

# Educational Mismatch and Job Satisfaction in China

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## **Abstract**

*Educational mismatch has become a growing concern in many countries. Using the 2014 China Labor force Dynamic Survey (CLDS), this paper examines the effect of educational mismatch on labor market outcomes such as wage level and workers' subjective job satisfaction. Moreover, this study explores the effective determinants of over- or under-education in China. Three major findings are reported in this paper. First, it provides empirical evidence for educational mismatch in China. The data shows that 13 and 17 percent of Chinese workers are over- and under-educated, respectively, for current jobs. Second, empirical analyses of this study show some evidence of the effect of educational mismatch on labor market outcomes. While educational mismatch has no statistically significant impact on wage level, there exists a negative effect of over-education on workers' subjective job satisfaction. Third, workers' individual characteristics and job characteristics influences the occurrence of educational mismatch. The empirical results of this study show that gender, language skills, firm size and employment status are major sources of educational mismatch. This study contributes to the literature by providing new empirical evidence on the effect of educational mismatch in China. It sheds more light on the issue of educational mismatch and provides important insights regarding labor market and educational policies.*

**Keywords:** educational mismatch, over-education, job satisfaction, CLDS

**JEL classification:** I26, J24, J28

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## **1. Introduction**

Over the last two decades, the education levels have generally risen in most countries. In OECD member countries, the proportion of the young adults (25-34 year-olds) who completed tertiary education increased from 25 percent in 1998 to 43 percent in 2016. The proportion of the youth

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with at least upper secondary education has increased from 72 percent in 1998 to 85 percent in 2016. Also in China, the proportion of the young adults who completed at least upper secondary education has increased from 23 percent in 1998 to 25 percent in 2016. Moreover, the proportion of the youth with tertiary education has doubled from 5 percent in 1998 to 10 percent in 2016 (OECD, 2000, 2017).

However, the number of jobs requiring higher education or skill levels does not grow fast enough to match the growth rate of the number of young adults with increased educational levels. As a result, many young workers find that their attained education levels are not adequate for the levels of education required for their current jobs. This educational mismatch, the lack of coherence between the worker's own education level and the level of education required for his/her job (Vermeulen et al., 2014; Betti et al., 2011), has become a growing concern among scholars and policy makers. Some even argue that there is over-investment in education and it results in inefficient use of resources of the society.

There has been much evidence of educational mismatch in advanced countries (Meroni, 2017; Carroll, Tani, 2013; Wu, Wang, 2018; Budria, Moro-Egido, 2008; European Union, 2012). For example, the European Union (2012) shows that 36 percent of workers in the EU27 were reported as over-educated for their jobs during the 2000s. Especially, over-education is reported more often among tertiary educated workers. Roughly 30 percent of college educated workers reported that their education levels were not matched to the required education level of current jobs in 2009. Also there have been some studies reporting evidence of educational mismatch in developing countries such as Mexico, Philippines, Pakistan and China (Mehta et al., 2011; Quinn, Rubb, 2006; Abbas, 2008; Wu, Lai, 2010; Wu, Wang, 2018).

While all types of educational mismatch matter, over-education among the young workers is considered as more problematic. First, over-educated workers tend to earn less than their former classmates who work at well-matched jobs and are less likely to be satisfied with their current jobs (Daly et al., 2000; Bauer, 2002; Boll, Leppin, 2016). Secondly, firms report that over-educated workers tend to be less productive than adequately educated workers (Tsang, Levin, 1985; Sicherman, 1991; Sloane et al., 1999). Lastly, an increase in educational mismatch causes inefficiency to the entire economy because it wasted social resources to finance excessive level of education (McGuinness, 2006). As such, educational mismatch is an important issue to be addressed (Mavromaras, McGuinness, 2012).

In China, the issue of over-education has become a concern as the average education level of Chinese youth rises fast. Over the last two decades, the number of young workers with college education has increased dramatically from 0.95 million workers in 2000 to 7.53 million workers in 2018 (Mok, Quian, 2018). However, the number of jobs that require higher education levels has not been growing as fast as the growth of the number of college educated young workers. The educational mismatch becomes one of major concerns in Chinese labor market. A recent article reports that Chinese labor market suffers from the problem of over-education and the problem of under-skilled simultaneously (Fudan University, Tsinghua University, 2016). That is, on the one hand, college educated young workers suffer from over-education problem, because this highly

educated young workforce failed to find well-matched jobs for their own education levels. On the other hand, firms are suffering from under-skilled problem, because the types of skills required by the firms are different from the those taught in schools and they found it difficult to get adequately trained workers for their specific jobs (Wu, Wang, 2018).

Considering that educational mismatch is a prominent problem in Chinese labor market, a more fruitful research is still desirable on this issue. This study explores the extent of educational mismatch and its effect on labor market outcomes using a micro-level data from China. This study has three goals. First, this study aims to provide empirical evidence of the existence of educational mismatch in the Chinese labor market. Secondly, this paper examines the effect of educational mismatch on labor market outcomes such as wage levels and worker's job satisfaction. Third, this study investigates the determinants of educational mismatch among young workers.

This study contributes to the literature by providing empirical evidence of educational mismatch in China. More specifically, this study shows that, similar to other advanced economies, more than one out of five workers are either over-educated or under-educated for their current jobs. Moreover, this study reveals that educational mismatch has a negative effect on non-financial benefits from the jobs, while it has no significant impact on financial benefits such as wage level. Lastly, this study reports that workers' individual characteristics and job characteristics are major determinants of educational mismatch in China. The results of this study will provide interesting facts to be considered on the nature of educational mismatch and induce important implications for relevant education and labor market policies in China.

This study is structured as followings. The next section discusses the existing literature on the topic of educational mismatch around the world. Section 3 introduces the data set and research methodology for empirical analysis. Section 4 reports the findings of this study. The last section concludes.

## **2. Literature review**

Educational mismatch in advanced economies is widely reported in many previous researches. Recent studies show that, in 21 EU countries, the share of overeducated workers is 28%, on average, with significant variation across countries (European Union, 2012). It is reported that, generally, the share of overeducated workers is higher in France, Austria, Italy, Greece and Spain (35% or above) and is lower in Estonia, Belgium, Latvia and Germany (20% or below). Based on the existing studies, Lueven, Oosterbeek (2011) show that the overall means of over-education is 30% of workers and the under-education is 26% among advanced economies. They also showed that, on average, the share of over education tends to be larger in the U.S. and Canada, while the share of under educated is somewhat larger in EU countries.

Relatively few researches exist on the educational mismatch in developing countries because these countries have relatively lower levels of accumulated human capital. However, some studies report empirical evidence of educational mismatch in developing countries such as Mexico (Mehta et al., 2011; Quinn, Rubb, 2006), Philippines (Mehta et al., 2011), and Pakistan

(Abbas, 2008). Also, in China, educational mismatch is reported recently. The studies which examined urban areas such as Beijing (Wu, Lai, 2010) or Kunming city (Wu, Wang, 2018) report a relatively large share of over-educated workers (34% or above) and a smaller share of under-educated workers (9% or below).

Educational mismatch has a significant implication for a national economy. From a macro level perspective, a large share of over-educated workers may suggest that their human capital is not fully utilized and their investment on education is not rewarded appropriately (McGuinness, 2006; Fei, Aun, 2019). From a micro-level perspective, educational mismatch could influence various labor market outcomes of each individual affected. Existing literature provides empirical evidence and some explanations on the effect of educational mismatch at individual levels. This section reviews two trends of existing studies on the effect of educational mismatch. The first type of studies focuses on the effect of educational mismatch on financial benefits such as wages (Duncan, Hoffman, 1981; Rumberger, 1987; Marvromaras et al., 2010; Sicherman 1991; Van der Meer, 2006). The other type is more focused on examining the effect of educational mismatch on non-financial benefits such as workers' job satisfaction (Tsang 1987; Hersch, 1991; Tsang et al., 1991; Verhaest, Omeij 2006; Buchel, Ham, 2003; Green, Zhu, 2010).

Many studies examined the effect of educational mismatch on wages, but the predictions on the effect of educational mismatch somewhat differ among researchers. The studies based on human capital theory (Rosen, 1972) argue that additional education among over-educated workers is somewhat productive. They find that over-educated workers tend to receive higher wages than their less educated coworkers, which implicitly suggest additional education is productive (Sattinger 1993). These arguments are supported by the empirical results showing positive return to surplus education and negative return to deficit education (Duncan, Hoffman, 1981).

On the other hand, the researches based on job competition model (Thurow, 1972) argue that attained education does not affect earnings directly, but it works as a signal for workers' unobservable ability when firms assign jobs based on workers' own ability levels. Since education does not change one's productivity level, the returns to over- or under-education would be zero empirically (Slonimczyk, 2008). In addition, job competition model predicts that higher educated workers would crowd out lower educated workers during the economic downturn. That is, the firms with jobs that require lower educational level reduce their workforce during recession but it upgrades their workforce with the surplus of higher educated workers during the recovery period. Gautier et al. (2002) found some evidence that firms upgraded their workforce in low employment years.

Meanwhile, some studies based on career mobility theory (Sicherman, Galor, 1990) argue that individuals voluntarily select into jobs which require lower education level due to the possibility of career mobility. They explain that some workers prefer to start in a job below his/her ability level in order to obtain more training and work experience on the job, which helps them to accumulate the necessary skills for future career mobility. It explains the individuals who accept the jobs that require a lower level of education voluntarily when these jobs offer higher

probability to be promoted in the future. According to the career mobility model, the prediction for the signs of return of over-education is ambiguous.

Lastly, there are studies implying that educational mismatch is the outcome of labor market friction. Since the labor market is not in equilibrium most of the time, highly educated workers tend to have more probability to get assigned to jobs that require lower level of training or education. However, high skilled workers may accept simple jobs if they are allowed to engage in job search for a better job (Gautier, 2002; Dolado et al., 2009). Also in this case, the prediction on the sign of the estimated expected return to over-education is ambiguous. If the job characteristic determines the wage level regardless of workers' true productivity level, one would expect zero return from additional education. On the other hand, if observed productivity on the job is associated with a higher probability of career mobility for better jobs and the productivity determines the wage level, one would expect a positive return to additional education (Daly et al., 2000). Overall, there has been no clear consensus on the effect of educational mismatch on wage level.

There is another trend of studies on the effect of educational mismatch on workers' job satisfaction (Freeman, 1978). These studies explain that educational mismatch lowers workers' motivation to work, which leads to more frequent absenteeism, higher turnover rate among the workforce (Tsang, Levin, 1985; Sicherman, 1991; Sloane et al., 1999). Also educational mismatch lower job satisfaction if workers feel that their skills are not fully utilized, or if they feel that their work tasks are boring, or if low productivity results in a lack of recognition (Judge et al., 2001). Some articles are providing evidence to support that over-education is related to lower job satisfaction (Daly et al., 2000; Bauer, 2002; Boll, Leppin, 2016).

In China, there are a few studies examining the effect of educational mismatch on wage level, focusing on the case of over-education. Most of studies conducted using Chinese micro-level data find a positive return to surplus education among over-educated workers (Yang, Mayston, 2012). However, Wu, Wang (2018) find that over-educated workers have systemically lower abilities compared with the well-matched former classmates, using the World Bank's STEP survey in China. According to them, that is why we observe lower wage level among over-educated compared to well-matched classmates, while their return to surplus education is positive.

Since educational mismatch influence workers' outcomes, it is crucial to understand why educational mismatch occurs. Existing studies point out three major sources of educational mismatches; labor market circumstances, job characteristics, and personal characteristics. Firstly, some researchers view educational mismatch as results of involuntary consequences due to labor market frictions. If there is no matching job available in the labor market, then workers may suffer from negative effect from educational mismatch such as unemployment, lower wages, lower job satisfaction, or loss of human capital (Rubin, 2003; Sayer et al. 2020). Secondly, it is also possible that some workers voluntarily choose to accept mismatching job for non-financial benefits. For example, some job may offer higher probability of promotion or career mobility in the future while it pays lower wage for now ability (Sicherman, Galor, 1990; Chevalier, Lindley,

2009; Green, McIntoshi, 2007). Or some other jobs may offer other non-financial benefits such as higher job satisfaction. In these cases, workers may choose to take non-matching job due to other non-financial benefits. Finally, some workers may choose mismatching jobs voluntarily for personal reasons such as marital status or region of workplace. The primary benefits from making the choices are work environment or other personal benefits. Frank (1978) pointed out that worker's personal characteristics such as gender, age, ethnicity influence workers' educational mismatch (Cho, Bedard, 2010).

### **3. Data and research method**

#### **3.1 Data**

This study uses the China Labor force Dynamics Survey (CLDS) to examine the impact of educational mismatch on labor market outcomes. The CLDS is the first nationally representative longitudinal survey targeting the labor force in China. This survey is conducted by the Center for Social Survey of Sun Yat-sen University every two years and adopts a stratified multi-stage sampling method, with a household sample data base from 29 provinces and municipalities.

This study uses the 2014 CLDS, which provides extensive information of 23,594 individuals on their education, labor market status, health, social participation, economic activities and community activities. Since this study aims to examine the effect of educational mismatch on labor market outcomes, the data set excludes the individuals who are younger than 16 or older than 60 years old. The data set also excludes individuals whose employment status is an employer, a self-employed worker, a farmer, or a freelancer. In addition, illiterates are also excluded from the sample due to lack of education. After excluding observations with missing information, this study uses a final sample of 5,469 employees for empirical analyses.

The main labor market outcomes to be examined in this study are workers' wages and workers' self-reported satisfaction level for the jobs. As for workers' wage variable, this study uses the (yearly) wage variable, which is measured by summing up all the yearly labor incomes (salary, bonus, allowance) subtracted by personal income tax, social insurance contributions, and housing funds. Workers' income levels above 700,000 Yuan per year are top-coded and observations with yearly income below 9,600 Yuan are dropped from the sample. As for the workers' job satisfaction variable, this study uses the respondents' answers to a CLDS survey item. The CLDS asked the respondents to rate their overall satisfaction with their current job on a 5-point scale from 1 to be very unsatisfactory to 5 to be very satisfactory. In this study, workers' job satisfaction level is measured by individuals' responses to this survey question.

The main explanatory variables are the measures for educational mismatch. Broadly speaking, there are two types of educational mismatch, vertical and horizontal mismatches. Vertical mismatch indicates the case when worker's education level is higher or lower than the education requirement for the job. Horizontal mismatch describes the case when the type of education obtained by the worker is not appropriate for the job. This study focuses only on two cases of vertical educational mismatches, over-education and under-education. Over-education means that a worker's education level is higher than the required level of education for the job, while under-education is the case when a worker's education level is lower than the required

education for the job.

Previous literature suggests three main approaches to measure over- and under-education, subjective method (Allen, van der Velden, 2001; Budria, Moro-Egido, 2008; Bender, Roche, 2013), empirical method (Kiker et al., 1997; Bauer, 2002), and job evaluation method (Carroll, Tani, 2013; Baert et al., 2013). The subjective method uses workers' self-assessment. In this case, one could measure the degree of mismatch based on all the relevant information included in the survey. A problem with this method is that the mismatch measure may suffer from potential bias if responding workers are poorly informed about the overall situation. The job evaluation method is based on the assessments of professional job analysts. The professional analysts evaluate the required level of education for a given occupation and, then, compare worker's educational level with the required education for the job. In this case, one could measure the degree of educational mismatch with more accuracy, but the professional opinions are not widely available at a national level and occupational requirements are changing rapidly over time. Finally, the empirical method is based on the actual data from the labor market. Researchers estimate the required level of education for a given occupation by assessing the mean or median education level of the workers from the given occupation. By comparing a workers' education level with the estimated average education level of the occupation, one could measure the degree of educational mismatch. The key advantage of this method is that it can be easily applied to any existing micro datasets containing information on both educational attainment and occupation. While this method also has some drawbacks due to sample specific limitations, this study adopts the empirical method to measure the degree of educational mismatch. In particular, we estimate the average and the standard deviation of education level for each three-digit level occupation. If a worker's education level is one standard deviation above the average education level for the given occupation, we define the worker's degree of educational mismatch as over-educated. If a worker's educational level is one standard deviation below the average education level for the given occupation, we define the worker's degree of educational mismatch as under-educated.

Table 1 shows the distribution of workers who are in educational mismatch for current job. All the workers with only primary school education are defined as under-educated for current jobs. Also, 13.8 percent of the workers with secondary school education are categorized as under-educated, while there is none in over-educated category. On the other hand, among the college graduating workers, 39.16 percent are categorized as over-educated while none is categorized as under-educated. This shows that educational mismatch has different issues for each different education group.

This study uses an extensive set of control variables to avoid potential bias. The set of control variables include respondent's demographic characteristics (gender, marital status, health status), family background (parental education levels, number of siblings), individual characteristics (citizenship, membership to political party, years of education, language skills, professional qualifications, years of work experiences), job characteristics (employment contract status, first job status, the size of the company), and geographic locations (east, center, or west of China). The summary statistics of the major variables are reported in Table 2.

**Table 1. Tabulation of Education Mismatch**

Education level	Primary school graduates	Secondary school graduates	College graduates
Over-educated	0	0	726 (39.16%)
Under-educated	528 (100%)	426 (13.80%)	0
Total	528	3,087	1,854

Note: The total number of observations is 5,469. The degree of educational mismatch is measured by the empirical method.

Table 2 provides some important information about the sample of this study. The average education level of the sample workers is 11.76 years. Among 5,469 workers, 13 percent are measured to be over-educated for current job, while 17 percent are measured to be under-educated for current job. The average wage level is 38,828 Yuan per year and the job satisfaction level is 3.49 where 5 indicates the very satisfactory level for current job. About 57 percent of workers answered that they work with formal employment contracts. Also, about 56 percent of the sample is found that they are currently working in their first jobs. The average work experience is 20.83 years on average. In the sample, 57 percent is male workers, and 85 percent of the sample are currently married. Also, 83 percent are native citizen of the region, and 17 percent of the sample answered that they joined in a political party. Most of the workers are very fluent in Mandarin, but only 25 percent of the sample can understand foreign languages. Also, 30 percent of the workers hold some certificates for professional qualifications. The respondents are mostly in healthy status and the number of siblings is 2.36 on average. The mean level of father's and mother's education are 7.15 and 5.54, respectively. These statistics show that the workers in the sample are more educated than their parents, on average. While 38 percent of the sample works in manufacturing industry, 61 percent is currently working in service industry. More than half of the sample currently resides in Eastern part of China.

### 3.2 Research method

The earnings function was first suggested by Mincer (1974) to show the empirical relationship between workers' earnings and their education. The familiar Mincer equation has been used to summarize the relationship between education and labor market outcomes as follows.

$$\ln Y_i = \alpha + \beta S_i + \gamma X_i + \varepsilon_i \quad (1)$$

where  $Y_i$  is observed labor market outcome of individual  $i$ ,  $S_i$  is the years of education completed,  $X_i$  is the vector of individual characteristics and  $\varepsilon_i$  is an idiosyncratic error of individual  $i$ . The estimated coefficient for the education variable reflects the marginal rate of return from educational investment.

**Table 2. The Summary Statistics**

Variable	Mean	Standard deviation
(Yearly) wage	38,828.21	36,293.64
Log (wage)	10.35	0.61
Job satisfaction (1=very unsatisfactory, 5=very satisfactory)	3.46	0.72
Over-education (1=over-educated)	0.13	0.34
Matched (1=matched)	0.69	0.46
Under-education (1=under-educated)	0.17	0.38
Gender (1=male)	0.57	0.50
Health status (1=not healthy, 5=very healthy)	3.95	0.82
Education (years)	11.76	3.34
Mandarin skill level (1=none, 5=very fluent)	4.19	0.91
Understanding of foreign language (1=understand foreign language)	0.25	0.43
Certificate (1=have a professional qualification certificate)	0.30	0.46
Membership to political party (1=have a membership)	0.17	0.38
Marital status (1=married)	0.15	0.36
Work experience (years)	20.83	11.40
Housing fund (1=have housing fund)	0.33	0.47
Native (1=native residence)	0.83	0.38
Father's education (years)	7.15	4.34
Mother's education (years)	5.54	4.41
Number of siblings	2.36	1.82
Employment contract (1=have a contract)	0.57	0.50
Firstjob (1=current job is my first job)	0.56	0.50
Log (company size)	4.63	2.04
Manufacturing (1=work in the manufacturing industry)	0.38	0.49
Service (1=work in the service industry)	0.61	0.49
East (1=living in east region)	0.58	0.49
Centre (1=living in central region)	0.21	0.41
West (1=living in western region)	0.22	0.41

Note: The total number of observations is 5,469. The work experience variable is measured by respondent's age subtracted by years of education and 6. The size of company is measured by the total number of employees of the company in which the respondent is currently working. The east region includes the areas such as Beijing, Tianjin, Hebei, Liaoning, Shanghai, Jiangsu, Zhejiang, Fujian, Shandong, and Guangdong. The central region includes the areas such as Shanxi, Jilin, Heilongjiang, Anhui, Jiangxi, Henan, Hubei, and Hunan. The western region includes the areas such as Neimenggu, Guangxi, Chongqing, Sichuan, Guizhou, Yunnan, Shaanxi, Gansu, Qinghai, Ningxia, and Xinjiang.

When observing an increase in over-educated workers in the U.S. in the 1970s, Duncan, Hoffman (1981) and Verdugo, Verdugo (1989) proposed revised models to measure the possible economic effects of over-education. The following shows the empirical framework to measure the effect of over- and under- education.

$$\ln Y_i = \alpha + \beta_1 S_i + \beta_2 S_{oi} + \beta_3 S_{ui} + \gamma X_i + \varepsilon_i \quad (2)$$

where  $S_i$  is actual years of education completed by worker  $i$ ,  $S_{oi}$  is a dummy variable for over-education, and  $S_{ui}$  is a dummy variable for under-education. When a worker's actual education level is higher than required education level for current job,  $S_o = 1$ , and a worker's education level is lower than required education level for current job,  $S_u = 1$ . If a worker's education level is adequate for current job, then  $S_o = S_u = 0$ .

In equation (2), the estimated coefficients for  $S_{oi}$  and  $S_{ui}$  report the effect of over- and under- education, respectively, on one's labor market outcomes, while the estimated coefficient for  $S_i$  shows the average rate of return for education. If the estimated coefficient for the over-education variable ( $S_o$ ) is positive, this suggests that the surplus education also has some economic value on workers' labor market outcomes. On the other hand, if the estimated coefficient for the over-education variable is negative, this implies that there exists a penalty for over-educated workers in terms of labor market outcomes such as wages or job satisfaction. Similarly, if the estimated coefficient for the under-education variable ( $S_u$ ) is positive, there is extra benefit for under-educated workers regardless of their productivity assuming that education level is a proxy for productivity. On the other hand, if the estimated coefficient for under-education is negative, this suggests that under-educated workers earn less due to their lower productivity compared to their adequately educated co-workers.

This study examines the effect of educational mismatch on labor market outcome using equation (2). As for the indicators for labor market outcomes, this study uses two variables, worker's annual wage and workers' subjective job satisfaction. The dummy variables for educational mismatch are defined as following. First, the mean and the standard deviation of years of education for each three-digit occupation code are calculated. Then the dummy variable for over-education is created. This dummy variable has the value of 1 if a worker  $i$ 's actual years of education ( $S_i$ ) is one standard deviation above the mean for current job code, and zero otherwise. Similarly, the dummy variable for under-education is created. The under-education variable has the value of 1 if a worker  $i$ 's years of education is one standard deviation below the mean for current job code. Finally, the model include an extensive set of control variable  $X_i$ , which include worker's experience, gender, marriage and other independent variables.

In this study we also investigate the determinants of educational mismatch. In order to examine the sources of over or under education, we use a logit model to find the factors of educational mismatch as follows.

$$S_{ji} = \theta_0 + \theta_1 X_i + \omega_i, \quad j = o \text{ or } u \quad (3)$$

where  $S_{ji}$  is an indicator for educational mismatch where  $j$  is either  $o$  for over-educated worker, and  $u$  for under-educated workers. Also  $X_i$  is a vector of determinants of educational mismatch and  $\omega_i$  is an idiosyncratic error. The estimation result for equation (3) would show the main determinants of educational mismatch

## 4. Empirical analysis

### 4.1 The effect of educational mismatch

This section discusses the empirical result on the effect of educational mismatch on labor market outcomes in China. As we have seen in Table 2, 13 percent of workers are currently working in the job required lower education level, while 17 percent of workers are working in the job required more education level. According to Table 1, all the over-educated workers are college graduates, which suggest that over-education problem is the main issue for college educated workers mostly. While under-education occurs among high school or elementary school educated workers. This section examines whether educational mismatch influence workers' labor market outcomes using equation (2).

Table 3 reports the main estimation results. Column 1 shows the effect of educational mismatch on wage level and column 2 reports the effect of educational mismatch on worker's subjective job satisfaction. Column 1 shows that there is no statistically significant effect on wage level from educational mismatch. This result contradicts to predictions based on human capital theory, which suggests that additional education has positive effect on productivity and wage level. This is also different from the empirical evidence for the positive effect of over-education on wage level observed in China (Wu, Wang, 2018). Our results are compatible with the explanations based on job competition theory (Thurow, 1976), which suggests that additional education has no positive effect on productivity and it is job characteristics that determines the wage level. In other words, it is the characteristics of the job that determined returns to one's educational attainment. Human capital theory argues that experience and education in the labor market have positive effects on earnings. Our model includes both variables and the coefficients are statistically significant, and seems to corroborate such hypotheses. The estimated return to each year of work experiences is 2.4 percent, while the estimate return to additional year of education is 5.6 percent.

Column 2 shows the effect of educational mismatch on job satisfaction, one of major non-financial benefit. The estimate for the over education is negative and is statistically significant at the 5 percent significance level, suggesting that over-educated workers tend to have

lower job satisfactions than well-matched workers. This result supports the argument that educational mismatch influence worker's work motivation and lower their incentive to work hard. Because over-educated workers feel that their human capital is not fully utilized or their potentials are not adequately appreciated, they have lower level of job satisfaction. It is possible that lower job satisfaction among over-educated may lead more frequent job turnover or lower productivity in their jobs. This conjecture may be tested, requiring additional research in the future. The work experience and actual years of education variables also have impacts on job satisfaction as well. Column 2 shows that job satisfaction increases with longer work experience. Also, worker's job satisfaction increases with each additional year of education increases by about 2.4 percent.

**Table 3. The Effect of Educational Mismatch**

	(1)			(2)		
		Log(wage)		Job satisfaction		
	t stat.	p-value	coeff.	t stat.	p-value	coeff.
Over-education	-0.398	0.327	-0.018	-2.0	0.021	-0.122
Under-education	0.286	0.452	0.018	1.837	0.060	0.155
Education	11.298	0.000	0.056	3.913	0.000	0.024
Gender	16.849	0.000	0.278	-1.609	0.421	-0.035
Health status	3.557	0.000	0.036	10.746	0.000	0.144
Mandarin skill level	5.101	0.000	0.051	2.135	0.051	0.028
Understanding of foreign language	5.324	0.000	0.115	1.722	0.077	0.050
Certificate	1.182	0.274	0.022	2.752	0.000	0.069
Membership to political party	-0.920	0.153	-0.021	1.821	0.061	0.055
Marital status	3.281	0.084	0.095	0.304	0.210	0.012
Work experience	6.807	0.000	0.024	-0.816	0.137	-0.004
Experience squared	-6.167	0.000	-0.047	2.748	0.000	0.028
Housing fund	8.911	0.000	0.180	1.296	0.325	0.035
Native	-10.091	0.000	-0.222	0.853	0.129	0.025
Father's education	-2.182	0.014	-0.005	1.877	0.074	0.006
Mother's education	1.821	0.072	0.005	0.049	0.523	0.000
Number of siblings	-4.896	0.000	-0.026	2.380	0.066	0.017
Employment contract	0.870	0.245	0.015	1.527	0.321	0.036
First job	0.679	0.134	0.011	-1.536	0.554	-0.034
log (company size)	6.568	0.000	0.029	-3.447	0.000	-0.020
over8exp	0.297	0.544	0.001	0.614	0.113	0.002
under8exp	1.903	0.084	0.004	-0.825	0.312	-0.002
Manufacturing	2.331	0.023	0.172	-1.427	0.225	-0.142
Service	1.839	0.066	0.135	-0.901	0.812	-0.089
Constant	78.089	0.000	8.824	16.336	0.000	2.483
Observations	4,523			4,502		
R-squared	0.289			0.065		

Note: All the specifications include regional dummies.

The estimated coefficients for other control variables in the wage equation also reveal some interesting results. Male workers tend to earn more than female workers, as is generally observed in the literature, but there is no statistically significant difference in job satisfaction between male and female workers. Health status of workers positively affects both workers' wage and job satisfaction. Workers with good health status tend to earn more as well as to be more satisfied with their own jobs. Workers with good language skills- both mandarin and foreign- tend to have better work outcomes, in terms of wage as well as job satisfaction. Married workers tend to earn more than single workers, while marital status has no significant effect on job satisfaction. Workers with more siblings tend to earn less, but tend to be more satisfied with current jobs. A membership to political party has no impact on wage level, while it positively affects workers' job satisfaction. The characteristics of current job are also related to labor market outcomes. Workers in the manufacturing sector tend to earn more than those in other industries. In general, workers hired in larger companies earn more, while they tend to have lower job satisfaction levels.

#### **4.2 The determinant of educational mismatch**

This section explores the factors determine educational mismatch. Table 4 reports the results from the logit analysis on the determinants of educational mismatch using equation (3). Columns 1 and 2 are for the mismatching factors of over-education and for those of under-education, respectively.

The results indicate that there are two major sources of educational mismatch. As is expected, worker's individual characteristics are related to one's education-job matching. Gender is important since male workers are more likely to be over-educated, while female workers tend to be under-educated. This finding could be explained by two opposite arguments. The result could be derived from the fact that parents tend to invest more on son's education than daughter's education, namely son preference in family educational decisions largely found in Confucian countries. If this is the case, there are over-supply of male college educated workers. Another possibility is that male and female workers may voluntarily select themselves into certain types of jobs. For example, male workers tend to accept jobs requiring less educational level while female workers tend to apply for jobs that require higher education than their current educational level. But those female oriented jobs may not attract male workers, so that overeducated male workers rarely choose. Jobs in the social service and public health fields seem to be in this category. Worker's language skills are also related to worker's education-job matching. Workers with good mandarin language skill are more likely to be assigned to well-matched jobs, while workers with poor mandarin skills tend to be assigned to jobs that require lower education level than they attained education level. This pattern is also revealed in the case of foreign language skills. Obtaining professional certificates or a membership to political party is also proved to be meaningful. Workers with professional certificates or with membership to political party are more likely to be assigned to well-matched jobs. One interesting observation is that work experience has no statistically significant relationship with the job-education matching, which suggests that workers would move to the jobs that matches their education level as their work experience seasons. But among the under-educated workers, we find that the shorter the experience, the

higher the probability of under-education. This suggests that they may be assigned to better jobs than their current level of education during earlier stage of their work experience.

The other important factor of educational mismatch is job characteristics. Over-education is more likely to occur when the jobs are in the manufacturing sector and provided with formal employment contract. If the job status is solid and stable, workers are more likely to accept the jobs requiring lower education. But if the job is in service industry or employment contract is not clear, workers are less likely to accept those lower matching job.

## **5. Conclusion**

This study aims to examine the effect of educational mismatch on labor market outcomes in China, using the 2014 CLDS data for empirical analysis. According to our data, 13 and 17 percent of workers in China are over- and under- educated, respectively, for current job. One of major findings of our statistical analysis is that over-education tend to lower workers' job satisfaction while it has no statistically significant effect on workers' wage level. This result implies that, even if educational mismatch seems to have no significant impact on workers' financial benefits, it could influence individuals' work motivation and lower their satisfaction. This provides some implications for labor market policies and firms' job assignment strategies, by estimating coefficients on the returns to over- and under-education in the earning's equation.

The second empirical finding is the factors of educational mismatch in China. It turns out that worker's individual characteristics such as gender and language skills are effective in explaining the plausibility of educational mismatch. We also find some job characteristics like firm size, industry, and formal employment contract may affect educational mismatch among workers. Whether these factors are generally influential in other regions in China or in other countries may be an interesting question to ask in the future research,

Finally, it is necessary to discuss the limitations of our study. While the empirical analyses of this study used an extensive set of control variables, there may be still some other factors that should be considered to be as determinants of educational mismatch. In particular, workers' academic and intellectual ability may not be measured just by counting education years.

Not only for the company in question, but for the society as a whole, educational mismatch may imply a significant loss in terms of available resources. Hence, considering its negative effects, finding a better solution for educational mismatch is crucial for policy makers as well as corporate managers. A rapid expansion of college education strongly implies a decrease in the private returns to education. Moreover, the current corona virus pandemic widens the educational opportunity across rural and urban areas (Karabag, 2020). This suggests that it is time to reshape the education system and improve the quality of education in order to help educated workers to adjust the changes in the labor market as well as the society.

**Table 4. The Determinants of Educational Mismatch**

	Educational mismatch					
	Over-education			Under-education		
	t stat.	p-value	coeff.	t stat.	p-value	coeff.
Gender	3.476	0.000	0.438	-2.803	0.000	-0.328
Health status	-0.681	0.124	-0.055	-1.367	0.155	-0.093
Education	20.315	0.000	1.483	-24.195	0.000	-0.917
Mandarin skill level	-2.848	0.000	-0.260	0.541	0.244	0.034
Understanding of foreign language	-3.221	0.000	-0.438	3.648	0.000	0.715
Certificate	-3.362	0.000	-0.437	5.671	0.000	0.845
Membership to political party	-1.930	0.085	-0.276	2.370	0.044	0.467
Marital status	-0.856	0.311	-0.160	0.371	0.125	0.093
Work experience	0.770	0.331	0.022	-2.050	0.044	-0.057
Experience squared	-1.114	0.247	-0.082	3.032	0.000	0.176
Housing fund	-4.25	0.000	-0.578	0.616	0.129	0.101
Native	-1.407	0.331	-0.242	1.468	0.552	0.229
Father's education	-0.436	0.574	-0.008	-1.129	0.443	-0.019
Mother's education	1.367	1.110	0.027	0.922	0.998	0.017
Number of siblings	-1.435	0.556	-0.066	0.734	0.453	0.025
Emp. contract	4.089	0.000	0.597	-0.522	0.113	-0.066
First job	-1.066	0.332	-0.145	3.096	0.000	0.356
Log (company size)	0.610	0.554	0.021	-0.855	0.449	-0.027
Manufacturing	3.189	0.000	1.939	-1.324	0.111	-0.679
Service	-2.081	0.044	-1.207	2.745	0.000	1.408
Constant	-16.329	0.000	-21.260	8.855	0.000	7.075
Observations	4,523			4,523		

Note: All the specifications include regional dummies.

## Reference

- Abbas Q, 2008. Over-education and under-education and their effects on earnings: evidence from Pakistan, 1998-2004. *SAARC Journal of Human Resource Development*, 4, 109-125.
- Allen J, Van der Velden R, 2001. Educational mismatches versus skill mismatches: effects on wages, job satisfaction, and on-the-job search. *Oxford economic papers*, 53:3, 434-452.
- Baert S, Cockx B, Verhaest D, 2013. Overeducation at the start of the career: stepping stone or trap? *Labour Economics*, 25, 123-140.
- Bauer T, 2002. Educational mismatch and wages: a panel analysis. *Economics of Education Review*, 21:3, 221-229.
- Bender K, Roche K, 2013. Educational mismatch and self-employment. *Economics of Education Review*, 34, 85-95.
- Betti G, D'Agostino A, Neri L, 2011. Educational mismatch of graduates: a multidimensional and fuzzy indicator. *Social Indicators Research*, 103:3, 465-480.
- Boll C, Leppin J, 2016. Differential overeducation in East and West Germany: extending Frank's theory on economic returns changes the picture of disadvantaged women. *Labour*, 30:4, 455-504.

- Buchel F, Ham M, 2003. Overeducation, regional labor markets, and spatial flexibility. *Journal of Urban Economics*, 53:3, 482-493.
- Budría S, Moro-Egido A, 2008. Education, educational mismatch, and wage inequality: evidence for Spain. *Economics of Education Review*, 27:3, 332-341.
- Carroll D, Tani M, 2013. Over-education of recent higher education graduates: new Australian panel evidence. *Economics of Education Review*, 32, 207-218.
- Chevalier A, Lindley J, 2009. Overeducation and the skills of UK graduates. *Journal of the Royal Statistical Society*, A172, Part2, 307-337.
- Cho I, Bedard K, 2010. Early gender test score gaps across OECD countries. *Economics of Education Review*, 29:3, 348-363.
- Daly M, Buchel F, Duncan G, 2000. Premiums and penalties for surplus and deficit education: evidence from the United States and Germany. *Economics of Education Review*, 19:2, 169-178.
- Dolado J, Jansen M, Jimeno J, 2009. On-the-job search in a matching model with heterogeneous jobs and workers. *Economic Journal*, 119:534, 200-228.
- Duncan J, Hoffman S, 1981. The incidence and wage effects of overeducation. *Economics of Education Review*, 1:1, 75-86.
- European Union, 2012. *Employment and Social Developments in Europe 2012*. Publications Office of the European Union, Luxembourg.
- Frank R, 1978. Why women earn less: the theory and estimation of differential overqualification. *American Economic Review*, 68:3, 360-373.
- Fei T, Aun L, 2019. The impact of human resource management bundles on innovation in Malaysia. *Journal of Applied Economics and Business Research*, 9:1, 83-95.
- Freeman R, 1976. *The Overeducated American*. Academic Press, New York.
- Fudan University, Tsinghua University, 2016. New skills at work: skills shortages in the Chinese labor market. Commissioned by J. P Morgan.
- Gautier P, 2002. Unemployment and search externalities in a model with heterogeneous jobs and workers. *Economica*, 69, 21-40.
- Gautier P, Van den Berg G, Van Ours J, Ridder G, 2002. Worker turnover at the firm level and crowding out of lower educated workers. *European Economic Review*, 46:3, 523-538.
- Green F, McIntosh S, 2007. Is there a genuine under-utilization of skills among the over-qualified? *Applied Economics*, 39:4, 427-439.
- Green F, Zhu Y, 2010. Overqualification, job dissatisfaction, and increasing dispersion in the returns to graduate education. *Oxford Economic Papers*, 62:4, 740-763.
- Hersch J, 1991. Education match and job match. *Review of Economics and Statistics*, 73:1, 140-144.
- Judge T, Thoresen C, Bono J, Patton G, 2001. The job satisfaction-job performance relationship: a qualitative and quantitative review. *Psychological Bulletin*, 127, 376-407.
- Karabag, SF, 2020. An unprecedented global crisis! The global, regional, national, political, economic and commercial impact of the coronavirus pandemic. *Journal of Applied Economics and Business Research*, 10:1, 1-6.
- Kiker B, Santos M, Oliveira M, 1997. Overeducation and undereducation: evidence for Portugal. *Economics of Education Review*, 16:2, 111-125.
- Leuven E, Oosterbeek H, 2011. Overeducation and mismatch in the labor market, in: Hanushek, E.A., Machin, S., Woessmann, L. (Eds), *Handbook of the Economics of Education*. Vol. 4. Elsevier, 283-326.
- Mavromaras K, McGuinness S, O'Leary N, Sloane P, Fok Y, 2010. The problem of overskilling in Australia and Britain. *Manchester School*, 78:3, 219-241.
- Mavronmaras K, McGuinness S, 2012. Overskilling dynamics and education pathways. *Economics of Education Review*, 31:5, 619-628.
- McGuinness S, 2006. Overeducation in the labour market. *Journal of economic surveys*, 20:3, 387-418.
- Mehta A, Felipe J, Quising P, Caringue S, 2011. Overeducation in developing economies: how can we test for it and what does it mean? *Economics of Education Review*, 30, 1334-1347.
- Meroni E, Vera-Toscano E, 2017. The persistence of overeducation among recent graduates. *Labour*

- Economics*, 48, 120-143.
- Mok K, Qian J, 2018. Massification of higher education and youth transition: skills mismatch, informal sector jobs and implications for China. *Journal of Education and Work*, 31:4, 339-352.
- OECD, 2000. *Education at a Glance 2000: OECD Indicators*, OECD Publications, Paris
- OECD, 2017. *Education at a Glance 2017: OECD Indicators*, OECD Publishing, Paris.
- Quinn M, Rubb S, 2006. Mexico's labor market: the importance of education-occupation matching on wages and productivity in developing countries. *Economics of Education Review*, 25, 147-156.
- Rosen S, 1972. Learning and experience in the labor market. *Journal of Human Resources*, 7:3, 326-342.
- Rubb S, 2003. Post-college schooling, overeducation and hourly earnings in the United States. *Education Economics*, 11:1, 53-72.
- Rumberger R, 1987. The impact of surplus education on productivity and earnings. *Journal of Human Resources*, 22:1, 24-50.
- Sattinger M, 1993. Assignment models of the distribution of earnings. *Journal of Economic Literature*, 31:3, 831-890.
- Sayer G, Erdas M, Destek G, 2020. The effects of financial development, democracy and human capital on income distribution in developing countries: does financial Kuznets curve exist? *Journal of Applied Economics and Business Research*, 10:2, 76-95.
- Sicherman N, 1991. Overeducation in the labor market. *Journal of Labor Economics*, 9:2, 101-122.
- Sicherman N, Galor O, 1990. A theory of career mobility. *Journal of Political Economy*, 98:1, 169-192.
- Sloane P, Battu H, Seaman P, 1999. Overeducation, undereducation and the British labour market. *Applied Economics*, 31:11, 1437-1453.
- Slonimczyk F, 2008. Skill mismatch and earnings: a panel analysis of the U.S. labor market, unpublished working paper
- Thurow I, 1976. *Generating Inequality*. MacMillan, London.
- Tsang M, 1987. The impact of underutilization of productivity: a case study of the U.S. Bell companies. *Economics of Education Review*, 11, 239-234.
- Tsang M, Levin H, 1985. The economics of overeducation. *Economics of Education Review*, 4:2, 93-104.
- Tsang M, Rumberger R, Levin H, 1991. The impact of surplus schooling on worker productivity. *Industrial Relations*, 30:2, 209-228.
- Van der Meer P, 2006. The validity of two education requirement measures. *Economics of Education Review*, 25, 211-219.
- Verhaest D, Omey E, 2006. The impact of overeducation and its measurement. *Social Indicators Research*, 77, 419-448.
- Verdugo R, Verdugo N, 1989. The impact of surplus schooling on earnings: some additional findings. *Journal of Human Resources*, 24, 629-643.
- Vermeylen G, Mahy B, Rycx F, 2014. Educational mismatch and productivity: a review. *Dans Dynamiques Regionales*, 1:1, 17-26.
- Wu X, Lai D, 2010. Incidence of overeducation and its factors: an analysis based on data of Beijing. *Education Development Research*, 30:19, 36-41.
- Wu N, Wang Q, 2018. Wage penalty of overeducation: new micro-evidence from China. *China Economic Review*, 50, 206-217.
- Yang J, Mayston D, 2012. Impact of overeducation on wages in China. *Chinese Economy*, 45:2, 65-89.