense and theoretical research have different judgments on the "value" change of education.

The educational role of the new labor market is not as prominent as before vocational education. On the one hand, it is related to the expansion of education. The promotion of compulsory education and the popularization of higher education have greatly improved the quality of the new labor force in China. In a market where the expansion of the scale of participants is not necessarily much, the overall income level of the labor force is bound to be affected Although the educational structure of labor force has been rapidly gathered up in a short period of time, and the industrial development has always been in a relatively low-level state of the industrial chain, the status quo of industrial development can not provide enough high-tech jobs (representing higher income) for high-quality new labor force, the rapid improvement of labor quality and the industrial structure has always been in the low-level contradiction Finally, with China's economic and social development, social structural changes, such as the solidification of social strata, the widening gap between the rich and the poor, and the alienation of social resources, are also projected on the new workers. Finding a good job and getting a good income is influenced by more social and family factors, In the past, as one of the most important characteristics of personal ability, the ability of educational level to affect income has been diluted and weakened.

4. Conclusion

Education plays a weak role in supporting the income of the new labor force. Of course, there are various micro reasons in the process of education expansion, such as the unclear idea of running a university, the decline of training quality, and the immaturity of students' employment outlook. The main reason is that China's existing "low-level" economic structure is difficult to adapt to and accept the labor market, that is, the "low-level" economy The structure does not match the "high" labor market. Therefore, in order to solve the employment problem of college graduates and even young labor force groups, we need to evolve the current industrial structure dominated by low-end industries to the new industrial structure dominated by medium and high-end industries as soon as possible, create "high-quality" employment posts with "high-quality" industrial structure, and improve the overall employment quality of new labor force, so as to fundamentally solve the employment problem of new labor force. The problems of low quality, low-end employment of college students and low value of labor education.
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References

[1] Xu Changfa. the Logic of Redevelopment of Labor Education in the New Era. Education Research, 2018, 039 (011): 12-17
[2] Gao Hongyan. Empirical Study on the Influencing Factors of Labor Dispute Growth in China During the Period of Economic Transformation. Tax and Economy, 2012 (03): 37-44
[3] Yan Xiaofei. Analysis on the Product Nature of Education and Training of Labor Force with Informal Employment. Education and Economy, 2007
[4] Wang Fanmei. Research on the Change of Education and Occupation Structure of African American Labor Force. China Population Science, 2014, 000 (002): 84-95
[5] Yan Xiaojia. on the Importance of Workers' Education in the Era of Knowledge Economy. Hunan Social Sciences, 1999 (03): 32-33
[6] Wang Zhengyu, Jiang Ling, Liang Han. Study on Regional Differences of Contribution of Higher Education Labor Force to Economic Growth. Education Research, 2011, 10: 32-37
[7] Jin Yunhui. a Preliminary Analysis of the Social and Economic Benefits of China's Rural Household Education Expenditure. Quantitative Economy, Technical and Economic Research, 1992, 009 (011): 11-18, 59
[8] Jin Yunhui. a Preliminary Analysis of the Social and Economic Benefits of China's Rural Household Education Expenditure. Quantitative Economy, Technical and Economic Research, 1992 (11): 12-19 + 60
[9] Wang Yasha, Liu Zhidong, Yue Song. Intervention Effect of Biofeedback on Metabolic Syndrome Patients with Different Occupational Stress Levels. Chinese Journal of Occupational Diseases of Labor Health, 2018, 36 (10): 728
[10] Yan Xiaofei. Analysis on the Product Nature of Education and Training of Labor Force with Informal Employment. Education and Economy, 2007, 4: 15-18
[11] Wang Xiugang, Cheng Jing. Looking at Income Distribution from the Perspective of Education Level of Labor Force. New Horizon, 2012 (6): 53-55
[12] Zhang Zhigang, Zhu Jinxiang. My Opinion on the Characteristics of Teacher Education Labor. Journal of Shanxi University of Finance and Economics, 2001 (s1): 158-159
[13] Sun Feifei. Calculation of Economic Benefits of Education and Scientific Research. Research on Quantitative Economy, Technology and Economy, 1987 (02): 36-42
[14] Bai Juhong, Yuan Fei. Analysis of the Relationship Between Farmers' Income Level and Rural Human Capital. Agricultural Technology and Economy, 2003, 1: 16-18
[15] Wang Lijun, Ma Wenxiu. Population Aging and China's Labor Supply Changes. China Population Science, 2012, 6: 23-33
[16] Zheng Meiqin, Wang Yapeng. on the Relationship Between Urban Women's Education and Labor Participation. Economic Review, 2006, 142 (006): 31-35
[17] Jiang Ying, Xiao Zhu. on the Necessity and Basic Ideas of Improving the Status of Labor Law Discipline. Journal of China Institute of Labor Relations, 2011 (01): 25-30
[18] Niu Jianlin. Research on the Influence of Education Level on Retirement Choice. China Population Science, 2015, 5: 58-66
[19] JGao Kai, Wang Hong, Liu Tingting. Influencing Factors of Health Level of Working Population and Evolution Trend of Health Status. Social Science Research, 2018, 1: 38-47