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## Wage penalty of overeducation: New micro-evidence from China

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## ABSTRACT

This paper studies the wage penalty of overeducation using the World Bank's STEP (Skills Towards Employability and Productivity) survey in China. Based on the measurements of cognitive, technical, and non-cognitive skills, the overeducated have systematically lower abilities compared with the well-matched, just as the skill heterogeneity theory predicts. Endogenous switching model is adopted to estimate the effect of overeducation on wage. We find that the overeducated workers with tertiary education suffer from significant loss compared with the well-matched workers, while overeducation has no significant effect on workers with high school education. The causality inference using nearest neighbor matching and propensity score weighted regression methods reveals that our conclusions are robust.

## 1. Introduction

There is a substantial body of literature about overeducation in developed countries. However, overeducation is viewed as a serious problem only in developed countries or areas. To the best of our knowledge, few studies have been conducted concerning the problem in developing countries, except for [Quinn and Rubb \(2006\)](#) regarding Mexico, [Abbas \(2008\)](#) regarding Pakistan, and [Mehta, Felipe, Quising, and Camingue \(2011\)](#) regarding the Philippines, Mexico, India, and Thailand. There are several reasons why little notice is taken in developing countries. First, the human capital accumulation is much lower in developing countries than in developed countries. Since overeducation is a phenomenon in which workers' actual education is greater than what is required, we assume that overeducation would not be a serious problem in developing countries with lower accumulated human capital. Second, data limitations (especially micro-survey data) in developing countries prevent researchers from making any focused analysis regarding overeducation. In fact, the incidence of overeducation in some developing countries is close to that in developed countries ([Mehta et al., 2011](#)), although there is not much evidence. According to labor force surveys from four developing countries, [Mehta et al. \(2011\)](#) found evidence of overeducation in unskilled jobs in the Philippines, mild evidence in Mexico, and little evidence in India and Thailand. [Li, Morgan, and Ding \(2008\)](#) discuss overeducation's effects on the Chinese labor market.

Because of its effect on earnings, productivity, and mobility, many researchers are concerned with overeducation. There is a bulk of literature on the wage penalties of overeducation and under-education. [Hartog \(2000\)](#) concludes that the return of education for the overeducated is about half to two-thirds of the return to that of the well-matched, while the penalty for undereducation is somewhat smaller. Many empirical studies confirm the wage penalty for overeducation in international developed countries, including the United States ([Dolton & Silles, 2008](#); [Duncan & Hoffman, 1982](#); [McGoldrick & Robst, 1996](#)), the United Kingdom ([Dolton & Vignoles, 2000](#); [Groot, 1996](#)), Germany ([Büchel & Van Ham, 2003](#); [Daly, Büchel, & Duncan, 2000](#)), and Spain ([Dolado, Felgueroso,](#)

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& Jimeno, 2000; Ortiz & Kucel, 2008; Sandra, 2015). Developing countries such as Mexico (Quinn & Rubb, 2006), India and Thailand (Mehta et al., 2011), and China (Shen & Kuhn, 2012) have also been studied.

In this paper, we focus on the problem of wage loss caused by overeducation, and we call it the wage penalty. A common finding in the overeducation literature is that overeducated employees typically earn more than individuals employed in the same job that have the required level of education but less than individuals with the same level of education who are employed in a job that matches their education. Returns to overeducation are generally half to two-thirds of the returns to required education (Hartog, 2000; van de Werfhorst, 2011). The labor market in China provides a good case study. Three reasons motivate us to conduct this research about China. First, China has experienced three decades of extraordinary economic growth, and now it is shifting to the “New Normal”, a lower but sustainable growth path. China's innovation-driven economic growth is the key characteristic. One of the overarching priorities to retain and improve the quality of growth in China is to “enhance skill provision from early childhood through to adult learning” (OECD, 2015). Second, with the rapid economic growth, education has also been accelerating. Since 2001, millions of students have graduated from college and universities. The explosive growth of the educated supply of labor outpaces demand, which eventually leads a surplus of skilled workers and workers who are overeducated for their jobs (Li et al., 2008). Lots of students struggle to find a job that matches their expectations, and employers do not always find the requisite skills. Therefore, it is useful to examine the problem of overeducation in China from both demand and supply sides. How does the coexistence of overeducation and mismatched skills affect the educational return? It is a great concern to job-seekers, companies, and policy makers. As is noted by Murillo, Rihona-López, and del Mar Salinas-Jiménez (2012), in order to fully take advantage of the investments in education, it becomes necessary to efficiently allocate resources and to balance the skills acquired through education and those required by the market.

In this paper, we aim to answer the question of how overeducation affects wages. Several original conclusions are drawn in our study. First, the skill heterogeneity theory partly holds in China. To be specific, overeducated workers have lower abilities than the well-matched at the same education level. This also partly explains overeducation in China. Second, like most empirical findings, there exists significant wage penalties for overeducation, and the educated suffer more than a 20% loss compared with the well-matched. This conclusion is consistent with most empirical findings.

Three contributions are made in our paper. First, our research expands the empirical literature about the overeducation wage penalty. There are some studies about the effects of overeducation on earnings in China, for example Ren and Miller (2012b), Ren and Miller (2012a), Luo and Peng (2010), Wu and Lai (2010), and Yan and Wang (2017). The typical data employed includes the China Health and Nutrition Survey (CHNS), the Chinese Household Income Project (CHIP), China General Society Survey (CGSS), and the China Urban Households Survey. As far as we know, our paper is the first one to use the World Bank Skills Towards Employability and Productivity (STEP) survey data to study the overeducation wage penalty. Section 3 introduces the advantages of the data. Next, some unique variables of abilities (cognitive, technical and non-cognitive) are considered in our model, and these variables are very important in the model's specification. Cunha, Heckman, and Schennach (2010) formulate and estimate multistage production functions for children's cognitive and non-cognitive skills. To the best of our knowledge, these variables are missing in most available studies about China due to limited data. These data come from the 2012 World Bank STEP survey in China, which will be described in detail in Section 3. The result shows that these variables are not only helpful to test the ability heterogeneity theory, but also have important effect on endogeneity test.

The rest of the paper is organized as follows. The next section summarizes some theoretical and empirical studies in the literature. Section 3 gives a description of the data and variables. The descriptive statistics and the econometric analysis are performed in Section 4. Section 5 concludes the paper.

## 2. Literature review

Overeducation is a type of skill mismatch. Before we discuss overeducation, it will be helpful to clarify some relevant concepts, such as overeducation, educational mismatches, and skill mismatches. These concepts are listed in Table 1. We cite the contents of International Labor Organization ILO (2014) about the frequently-discussed types of direct skill mismatches. Concerns about skill mismatches date back to the 1970s due to the skill-intensive nature of that time's economic and technological changes. Skill mismatch is an encompassing term that refers to various types of imbalances between the skills offered and needed in the workplace. Although education is often used as a proxy for skills, education and skills have different meanings. Among the concepts in Table 1, skill

**Table 1**

Frequently discussed types of skill mismatch.

Source: Table 1 in ILO (2014).

Type	Description
Skill shortage (skill surplus)	Demand (supply) for a particular type of skill exceeds the supply (demand) of people with that skill
Skill gap	Type or level of skills is different from that required to adequately perform the job
Vertical mismatch	The level of education or qualification is less or more than required
Horizontal mismatch	The type/field of education or skills is inappropriate for the job
Overeducation (undereducation)	Workers have more (less) years of education than the job requires
Overqualification (underqualification)	Workers hold a higher (lower) qualification than the job requires
Skills obsolescence	Skills previously used in a job are no longer required and/or skills have deteriorated over time

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