Empirical Analysis of the Impact of Internet Technology on Employment in China

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Abstract

As a primary productive force, technology plays an important role in national economy and a decisive role in the economic growth of a country. In recent years, with the development of information technology, Internet technology has become more and more prominent in the national economy. At the same time, employment is also the basis for maintaining a sustained growth of the national economy and social stability and development. Although Internet technology cannot directly affect employment, it has an impact on employment through other mechanisms of action. In addition, the progress of Internet technology affects the employment through the theory of endogenous growth, the influence of progress of Internet technology on employment gradually receives attention. Therefore, the empirical analysis is conducted based on the influence mechanism of Internet employment on employment in the paper to further study the influence of Internet technology on employment in China in order to provide reference for improving the employment level in China.

Keywords: Internet Technology, China, Impact on Employment, Empirical Analysis.

1. RESEARCH BACKGROUND

1.1 Research review

At present, China is in the constant change and development of technology. Internet technology is one of the mainstreams of development and has profound impact on employment. More employment and entrepreneurial mechanisms have been created through the innovation of Internet technology. Relevant scholars have found that the Internet technology has a negative effect on the total employment in China through the research on innovation of Internet technology in China in recent 30 years. The main reason is that the level of economic development in China is incompatible with the development of Internet technology and the serious imbalance of labor structure caused by the large mobility of labor force, which makes it difficult for Internet technology to play its due role in employment (Chen et al., 2012). At the same time, the researches on the impact of Internet technology on employment emerge. Among them, some scholars selected the data of 30 provinces and cities in China from 1978 to 2008 and calculated the change of Internet technology and technology efficiency in China using DEA method. The ARDL model is used to analyze the influence of Internet technology and technological change on employment (Wen and Wang, 2013). Through the empirical analysis of the impact of total factor productivity, technological progress and technical efficiency index on employment in China, it is found that total factor production (TFP) and technological progress are negatively correlated to the employment level, while the recent advances in Internet technology are conducive to the increase of employed population (Cui et al., 2015). In addition, it is further found in the study of empirical relationship between Internet technology and employment that the impact of progress of Internet technology on employment is not clear during a certain period, which is conducive to the impact of purely technical progress and technical efficiency on the employment level in China. Finally, it is found that backward technology has a negative effect on the increase of employment, and further found that the rapid economic growth has a significant positive effect on the increase of the total employment. Therefore, in order to promote the continual increase of the employment level in China, the Internet technology should be continually adjusted to meet the demand of employment, create all possibilities and maintain high-speed development of economy (Liu and Zeng, 2010).

1.2 Purpose of research

In recent years, with the advent of the information age, the Internet technology has been continuously improving and the impact on employment has been called an important research object in the field of employment.
However, there is no clear conclusion about the impact of Internet technology on employment. Throughout the current research on the relationship between employment and Internet technology, it can be seen that the progress of Internet technology has a dual impact on employment. Specifically, more employment opportunities have been provided and the employment rate has been increased through continuous innovation and development of Internet technology; on the other hand, it has led to a gradual reduction in job opportunities and an increase in unemployment rate (Sheng and Hu, 2011). At the same time, there are other studies on the relationship between employment and Internet technology. Among them, some scholars pointed out that the progress of Internet technology will reduce the employment scale at the beginning of different economic cycles, but the employment rate also changes, as the economic cycle continues to rise. And relevant scholars further pointed out that the effect of the advances in Internet technology on employment should be divided into long-term and short-term effects (Ma and Ning, 2017). In the long term, advances in Internet technology have contributed to employment. However, in the short term, advances in Internet technology have had a devastating effect on employment. Therefore, the paper further analyzes the impact of Internet technology on employment in China based on the above research.

2. IMPACT MECHANISM OF INTERNET TECHNOLOGY ON EMPLOYMENT IN CHINA

The mechanism of action of internet technology on employment has cyclicity. The drive effect of Internet technology to other industries is not very obvious at the initial stage of the development due to its limited development scale. Therefore, the development of Internet technology has negative effect on the employment level in the initial stage, and in many cases, it will lead to decline of employment. As Internet technology gradually grows to a certain stage, the impact on other industries will gradually deepen, which in turn will result in a further increase in employment level (Mao and Zeng, 2017). For example, Alibaba, an internet company that has grown and expanded, has created a lot of employment opportunities on its own. At the same time, with the continuous expansion of Alibaba, it has also promoted the development of express logistics and provided more employment opportunities. Therefore, with the constant development of Internet technology, employment will also show a rapid growth and coordinated development with Internet technology. In addition, the relevant forecasts show that the impact on employment will gradually diminish as the Internet technology moves into a more loyal period (Wen et al., 2011). This shows that the impact of Internet technology on employment is a process from weak to strong and from strong to weak, characterized by periodicity. In this process, the relationship between Internet technology and employment is developed from lack of coordination to coordinated development and mutual improvement (Xiao et al., 2017). The specific process is shown in Figure 1.

4. EMPIRICAL ANALYSIS OF THE IMPACT OF INTERNET TECHNOLOGY ON EMPLOYMENT IN CHINA

4.1 Establish a model

In order to further study the influence of Internet technology on employment, the model of the impact of Internet technology on employment is established with the Suoluo growth model based on the principle of profit maximization of manufacturing enterprises in the paper (Qi and Wang, 2015). The production function of manufacturers is as follows,

\[ Y = AK^aL^\beta \]  

(1)
Where Y refers to the actual output of the manufacturing enterprise; A refers to the specific impact of Internet technology on the output; K refers to the impact of capital stock on the output; L refers to the number of people required for production. Among them, \( \alpha \) and \( \beta \) refer to the elasticity coefficients of the capital stock and the number of people required for production. The profit function can be obtained through calculation with the production function.

\[
l = PY - wL - rK
\]

P refers to the selling price of the product; \( w \) refers to the salary required for the production and \( r \) refers to the cost of equipment required for production, including plant and machinery. The partial derivative in equation (1) is solved to obtain the marginal efficiency of labor required for production. In the process, the profit from production is the largest by default, and then it can be seen that the labor required in the production process should be

\[
\frac{\partial Y}{\partial L} = MPL = \beta AK^\alpha L^{\beta-1} = \frac{w}{\beta}
\]

The logarithmic function on both sides of equation (3) is solved to calculate the influence model of Internet technology on employment:

\[
\ln L = \alpha_0 + \alpha_1 \ln A + \alpha_2 \ln K + \alpha_3 \ln \left( \frac{w}{\beta} \right)
\]

The impact of industrial structure change in China on employment should be fully considered on setting up the influence model of Internet technology on employment. As the tertiary industry accounts for a relatively larger proportion in the industrial structure of China and boasts higher flexibility, the impact of industrial structure change on employment has been incorporated into the model. In addition, advances in the Internet technology also affect the capital stock and the investment in labor force required for production. Therefore, when the model is established, the capital stock and laborer’s wages should be introduced.

### 4.2 Select variable

In order to clarify the impact of Internet technology on employment, the Internet technology, capital stock in enterprises, proportion of industries and the wage level of employees required for production and management of enterprises in 30 provinces and cities of China are selected as the variables in the paper, and the geographical differences between provinces and cities, different levels of economic development and other factors are fully considered, so as to further reflect the impact of Internet technology on employment. In selecting related variables of Internet technology, the total factor productivity is used as the calculation volume, which mainly includes the total production volume, labor force and funds required for production. At the same time, according to the relevant scholars’ research, the whole production factor can be expressed as \( A = y / (l^\alpha k^\beta) \). In addition, the impact of Internet technology on employment will be studied through the panel data of 30 provinces and cities in China from 1996 to 2016 in the paper. The data studied refers to the characteristics of economic development in China, and the data of 30 provinces is divided into the eastern, central and western region. Among them, the eastern region includes 10 developed regions such as Beijing, Shanghai, Guangdong and Shenzhen. The central region includes 10 provinces and cities such as Hebei, Hunan, Jilin and Heilongjiang. The western region includes 10 regions including Inner Mongolia, Xinjiang, Gansu and Qinghai. The selected data is described in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Variable value</th>
<th>Average value</th>
<th>Standard deviation</th>
<th>Minimum value</th>
<th>Maximum value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet technology</td>
<td>900</td>
<td>0.98</td>
<td>4.5</td>
<td>39</td>
<td>38.98</td>
</tr>
<tr>
<td>Capital stock</td>
<td>900</td>
<td>1130</td>
<td>1550</td>
<td>12541</td>
<td>9854</td>
</tr>
<tr>
<td>Salary</td>
<td>900</td>
<td>2010</td>
<td>1157</td>
<td>624</td>
<td>5642</td>
</tr>
<tr>
<td>Proportion of industry</td>
<td>900</td>
<td>0.35</td>
<td>0.98</td>
<td>0.15</td>
<td>0.81</td>
</tr>
</tbody>
</table>
4.3 Empirical analysis

In this paper, the employment is deemed as explanatory variable to integrate the panel data of 30 provinces and cities in China through the method of panel data analysis. In order to validate the cross-section and time-series data of the template data, the panel data is verified. The test results show that the panel data has a positive effect on the cross-section model. For panel data, variables other than employment, capital stock, real wages, industrial structure and other factors exist. Therefore, OLS regression is usually used to name the variable that causes the change of explanatory variables to be random variable V. The estimation method is usually used to remove the average in the variable group to obtain the fixed effect model. When random variables have a significant impact on the explanatory variables, a random effect model is used. When there is a significant difference between the two models, the variables of other influence factors have obvious influence on the explanatory variables.

At the same time, according to the established model $\ln L = \alpha_0 + \alpha_1 \ln A + \alpha_2 \ln K + \alpha_3 \ln \left( \frac{\ln w}{P} \right)$, and in consideration of the defects of data collection, the model only includes the variables such as Internet technology, capital stock, and wage level of workers required for production as the variables have no obvious impact on the explanatory variables caused by loss of data freedom, which is used to predict the result of impact on the explanatory variables. It can be seen from Table 2 that the correlation coefficient of Internet technology and capital stock is negative, and the coefficient of wage level of workers required for actual production is positive. This shows that the development of Internet technology in China in recent years has led to the emergence of labor force replaced by capital in the employment field. As the wage level in our country is at a low level, the labor supply is in a rising stage and increase in wage has driven further growth of labor force. At the same time, it can be seen that in the development process of Internet technology, the influence coefficient of Internet technology on employment is almost unchanged. However, the coefficient of lagged variable of Internet technology is negative. In other words, the negative influence of Internet technology on employment will decrease in course of time. When the development of Internet technology enters a stable stage, it will have less negative impact on employment. As the development of Internet technology comes to maturity, the impact on employment will increase. Specifically, the impact of Internet technology on employment will continue to change as it develops and over time. In a short period of time, Internet technology is not conducive to the growth of employment. However, when Internet technology comes to a certain period of time, its positive effect on employment will be highlighted. Thus, the impact of the development of Internet technology on employment presents a U-shaped graph. The specific result is shown in Table 2.

<table>
<thead>
<tr>
<th>Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\ln A$</td>
<td>-0.087***</td>
<td>-0.0833***</td>
<td>-0.821***</td>
<td>-0.081***</td>
<td>-0.0810***</td>
<td>-0.0711***</td>
</tr>
<tr>
<td>$\ln K$</td>
<td>-0.154***</td>
<td>-0.174***</td>
<td>-0.197***</td>
<td>-0.178***</td>
<td>-0.124***</td>
<td>-0.0144***</td>
</tr>
<tr>
<td>$\ln \left( \frac{\ln w}{P} \right)$</td>
<td>1.093***</td>
<td>1.341***</td>
<td>1.198***</td>
<td>1.154***</td>
<td>1.105***</td>
<td>0.941***</td>
</tr>
<tr>
<td>$\ln t$</td>
<td>0.0984</td>
<td>0.0740</td>
<td>0.584</td>
<td>0.0014</td>
<td>-0.012</td>
<td>-0.0341</td>
</tr>
</tbody>
</table>

***shows it is significant at the level above 0.01.

5. CONCLUSION

At present, China is in a new normal of economic development. Internet technology has significant differences in different regions for employment in China. And due to the imbalance of economic development in China, the impact of Internet technology on employment in different regions has different effects. With relatively high level of economic development in eastern China, the level of Internet technology is significantly higher than that in other regions. Therefore, the compensation of Internet technology on employment is more obvious than that in other areas. Overall, the impact of Internet technology on employment in China is currently in a negative state and in the left part of the U-shape. The positive effect of Internet technology on employment in China has not yet been reflected. Therefore, so far the employment pressure in China is still facing huge difficulties.

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