Underemployment in China: Causes and Effects

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Abstract

The purpose of this paper is to explain the influence factors of matchup and mismatch in the investment of highly educated laborers and income by job for new college graduates in China. Although with the economic development, employment opportunities are constantly increasing, the country has realized the polarization of education with its rapid development in China. A large number of new college graduates flooded the market. The phenomenon is that market labor demand is insufficient to meet the annual supply of new graduates entering the market, resulting in underemployment and overeducation. In China, which is in the process of economic transformation, the more prominent problems in the social labor market are overeducation and a series of mismatches in income returns. This paper has considered the effect of mismatch due to underemployment. Taking this into account, we have used the overlapping generations (OLG) model and found that the greater the mismatch, the greater the underemployment is.

Keywords: Overeducation, Underemployment, Mismatch, Match up

1. Introduction

Underemployment means that laborers can't become skilled workers even though they have received education even higher education. The number of college freshmen has been increasing in China since 1978, and high education in China has entered the stage of popularization. After the second half of the 1990s, with changes in China's education reform, the employment of college graduates shifted from the previous national distribution system to an independent employment system. With the advancement of job marketization, employment of college graduates benefits graduates from first-rate universities and specific majors, but it is also difficult for graduates from universities with low preparatory stages and certain majors. Although the number of new graduates increased from 1.15 million in 2001 to 10.76 million in 2022, the unemployment rate for college graduates continued to rise, and

wages gradually decreased. According to the data from the National Bureau of Statistics of China, the average wage of a college graduate in 2007 was 24,852 yuan, a decrease of 7.1% in 2006 and 11.6% in 2005. Many college graduates must wait for jobs for years. Moreover, college graduates who need a job choose a job with a lower requirement in their educational background or a job mismatch in their major because of several reasons. The scale of high education in China has been ahead of most countries and has become the top of the world; however, with the growth of GDP, the number the jobs offered by companies falls short of the yearly increasing number of college graduates. Many college graduates choose to find a job and job-hopping to another company later. Moreover, many jobs need laborers without high education, but laborers with high education took such jobs. Because of the general increase in the educational background by companies, the rate of low-skill labor without a college degree has been substantially reduced. The number of highly educated new college graduates is speedily increasing. A symbol of overeducation is that new college graduates the jobs with low requirements of vocational skills. Whether highly educated graduates or not, if low-skill laborers refuse jobs of lower requirements, they must face the truth that they have no job to do. Then overeducation appeared.

Finding a job has become more and increasingly hard recently. Postgraduate exams are a hotspot at the same time and the number of graduate students has increased rapidly. The number of people taking the postgraduate exam has risen to 1 million for 9 years. The increase of graduate students and the improvement in social quality are the preconditions for scientific research ability. However, we should rethink the conditions in China. According to the interview, most students take the postgraduate exam to find an appropriate job instead of continuing the study of vocational skills.

According to some scholars, the process of industrialization and urbanization has become a key factor in national income due to the constantly changing industrial structure. The construction of the labor market and the form of the income distribution have changed several times as a result of economic development and the transference of industrial structure. China's economy is still undergoing economic and social transformation, and model change and upgrades have yet to be fully realized. The job market cannot sustain so many high-quality groups. The former secondary industry-based manufacturing industry has given way to a tertiary industry-based industrial structure. A large number of secondary industry workers transferred to the tertiary sector. The jobs that can be provided by the manufacturing industry, which has a relatively large demand for labor, have also gradually decreased, replaced with a mechanized production structure. The influx of secondary industry employees into the tertiary industry has increased the tertiary industry's employment pressure.

The tertiary industry market is divided into primary (high skill) and secondary (low skill). The high-skill market has high wages and good conditions, whereas the low-skill market is the opposite. The social structure of our country determines that there are too few jobs in the high-skill market. Because of a lack of employment opportunities in the high-skill market, many new graduates choose the low-skill market as their second-best option. Higher education does not increase their income, but rather increases knowledge depreciation, resulting in the mismatch phenomenon of educational investment and return.

Two main research results related to education matching can be drawn. One is the explanation of the current situation and changing trends, the other is the effect upon the labor market. For example, in recent years, most studies have focused on the impact of statistical variables such as the level of education and work experience received by workers on the unemployment rate (Hur and Bae,2021). The matching theory of education and work holds that a job with which matches up will lead to positive work attitudes. Otherwise,it will cause negative consequences. Overeducation, as a representative form of mismatch between education and work, is the result of the mismatch between personal ability and job requirements (Luksyte and Spitzmueller, 2016), therefore, compared with moderate education, overeducation will positively affect the unemployment rate of workers (Harari, 2017).

Two approaches can be employed study the problem by building a specific model. One approach is the Mincer Equation, proposed by Duncan and Hoffman (1981), which splits years of education into a required year of education by company, a year of overeducation, and a year of undereducation to presume the return rate of matching education and mismatching education.

Another research approach is to obtain the effect of education matching on income directly by practically controlling the year of education and adding two virtual variables of overeducation and undereducation, which is proposed by Verdugo (1989). However, regardless of the approach, the same finding is obtained in that compared with an appropriately educated person, the income return of the overeducated person is at a disadvantage (Dolton,2000).

Then, how can we understand the inferior income of an overeducated person compared with an appropriately educated person? Most researchers have proposed two theoretical interpretations of mutual competition: the theories of post-distribution and human capital.

How much is the causality between education matching and income? Due to the marginality of the ordinary least squares (OLS) regression model, researchers have recently started to discover the relationship between education matching and income by other statistical methods. However, there is a huge difference in results. For example, a significant difference exists between the trend value matching method and the OLS regression model results. The findings reveal that overeducation negatively impacts individual and collective productivity and wage level, however, the missing variable is ignored. In contrast, Bauer (2002) analyzed tracking data via random and fixed effect models. After controlling the unobserved individual heterogeneity, he discovered that the income gap between appropriately educated labor and inappropriately educated labor has almost disappeared. According to the research of Moav(2002), when there is no bequest, they can't get money from their parents, then they will always be poor. When education becomes possible, and bequest will be invested into education, then the saving will be plus if they receive maximizing education.The difference from Moav's research is that the mismatch is considered. According to the difference between the high-skill wage rate and low-skill wage rate. Because the preceding research was conducted in different social contexts, the central issue addressed in Chapter 2 is the influence factors of matchup and mismatch of the investment and employment income of

highly educated laborers for new college graduates in China.

2. Model

In general, those with higher education will become high-skill workers, while those without will become low-skill workers, and the income of high-skill workers will be higher than that of low-skill workers. However, do people with more education necessarily become more skilled workers?

This chapter uses a theoretical model to analyze underemployment due to mismatch while distinguishing between high-skill and low-skill workers.

2.1 Firms

Production, capital, and labor markets exhibit perfect competition in a closed economy. Two production methods exist. The first uses capital and low-skill labor. For simplicity, we assume a linear production function.

Considering the relationship between production, labor, and capital as the following production function,

$$Y_t = aK_t + d_l L_{lt} \tag{1}$$

where Y_t is the throughput, K_t is capital, and L_l is the amount of low-skill labor.

According to the principle of Cost Minimization,

$$a = R_t = R, \text{ and } d_l = W_{lt} = W_l,$$

where, R_t is the interest rate, and W_{lt} is the wage rate for low-skill workers.

Hence, both interest rates and wages are constant.

The following production function describes the second method of production, which can only be produced with highly skilled labor,

$$Y_t = d_h \sum_{i=1}^{L_{ht}} h_{it}, \tag{2}$$

L_{ht} is the high-skill labor force, h_{it} is the human capital level of high-skill workers i.

According to the principle of Cost Minimization,

$$d_h = W_{ht} = W_h,$$

W_{ht} is the high-skill wage rate.

2.2 Households

Think of the human capital as follow,

$$h_{it} = h(e_{it}) = \begin{cases} 1 + \gamma e_{it} & \text{, if } e_{it} < \bar{e}, \tag{3} \\ \\ 1 + \gamma\,\bar{e}, & \text{ if } e_{it} > \bar{e}, \tag{4} \end{cases}$$

Where $i(th)$ is the household (i=1,2…N), $\gamma>0$, e_{it} is the education investment, $\bar{e}$ means that education investment will not increase any further, h_{it} denotes human capital level in period t.

The utility maximization problem of an individual born in period t-1 is,

$$max \quad U_{it} \equiv \beta \ln c_{it} + (1-\beta)\ln(\theta + b_{it}) \tag{5}$$

$$(c_t, b_t)$$

where, $0<\beta<1$ and $\theta>0$. An individual's income in period is used for consumption and bequest, where bequest is used for a child's education investment and the remaining transfers to the offspring as a saving. Hence, the budget constraint equation is,

$$I_{it} = c_{it} + b_{it} \tag{6}$$

where c_{it} is the consumption in t, I_{it} is the income, b_{it} is bequests for the children in t. Assume a positive parameter θ, $\theta>0, 0<\beta<1$.

The utility function is designed to generate the convex bequest function. The bequests level of an individual born in period t-1 is described by the following equation,

$$b_{it} = (1-\beta)I_{it} - \beta\theta, \text{if } I_{it} > \frac{\beta\theta}{(1-\beta)} \tag{7}$$

$$b_{it} = 0, \text{ if } I_{it} \leq \frac{\beta\theta}{(1-\beta)}. \tag{8}$$

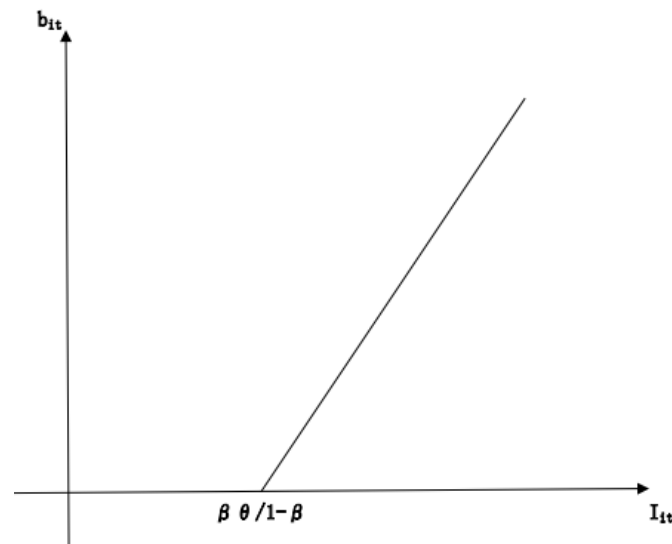Using(7)and(8), The relationship between income and asset can be expressed as,

Figure 1. The relationship between income and bequest

If the income is higher than $\beta\theta/1-\beta$, there will be an increase in the asset, while if the income is lower, there will not be any bequest.

Using (6) and (7), and (8), The relationship between income and consumption is as the following,

$$c_{it} = \beta I_{it} + \beta\theta \;, \text{ if } I_{it} > \frac{\beta\theta}{(1-\beta)}, \tag{9}$$

$$c_{it} = I_{it} \;, \text{ if } I_{it} \leq \frac{\beta\theta}{(1-\beta)}. \tag{10}$$

Under (9) and (10), The relationship between income and consumption is as the following,

assumption 1: $\; d_l < \frac{\beta\theta}{(1-\beta)}.$

2.3 Equilibrium

Parents will have no assets if they work as low-skilled workers during the $I_{it} = W_l$ stage. Households will spend their entire income. Everything revolves around consumption. There will be no assets if $b_{it} = 0$. In other words, no savings will be made. Parents cannot afford to send their children to college or buy them an education. As a result, the family will always be poor.

Assumption 2: Based on b_{it} how much will be spent on education and how much will be saved, the following assumptions are made,

$$\text{h'}(e_{it})\text{E}(W_h) > \text{R}, \tag{11}$$

where $\text{E}(W_h)$ is the expected value of W_h. In this analysis, we consider the possibility of a mismatch between education and work for high-skilled labor, so W_h is the expected value.

Hence,

$$\gamma\text{E}(W_h) > a \;, \tag{12}$$

$\gamma\text{E}(W_h)$ is the expected return on investment in education, and a is the return on savings. Compared with the interest rate, the return rate on education is higher. In other words, if there is a b_{it}, please use it for education first. When we increase education funding, the quality of education improves, as does the return on investment. However, because the maximum return on education is $\bar{\text{e}}$, there is no need to invest in education at that time, and the remainder should be saved.

The formula for the relationship between educational investment and wealth is as follows,

$$b_{it} = e_{it}, \qquad \text{If} \quad b_{it} \leq \bar{\text{e}} \tag{13}$$

$$b_{it} = \bar{\text{e}} + (b_{it} - \bar{\text{e}}), \quad \text{If} \quad b_{it} > \bar{\text{e}} \tag{14}$$

the probability of mismatching is given by q. The formula for the expected value is as follows,

$$\text{E}(W_h) = (1-q)\; W_h = (1-q)d_h \tag{15}$$

Under (11) and (15),

$$（1-q）\gamma W_h > a \tag{16}$$

Individuals will undoubtedly work as low-skilled workers if no educational investment is made. Individuals who are educated are likely to be able to work as highly skilled workers. Therefore, the problem here is that you may or may not be able to find a decent job. There could be a mismatch. The probability of mismatching is given by q. People with a probability of (1-q) may find a job that matches their education level. If q=0, everyone with higher education is automatically highly skilled, which is the ideal situation.

However, because q>0, if there is a mismatch, some unfortunate people may go from rich to poor as a result of the mismatch.

Because of this, the distinction between high-skilled and low-skilled workers is first considered. If q is zero, then the result is largely consistent with the conclusions in Moav's (2002) research.

2.4 Dynamics

Considering the difference between W_h and W_l, the child's income can be written as follows if a child receives a higher education.

First, $0 < b_{it} \leq \bar{e}$,

$$I_{it+1} = W_l, \qquad \text{with probability q} \tag{17}$$

$$I_{it+1} = W_h \text{h}(e_{it}), \qquad \text{with probability 1-q} \tag{18}$$

considering on average,

$$I_{it+1} = qW_l + (1-q)W_h \text{h}(e_{it}). \tag{19}$$

Then, $b_{it} > \bar{e}$,

$$I_{it+1} = W_l + R(b_{it} - \bar{e}) \quad \text{with probability q,} \tag{20}$$

$$I_{it+1} = W_h \text{h}(e_{it}) + R(b_{it} - \bar{e}) \quad \text{with probability 1-q,} \tag{21}$$

Considering on average,

$$I_{it+1} = qW_l + (1-q)W_h \text{h}(\bar{e}) + R(b_{it} - \bar{e}), \tag{22}$$

depending on the size of the bequest, the bequest from the children can be written as,

$$b_{it+1} = \begin{cases} (1-\beta)\left[q d_l + (1-q)d_h(1+\gamma b_{it})\right] - \beta\theta, & \text{if } 0 < b_{it} \leq \bar{e} \tag{23} \\\\ (1-\beta)\left[q d_l + (1-q)d_h(1+\gamma \bar{e}) + R(b_{it} - \bar{e})\right] - \beta\theta, & \text{if } b_{it} > \bar{e} \tag{24} \end{cases}$$

Under (23), we assume,

$$(1 - \beta)(1 - q)d_h\gamma > 1 \tag{25}$$

This assumption allows catching up from the poor to the rich. Please refer to Figure 2.

Under the assumption of (25), we consider the steady state,

$$b_{\mathrm{I}} = \frac{\beta\theta - (1-\beta)[qd_l + (1-q)d_h]}{(1-\beta)(1-q)d_h\gamma - 1} \tag{26}$$

under (26), $\partial b_{\mathrm{I}} / \partial q > 0$

hence, the higher the mismatch probability is, the higher b_{I} is.

Under (24), assumption,

$$(1 - \beta)R < 1. \tag{27}$$

This assumption guarantees the convergence of the rich's wealth. Please refer to Figure 2.

Under the assumption of (27), we consider the steady state,

$$b_{\mathrm{II}} = \frac{(1-\beta)\,[qd_l + (1-q)d_h(1+\gamma\ \bar{e}) - Re] - \beta\theta}{1 - (1-\beta)R} \tag{28}$$

$$\partial b_{\mathrm{II}} / \partial q < 0 \tag{29}$$

The more extensive q is, the more negative b_{II} becomes.
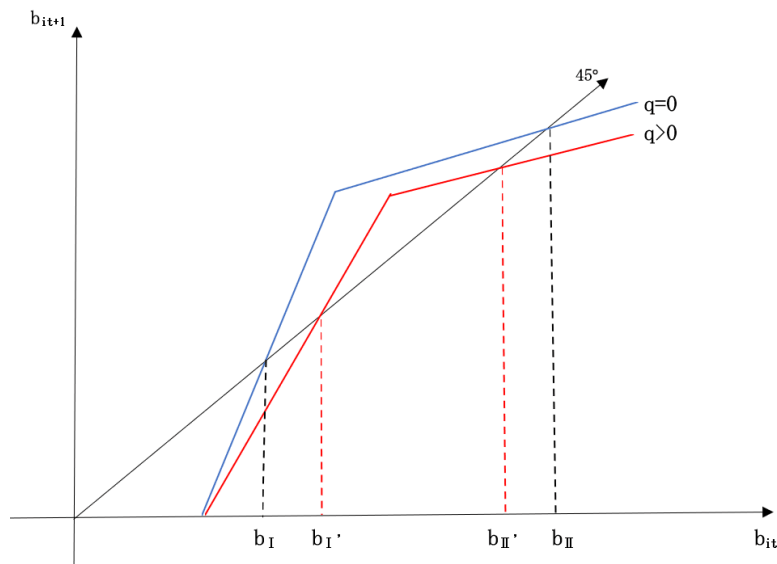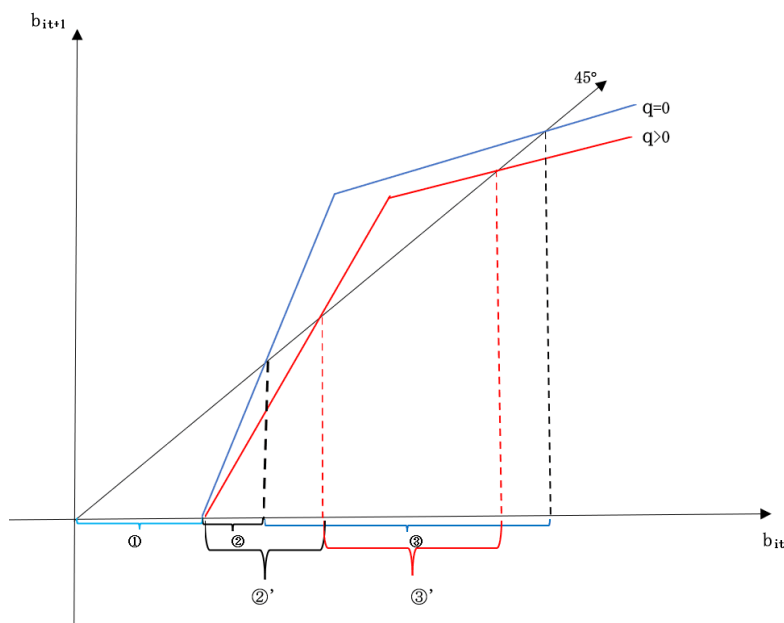

Figure 2. Bequest Dynamics(1)

Figure 3. Bequest Dynamics(2)

If q is less than zero (Fig. 3), people in part 3 can work as high-skilled workers - they can save money and all become rich. However, people in parts 1 and 2 will stay poor forever.

If q = 0, some people with higher education can be high-skilled workers. However, since there is a mismatch (q > 0), low-skilled workers will remain poorer, and there is an increasing possibility that a portion of the middle class with higher education (2 '- 2) will fall into the poverty group. The number of people working as high-skill laborers who are originally wealthy will also decrease. Furthermore, if q = 0, the rich (3 – 3 ') should be able to increase their income level even further, but the number of highly skilled workers will decrease even further, with a decrease in their income level as well.

3. Conclusions and Suggestions

This paper has considered the effect of mismatch due to underemployment. Taking this into account, the OLG model has been applied. It is concluded that the greater the mismatch is, the greater the underemployment is. When there is a mismatch, the income of employment will reduce and the accumulation of finance will slow down. The people who should have been high-skill laborers become low-skilled workers. As a consequence, the quantity of underemployment increases. The greater the mismatch is, the greater the underemployment is, then the overeducated labors increases and results in the waste of talent.

In China, households are classified as high-income or low-income based on their income. If the conditions for receiving higher education are not satisfactory for low-income families, children must begin working while still in high school and become low-skilled workers. In contrast, high-income families can provide an environment in which their children can pursue higher education. With economic development, industrial structure changes and higher education expansion, the phenomenon of underemployment appears. Underemployment

directly causes new university graduates to be unable to find jobs or jobs that do not suit them. Additionally, when there is a gap in recognition between themselves and the company, a mismatch of jobs and expectations will occur the number of people who should have obtained high income will decrease, and the investment and return on education will become unequal.

On the macro level, the issue of overeducation and mismatch generated in the labor market mainly results from the structural transformation of industry and employment as well as the gap between investment and return of the expansion of higher education. On the micro level, the problem of overeducation and underemployment is the result of voluntary or passive choices of employers and employees.

While macroscopically overeducation and mismatch cannot be completely eliminated, their seriousness can be discussed. Individually, it occurs in an uncertain manner. As a result, the author believes that several policy options exist to alleviate or control the problem of overeducation and mismatch. First, the industrial structure requires upgrading to generate more opportunities for employment catering to the labor force with higher education.

Second, higher education must be scaled up moderately, and the allocation of educational resources must be optimized rationally.

Third, the degree of segmentation of the labor market should be reduced to ensure a reasonable flow of talent.

Last but not least, rather than blindly following the trend, college students should invest more rationally.

Acknowledgments

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