Job search and over-education: Evidence from China's labour market for postgraduates[1]

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This article investigates the relationship between the number of informational channels and over-education in the outcome of job search, using the survey data of postgraduates in China. The empirical results show: (1) the more the informational channels of job search are used, the lower the probability and the less the intensity of over-education will be; (2) graduates from prestigious "985" universities have lower probability and less intensity of over-education than those of their counterparts from "none-985" universities. Based on the findings above, we argue that helping graduates to get more job information and improving the quality of universities will lighten the problem of the over-education under the situation of great higher education expansion.

Keywords: job search, over-education, informational channel, information asymmetry, JEL: I20, J21, D82

Introduction

After World War II, especially in the 1950s and 60s, with the emerging of Human Capital Theory (Schultz, 1961; Becker, 1964), many countries in the world started to make great efforts to develop education, expecting to promote economic growth and reduce poverty through increasing the overall human capital. As the scale of education (higher education especially) was expanding in developed countries and some developing countries, however, more and more higher education graduates entered the labour market. Although the labour market in a number of countries and areas has an increasing demand for such labour force, the growth in supply seems to be faster than that in demand (Bishop, 1995). Therefore, many higher education graduates had to choose those jobs which used to be open to senior or even junior high school graduates. The pervasive and persistent appearance of this phenomenon (Groot & Brink, 2000) has drawn widespread concerns in international academic circles. Many scholars have generally defined it as over-education and have done far-ranging studies in terms of its cause, incidence, mechanism, measuring methods, influential factors, as well as both its merits and negative effects (Duncan & Hoffman, 1981; Rumberger, 1981; Tsang & Levin, 1985; Hartog, 2000).

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It is commonly believed to be the result of the imbalance between the supply of labour and the demand for skills in the labour market (Rumberger, 1981 & 1987). Moreover, many empirical studies have found that over-education could even decrease the profit of education. Based on the research in the UK graduate labour market, Dolton and Vignoles (2000) found that the economic return to over-education was less than the return to required education. After summarizing previous studies, Hartog (2000), Groot and Brink (2000) concluded that the rate of return to over-education was about half to two-thirds that to required education.

Why would over-education then have a negative impact on the income of the individual? Tsang (1987) found that it was because over-education could decrease the productivity of individuals. Conducted in Bell Company, Tang's research showed that over-education has a significant negative impact on job satisfaction and that there was a positive relation between productivity and job satisfaction. It could thus be seen that over-education had a significant negative impact on the productivity of individuals, which decreased the productivity of the entire company. Statistics from Bell Company showed that if there was a deduction of one year in over-education, there would be an 8.35% increase in productivity. Furthermore, Tsang (1987) argued that over-education was a problem involving every worker, every company and also the government, which required attention from the public. It was thus necessary for workers, companies and the government to think reconsider how to reduce the probability and intensity of over-education, with a view to increasing the return of education investment and reduce dissipation due to over-education.

The question arises as to how reduce the probability and intensity of over-education. Job Search Theory has provided a solution for this. Job Search Theory states that because of the information asymmetry in the job market, if job seekers can obtain more job information through investment in the job search, they are is more likely to find a better and more satisfactory job (Stigler, 1961). Therefore, if one does not do a proper job search, the job seeker might have to accept a job demanding a lower educational level. In this way, over-education occurs (Johnson, 1978). Also, if one can get more comprehensive job information in job search and lessen the information asymmetry between oneself and the employer, then the job seeker is more likely to find a job with a corresponding/well-matched educational level, that is to say, the education the employee has received matches what is demanded by the job. According to our knowledge, it seems that there are few empirical studies that investigate the relationship between the process of job search and over-education. Therefore, this article aims to fill this gap and empirically test whether a job search will help to decrease the probability and the intensity of over-education or not.

Over-education in Chinese higher education labour market

Since the end of 1990s, higher education in China has experienced a remarkable expansion. Whether this phenomenon could lead to serious over-education has become a hot issue with the public. Li, Morgan and Ding (2008) investigated the relationship between the expansion of higher education and over-education in China. They found that although the incidence of over-education has had an apparent upward trend since the middle of the 1990s in China, the incidence of over-education in 1998 was not only lower than that of Europe, the USA and other developed countries in the 1990s, but also was apparently lower than that of China in the 1980s. In addition, the incidence was related negatively to the competitiveness of the sector or industry in China. Throughout the Chinese regions, the percentage of highly educated workers was lower than the corresponding international averages.

Based on the facts above, Li *et al.* (2008) were optimistic about the over-education of China's higher education graduates. This article endorses their point of view and believes that the over-education phenomenon of recent years will prove to be only temporary. However, this does not mean that no measures need to be taken to reduce the probability and intensity of over-education as it does have a negative impact on the productivity and income of individuals. Empirical studies thus need to be conducted against the background of the massive expansion of China's higher education.

Currently the employment problem of Chinese higher education graduates has attracted many researchers' attention. However, most studies have only focused on the group of university or college graduates instead of postgraduates. In fact, employment of postgraduates also calls for public attention due

to the reason that postgraduates' education, an important constitution of higher education, is expanding rapidly. Figure 1 shows the changes of postgraduate graduates in Mainland China, from which it can be seen that the number increased from 55,000 in 2001 to 301,000 in 2008. In less than ten years, the number of postgraduates has increased six times. At the same time, the number of university and college graduates is also increasing remarkably, which makes it even more difficult for postgraduates to obtain employment. One study shows that from 2003 to 2007, the incidence of over-education of postgraduates in Mainland China has been rising steadily (TSU IOE, 2009). The article will focus on the over-education of postgraduates and empirically test whether postgraduates can reduce the incidence and intensity of over-education through job search.

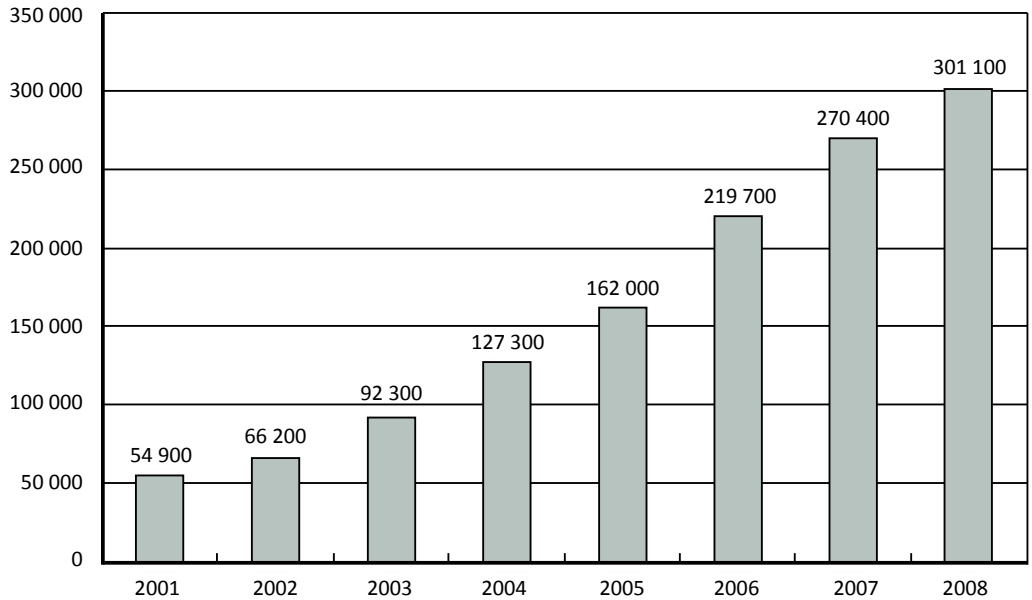

Figure 1: Number of postgraduate graduates from 2001-2008 in China

According to Job Search Theory, job seekers do not know much about job distribution before starting job search, which means there is information asymmetry between job seekers and the job market (McKenna, 1990; Ehrenberg & Smith, 2000). If job seekers cannot solve this potential problem through job search, the jobs they find will somehow mismatch with their education,. If job seekers can gather as much job information as possible by every means and channel, then they will finally find jobs which match their ability, interest and educational level. With regard to the issue of over-education, those who can gather more job information in their job search are less likely to be over-educated; even if they are over-educated, the extent of being over-educated is less intense. In current empirical studies on Job Search Theory, the number of informational channels is commonly used to measure the degree of information asymmetry that job seekers can eliminate or reduce in job search (Holzer, 1987 & 1988; Addison & Portugal, 2002). Therefore, the key question in this study is: Can postgraduates reduce over-education by gathering as much job information as possible from more possible informational channels through job search?

Since the data used include information about the educational levels required for postgraduates' first jobs, we can not only examine the impact job search has on the probability of graduates' over-education, but we can also further investigate the impact job search has on the intensity of graduates' over-education. Based on the data used, the hypothesis in this study can be stated as follows:

- The more the postgraduates use informational channels in the process of job search, the smaller the probability of over-education in the outcome of job search.

- The more the postgraduates use informational channels in the process of job search, **the smaller the intensity** of over-education would be.

Data and method

All of the data used in this study is from *Research on Fresh Postgraduates' Employment* conducted in 2007 by National Research Center for Science and Technology for Development (now renamed Chinese Academy of Science and Technology for Development). The research adopted a combined method of representative sampling and random sampling. Firstly, fourteen higher education institutions in four cities (Beijing, Shanghai, Wuhan, Lanzhou) were selected. After that, the sample was distributed according to their respective numbers of postgraduates in each institution and the respondents were randomly selected in each institution. Lastly, 4,200 cases were selected in total. The questionnaire survey was conducted from May to July in 2007, and a total of 3,104 valid questionnaires were collected (73.9%). In the whole sample, 55% are male. Their major distribution is as follows: science 10%, engineering 38%, agriculture 3%, medicine 5%, economics 8%, management 11%, philosophy and social sciences 20%, others and the unclassified 5%.

In the whole sample, some cases did not plan to seek for a job immediately; they would instead continue to obtain a Doctor's degree or study abroad or establish their own business. Some were part-time students who intended to return to their current or previous jobs. Some were job-directed students (Chinese term is Ding Xiang Sheng) who had signed a job contract with certain national enterprises before they began the postgraduate study. Since this study is primarily investigating the relationship between the number of informational channels that graduates use in job search and over-education in the outcome of job search, those who did not plan to apply for a job right away will not be taken into consideration. With such a sample excluded, 2,629 cases who had done job searches were left. 2,047 of them had already found a job when the survey was undertaken, and they constructed the data set used in the study. It means the rate (the successful job seekers/ all the job seekers) is about 78% (2047/2629). In another similar survey of higher education graduates implemented by Peking University in 2007, the rate for post-graduate level is about 81% (PKU GSE, 2007). The difference is small.

The following three points require clarification. Firstly, the sample of graduates who have found a job include not only those who have signed up, but also those who have not yet but will do soon. Secondly, because the time of conducting the survey is earlier than the students' actual graduation, the employment rate in the survey cannot reflect the real employment rate, and the former should be lower than the latter. Thirdly, since the time of conducting the survey precedes the time the graduates actually began to work, the students estimated their working condition reflected in the study, for instance, the educational level demanded by the job.

Dependent variable

The study mainly examines two variables: the informational channel of job search and over-education. Over-education is a dependent variable. Information about that comes from graduates' answers to "the demand for employees' educational level by the job". Instead of distinguishing Master's graduate students and Doctoral graduate students, the highest educational level provided in the options is "postgraduates and upward" and all of the survey sample are therefore Master graduate students. Consequently there are only two situations possible: 1) the educational level demanded by the job is lower than Master's degree, which implies over- education; 2) the educational level demanded by the job is equal to Master's degree, which implies adequate education.

Based on the information about educational levels demanded by jobs, we can set up three different dependent variables of over-education.[2]

- A binary dummy variable of the probability of over-education. If one subjectively considers that the necessary educational level for his/her first job after graduation is lower than his/her own, it is over-education, and over-education=1; if one considers that they are in equilibrium, then over-education=0.
- A continuous variable of the year(s) that employees are over-educated. If the educational level is matched, the year(s) over-educated is 0; otherwise, it is the year difference between obtaining a Master's degree and getting the educational level demanded by the job.
- An ordered categorical variable of the level(s) over-educated. It is defined as 0 if educational level matched. If there is one-level difference between the educational level demanded by the job and what the graduate has got, it is 1; if there is two-level difference in between, it is 2; and so on. The maximum level of over-education for the sample in this study is 4.

Independent variable and model

The informational channel of job search is an independent variable, the definition of which comes from graduates' answers to the question: "In the process of job search, which channel(s) have you used to get job information? (Please select all that you have used)". Ten options are provided: newspaper, magazine; TV, radio; internet; campus recruitment; off-campus recruitment; intelligence intermediary institutions; relatives; familiar friends/teachers/people from your hometown; people you know but are not acquainted with; Career Instruction Center at school. If the respondent selected one option, then the informational channel of job search is defined as 1; If the respondent selected two, then the informational channel is 2; and so on. In this way, we get a discrete variable with its value ranging from 0 to 10.

This study attempts to examine the influence on the probability and intensity of over-education (including year and level) exerted by the number of informational channels. The probit model, the OLS (Ordinary Least Squares) model and the Oprobit (ordered probit) model are adopted respectively to investigate the influence on the probability, year and level of over-education exerted by informational channel that graduates use in job search, in other words, to investigate the coefficients and the levels of significance of the variable of informational channel in the three models.

Therefore, other factors that may affect the probability and intensity of over-education should also be controlled. Based on the literature review on influential factors of over-education as well as data analysis in the early stage, we finally determined control variables to be graduates' gender, reputation of their institutions, place to live before 14 years old, occupation, and working place. Why occupation should be controlled is because studies have found that different occupations have different degrees of educational screening, which will definitely influence individuals' situation regarding over-education (Chatterji, Seaman & Singell, 2003).

Control variables above are defined as follows:

- Male, dummy variable, female as reference group.
- "985" university,[3] dummy variable, "non-985"[4] universities as reference group. This variable is used to control the quality and reputation of the higher education institutions and "985" university means higher quality and better reputation.

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2 Apart from using self-evaluating approach, researchers also use standard deviation in measuring over-education. Cohn and Khan (1995) found that the probability of over-education was higher using the self-evaluating approach. This may imply the subjective estimation seems to exaggerate over-education. Since there is no relevant information available in the sample data, we are unable to execute other methods.

3 In May 1998, Jiang Zeming, the former Chinese Chairman, stated that China should develop several world-class universities. It was the start of "985 project". It means those universities included in the "985 project" are the best universities in China.

4 The sample used in this study includes postgraduates from Chinese Academy of Sciences. Here Chinese Academy of Sciences is classified as "985" university.

- Place to live, dummy variable. If one was living in a big city before 14 years old, then place to live=1; otherwise, place to live=0.
- Working place, dummy variable. If one works in a big city, then working place=1; otherwise, working place=0.
- Occupation, a set of 13 dummy variables, professional jobs (i.e. engineer, doctor, and so on) as reference group.

Table 1: Simple statistical description of the variables

	All Graduates		Over-Education=0		Over-Education=1	
	Mean	**Standard Deviation**	**Mean**	**Standard Deviation**	**Mean**	**Standard Deviation**
Male	0.554	0.497	0.561	0.496	0.542	0.499
"985" university	0.57	0.496	0.57	0.495	0.56	0.496
Place to live	0.135	0.342	0.116	0.320	0.170	0.376
Working Place	0.813	0.390	0.809	0.393	0.820	0.384
Informational channel	3.666	1.562	3.714	1.613	3.577	1.460
Over-education	0.356	0.479	0	0	1	0
Year(s)	1.131	1.614	0	0	3.174	0.908
Level(s)	0.391	0.586	0	0	1.097	0.435
N	**2,047**		**1,329**		**718**	

From Table 1, we can find that the probability of over-education is 35% (718/2047). In order to make certain that it is reliable, we calculate the same index from the similar survey data by PKU (PKU GSE, 2007), and the incidence of over-education in that survey is 38%.

Empirical results

We first come to test the first hypothesis. Table 1 shows that the average number of informational channel of job search for the sample with over-education equalling to 0 is 3.714, and that for the sample with over-education equalling to 1 is 3.577. While the former is slightly larger than the latter, it indicates that graduates having more informational channels in job search are less likely to be over-educated. We further find that the difference is statistical significant. So the first hypothesis is preliminarily validated by the empirical results.

Table 2 shows the regression results of the probit model, the Oprobit model and the OLS model. From the regression results of the probit model, the coefficient of informational channel is negative and significant, which reveals that with factors as gender, family background, working place, occupation and so on under control, the probability of over-education is significantly smaller when graduates use more informational channels in job search. Moreover, the marginal value of informational channel indicates that every time one more informational channel is used, the probability of over-education is reduced by 3.3%. The first hypothesis 1 has been supported and confirmed by empirical results, that is to say, with other factors under control, the more the postgraduates use informational channels in the process of job search, the smaller the probability of over-education in the outcome of job search.

Next we will test hypothesis 2. From the regression results of the Oprobit and OLS model in Table 2, we can see that the coefficient of the informational channel is also significantly negative, showing that graduates able to obtain and make use of more informational channels in job search have much fewer levels and years of over-education. In addition, the coefficient given by the OLS model indicates that every time one more informational channel is used, this will reduce the years that graduates are over-

educated by 0.05. This decrement is small, but significant. We also calculated the marginal value of the regression result of the Oprobit model, and found that every time one more informational channel is used, the probability that levels over-educated will change from 0 to 1 reduced by 1.5%, from 0 to 2 reduced by 0.7%, from 0 to 3 reduced by 0.2%, and from 0 to 4 reduced by 0.2%.[5]

Both of the hypotheses have been confirmed by the empirical results; thus in graduates' job search, the more they use informational channels, the smaller the probability and intensity of over-education in the outcome of job search will be.

Table 2: Results of the three regression models on over-education

	Probit			**Oprobit**		**OLS**	
	Coefficient	**Marginal value [a]**	**Std. error**	**Coefficient**	**Std. error**	**Coefficient**	**Std. error**
Constant	0.061		0.123			1.626***	0.139
Male [b]	-0.164***	-0.059	0.062	-0.130**	0.059	-0.134*	0.069
"985" university [b]	-0.116*	-0.042	0.062	-0.126**	0.061	-0.123*	0.070
Place to live [b]	0.223***	0.083	0.085	0.210***	0.081	0.257***	0.099
Working place [b]	-0.119*	-0.044	0.051	-0.140*	0.078	-0.151*	0.090
Information channel [b]	-0.033*	-0.012	0.019	-0.045**	0.019	-0.053**	0.022
Adjusted R^2						0.11	
Chi square		246.78		256.38			
Log likelihood		-1202.89		-1384.6281			
N		**2,047**		**2,047**		**2,047**	

Note:

- The coefficients of the dummy variables of graduates' occupations, the coefficients of the four ancillary parameters in the Oprobit model, and the marginal values of the variables at different levels of over-education are left out.
- a means the marginal effect at $\bar{x}$.
- b means that the marginal effect is for discrete change of dummy variable from 0 to 1.
- Standard errors are presented in parentheses. "***": significant at the 1% level; "**": significant at the 5% level; "*": significant at the 10% level.

We have another interesting finding in Table 2. Compared with postgraduates from "non-985" universities, those from "985" universities are much less likely to become over-educated and also have much less intensity of over-education. This finding coincides with what has been revealed before, namely, that the quality of schools plays an important role in over-education, since the better the schools, the smaller the probability of graduates being over-educated (Robst, 1995).

Suggestions

Either from the simple statistical description or results of the three regression models, we find that when the postgraduates use more informational channels in job search, the probability and intensity of over-education in the outcome of job search will be significantly smaller. These empirical findings clearly support the application of the Job Search Theory on over-education, which is that the better the job

5 The level(s) of over-education in this study is an ordered variable with its value ranging from 0 to 4, thus every independent variable in the Oprobit model accordingly has four marginal values. In Table 2, we did not list them. Whoever interested might get it by contacting the authors.

seekers solve the problem of information asymmetry between themselves and the job market, the more possibility will they have to find jobs that match to their educational level.

This means that information-gathering in the process of job search has significant impact on its outcome. So when graduates are seeking employment, they, and higher education institutions and even employers should broaden the informational channel in order to enhance the students' understanding of jobs and the job market. It will help to decrease the probability and intensity of over-education, and also serve as an important measure to guarantee the income of human capital (Becker, 1964). In this course, the function of higher education institutions especially needs to be strengthened. For example, they can give career guidance (Norm, 2008), collect job information actively, invite specific enterprises and employers to promote and recruit on campus, and also arrange visit to some enterprises or internship for students. These activities will improve the interaction and mutual understanding between higher education students and the job market, and either side will gain a more sufficient amount of information as the basis for later making decisions about which job to take or which graduate to employ. It also brings benefits for both higher education institutions and employers (Glenda, 2006).

In addition, the empirical results show that postgraduates from prestigious "985" universities have significantly smaller probability and less intensity of over-education. We consider the great expansion of higher education in recent years[6] to be a big cause. Because throughout the world, rapid expansion of higher education is mostly going with a decrease in the average expenditure per student as well as in the quality of higher education institutions (Ballantine, 2001) and quality assurance of higher education has been a globalizing issue (Mala & Lis, 2007). A great deal of empirical studies have given evidence that graduates, who do not achieve well in their study, or study in schools of low quality or with a bad reputation, are more likely to be over-educated (Bishop, 1995; Robst, 1995; Chevalier, 2003). It means that both the government and the higher education institutions should make sure that the quality of education would not go down rapidly as the higher education expands. Only in this way could the problem of graduate employment be solved at its root — the supply of labour force, hence the probability and intensity of graduates being over-educated would be lessened.

As discussed above, to solve a series of challenging problems of graduate employment including over-education, the quality of higher education institutions should first of all be improved to supply highly qualified labour. Secondly, graduates, higher education institutions and employers should actively interact with one another and advance comprehension between graduates and the job market through various means. Once the information asymmetry between graduates and the potential employers gets less serious, the probability and intensity of over-education will decrease tremendously.

Conclusion

Against the background of massive and continuous expansion of higher education in China, this article aims to investigate the phenomenon of over-education from the perspective of job search and to help make policy suggestions which may reduce over-education of Chinese post-graduates from a microcosmic point of view. Our empirical results show that the probability and intensity of over-education decrease significantly as the number of informational channels used in job search increases, which therefore support the explanation for over-education given by Job Search Theory (Stigler, 1961; Ehrenberg & Smith, 2000).

Based on our empirical results, we suggest that graduates and higher education institutions reduce over-education through at least two ways: 1) under the rapid expansion of higher education, higher education institutions should ensure educational quality, so that graduates can meet the demand for talents in the job market; 2) the stake-holders (students, higher education institutions, employers, government) should broaden the informational channel of job search, and reduce the information asymmetry between graduates and the job market to the furthest.

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6 From 1999, the Chinese higher education started to expand greatly. Within six years, China achieved transition from elite education to mass education (MOE, 2006).

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