The Mismatch in Thai labor market: Overeducation

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จุดมุ่งหมายของการศึกษาเพื่ออธิบายสถานการณ์การทำงานเกินวุฒิในตลาดแรงงานไทย โดยวิธีการวัดคนที่ทำงานเกินวุฒิ ใช้วิธีขององค์การเพื่อความร่วมมือทางเศรษฐกิจและการพัฒนา ซึ่งเป็นการเปรียบเทียบระหว่างระดับทักษะซึ่งสอดคล้องกับการวัดระดับการศึกษาและการวัดระดับอาชีพมาตรฐานสากล การศึกษาพบว่าสถานการณ์การทำงานเกินวุฒิในตลาดแรงงานไทยเพิ่มขึ้น และ คนที่ทำงานเกินวุฒิส่วนใหญ่จะจบปริญญาตรีในสาขาสังคมศาสตร์ การศึกษานี้ให้ความสำคัญกับสาขาที่เรียน และพบว่าความเป็นไปได้ของการทำงานเกินวุฒิจะต่ำสุดในคนที่เรียนระดับปริญญาตรี สาขาสาธารณสุข และ คนที่เรียนระดับมัธยมปลายหรืออาชีวะ ในสาขาวิทยาศาสตร์

คำสำคัญ: การทำงานเกินวุฒิ การวัดระดับการศึกษาแบบสากล การวัดระดับอาชีพแบบสากล

Abstract

The objective of this study is to explain the incidence of overeducation in Thai labor market. Using the correspondence between ISCO occupational titles and ISCED educational levels by OECD, the likelihood of overeducation is subject to the level of education and the field of study. Workers with college degree in social science have accounted for the largest proportion of the overeducated employees and workers with tertiary degree in medicine and those with non-tertiary in science are the least likely to suffer from overeducation.

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Keywords: Overeducation, ISCO occupational titles, ISCED educational level

1 Introduction

Greater educational accessibility in Thailand has considerably contributed to a collective higher level of educational attainment of the Thai labor force. Individuals who attend higher education have higher private rate of return, are more employable, and are less likely to experience poverty than those without higher education. Moreover, higher education generates economic benefits to society, i.e., high tax receipts, low dependence on public welfare program, being healthier, etc. Thus, it is reasonable for students to pursue university.

Because of an increase in the supply of university graduates, they are relegated to jobs formerly filled by high school graduates. They find that their educational level significantly exceeds the level of education their jobs required. They are called overeducated workers. Different studies have found different degrees of overeducation ranging from 7% to 45% of the total employed, depending upon region, study period, methodology, and so forth (Hartog, 2000; Sloane, 2003; McGuinness, 2006; Sicherman, 1987; Hung, 2008; Alba-Ramirez, 1993).

Employers cannot fully utilize employees' productivity so overeducation imposes costs on the economy: individuals, firms, and society. For individuals, overeducated workers are likely to earn a lower wage relative to similarly educated individuals whose jobs match their education (Sicherman, 1991; Duncan & Hoffman, 1981; Daly et. al., 2000; Hartog & Oosterbeek, 1988; Cohn & Kahn, 1995; Cohn & Ng, 2000; Alba-Ramirez, 1993). It is also possible that previously well-matched workers in the economy will be bumped down in the labor market and, perhaps out of the market entirely, as overeducated workers move into lower level occupations thus raising the mean educational level within these occupations rendering some previously adequately educated individuals undereducated (Battu, Belfield & Sloane, 2000). From a student's point of view, university workers have additional costs in the form of wage penalties if they work in jobs which require lower educational level. Based on cost-benefit analysis, it may be better for some

individuals to study higher vocational education which require 2 years less than bachelor education.

At firm level, there is some evidence to suggest that overeducation is associated with lower productivity. Overeducated workers have lower job satisfaction (Tsang et. al., 1991; Battu et. al., 2000; Verhaest & Omey, 2004; Veiera, 2005) and poor health (Kornhauser, 1965; House, 1974; Caplan et. al., 1980) which lead to lower output for firms (Tsang et. al., 1991). Moreover, firms may lose investments in training, recruitment, and screening due to higher turnover rate for overeducated workers (Vroom, 1964; Alba-Ramirez, 1993; Hersch, 1991, 1995). At societal level, society wastes resources from underutilizing highly educated workers and tax revenues are being wasted on equipping individuals with non-productive education. Also, inefficient allocation of human capital affects low productivity and growth.

The main objectives of this work are first, to exhibit facts on overeducation by gender, educational level, and occupation; second, to explain the characteristics of mismatched workers; third, to describe the relationship between the choice of field of study and the likelihood of being overeducated. This paper continues as follows. Section 2 describe conceptual framework. Section 3 explains the data set. In section 4, econometric framework is presented and is followed by a discussion of results. Finally, section 5 presents brief summary and conclusion.

2 Conceptual framework

There are two main methods to measure educational mismatch: the comparison between years of schooling attained and years of schooling required by a job, and the correspondence between ISCO[2] occupational titles and ISCED[3] educational level. Under the first method, there are 3 ways to define required years of schooling. One, the self-assessment method asks to specify the

[2] ISCO is International Standard Classification of Occupations by International Labor Organization (ILO). ISCO is a tool for organizing jobs into a clearly defined set of groups according to the tasks and duties undertaken in the job.

[3] UNESCO developed the International Standard Classification of Education (ISCED) to facilitate comparisons of education statistics and indicators across countries on the basis of uniform and internationally agreed definitions. ISCED classified educational programmes by two main axes: levels of education and fields of education.

minimum years of schooling required for their jobs and their response is defined as required schooling. Two, job Analysis is a systematic evaluation by professional job analysts who spell out the exact required years of schooling for the job titles in an occupational classification. Three, Realized Match calculates mean or mode of completed schooling of workers as required schooling. The second method is called OECD method[4], the correspondence between ISCED educational level and ISCO occupational titles. Educational levels and occupational titles are converted into 3 skill level: low skilled, intermediate skilled, and high skilled level.

This study also determines characteristics of mismatched workers by including individual and job characteristics. Human capital theory by Becker (1964) gives an emphasis on worker characteristics to identify overeducation. Overeducation arises when there is an increase in the educational attainment of workers. This causes the relative wage of highly skilled workers to fall. Producers, faced with a cheaper supply of educated labor, substitute away from low skilled workers towards the more highly skilled workers. Educated workers are placed in positions previously filled by low skilled workers. Worker characteristics are educational level, fields of study, gender, marital status, household head, and experience.

The level of education completed by graduates is critical concern to employers. A lot of literature (Frenette, 2004; Ortriz & Kucel, 2008) have concluded the positive relationship between educational level and the probability of being overeducated. Some papers (Kiker, 1997; McGoldrick & Robst, 1996; Alba-Ramirez, 1993) use years of schooling instead of level of education and find the same result that the higher the years of schooling, the likelihood is greater for being overeducated.

Widening the access to higher education has increased individual heterogeneity due to differences in skills and educational quality. This study does not investigate the impact of educational quality on overeducation because of data unavailability. However, field of study is used to identify different stocks of human capital which lead in turn to different recognition of skills. That is, some programs such as Arts & Humanities, Languages, etc.

[4] Matching educational background and employment: A challenge for immigrants in host countries, International Migration Outlook (2007)

give individuals general skills that can lead to a wider range of occupations, while some programs like engineering, architecture, or medicine give occupational-specific skills that are aimed at certain occupations. Wolber (2003), Grayson (2004), Garcia-Espejo and Ibanez (2006), Robst (2007), Krahn and Bowlby (1999), Storen and Arnesen (2006) and Heijke et al. (2003) find that graduates from occupation-specific programs have a much higher degree of match than those in the more general programs. This is attributable to the fact that these such programs provide specific skills meant for the job market.

Other individual characteristics, like gender, marital status, household head, and experience are expected to play an important role in a decision to accept a job offer. Evidences find mixed results of the relationship between gender and the probability of overeducation. Some literatures (Belfield, 2010; Hung, 2008; Battu et al., 1998) find that men have higher probability to be overeducated than women. The opposite result is found by Verhaest and Omey (2009), Ordine & Rose (2009), and Ortriz, et al. (2008).

Marital status has a differential effect of being overeducated between men and women. The theory of differential overqualification (Frank, 1978) claims that overeducation will be more marked for married individuals (especially, women) because married women are tied movers or tied stayers, that is, their job search is undertaken under the condition that the job search of their husband is optimized. Being a household head is a kind of family commitment. He or she has financial responsibility for family so he or she has higher risk of being overeducated because he or she needs to work regardless of the match between education attained and education required. Work experience is another factor causing overeducation. The human capital theory (Becker, 1964) states that overeducation is transitory phenomenon that individuals use more years of schooling to compensate for low years of experience to get jobs. After they get more experience, they would move to jobs which matched with their educational level. So an individual with more years of work experience would less likely to be overeducated rather than adequately educated (Hartog, 2000; Groot & Brink, 2000; Borghans & de Grip, 2000; Cohn & Ng, 2000).

Workers' heterogeneity alone cannot account for the extent of overeducation in the labor market. Job characteristics also have a significant

impact on the probability of being overeducated. The job competition theory (Thurow, 1975) highlights the role of jobs, instead of workers, as the origin of overeducation. Under this theory, workers compete for a job on the basis of their relative training costs. The more education, the less training required and hence the better is the position in the job queue. In such a setup overeducated workers should find themselves in an advantageous position since their relative training costs are smaller than the costs of other workers. Wage is determined by the characteristics of the job, not by worker's marginal productivity. In this view the worker's marginal product is dictated by the job characteristics and not by the stock of worker's human capital. Two main job characteristics are considered: temporary employment and size of firm.

Temporary employment has a positive effect on overeducation (Wolbers, 2003; Witte & Kalleberg, 1995; Krahn & Bowlby, 1999). The reason is that employers do not want to invest in part-time workers who may leave anytime. A lot of literatures (Wolbers, 2003; Witte & Kalleberg, 1995; Ordine & Rose, 2009; Dolton & Silles, 2008) have found that working in larger firm is negatively associated with being overeducated because there are more positions available for individuals to find a position that matches their skills.

Assignment theory by Sattinger (1993) supported the argument that both individual and job characteristics affect the incidence of overeducation. Workers with the same level of human capital are not equally productive; their productivity depends on the job to which they are matched. Therefore, overeducation arises because of a bad job match since overeducated workers are matched with a job that they cannot perform well. In these models, the returns associated with additional education depend, in part, on the quality of the assignment of heterogeneous workers to heterogeneous jobs. The returns associated with investments in human capital via educational attainment are limited if occupations do not utilize all of the schooling of the workers. That is to say, overeducated individuals earn less than others with their level of educational attainment because of an occupational ceiling on productivity. Indeed, the existence of unequal wage structures among economic sectors provides indirect evidence of an assignment problem.

3 Data sets

3.1 Method to measure educational mismatch

OECD method, the correspondence between ISCO occupational classification and ISCED educational classification, is chosen to define overeducated workers. The reasons are: 1) The Labor Force Survey collects educational level, instead of years of schooling so transforming educational level into years of schooling may be biased. Therefore, the number of year of education is not a fully reliable measure of educational attainment because it is frequently upwardly biased (Ortriz, 2008); 2) The incidence of overeducation can be compared internationally because countries also use ISCO occupational classification and ISCED educational classification.

The 1-digit educational and occupational groups are classified as high-skilled, intermediate or low skilled depending on the capacities and abilities related to them and, finally, three categories, overeducated, matched, and undereducated, will be obtained from a correspondence between occupations and educational levels (Table1-3). This approach, however, has some weaknesses. The attempt to achieve uniformity through the ISCO and ISCED classification systems can mask certain particularities associated with specific countries. The content of diplomas of a similar level in two different countries may differ, and within any given country, the value of a diploma may vary over time. Educational attainment at the time individuals complete their schooling excludes their skills acquired outside the classroom.

Table 1 Conversion of ISCO 9 categories to 3 categories

Occupational titles (ISCO-08)	Low-skilled	Intermediate	High-skilled
1.Managers			X
2.Professionals			X
3.Technicians and associate professionals			X
4.Clerical support workers		X	
5.Services and sales workers		X	
6.Skilled agricultural, forestry and fishery workers		X	
7.Craft and related trades workers		X	
8.Plant and machine operators, and assemblers		X	
9.Elementary occupations	X		

Source : Measuring competencies by educational level and job classification, OECD(2007)

Table 2 Conversion from ISCED 8 categories to 3 categories

Educational level	Low-skilled	Intermediate	High-skilled
1.Pre-school	X		
2.Primary education	X		
3.Lower secondary education	X		
4.Upper secondary education		X	
5.Post-secondary education		X	
6.Bachelor degree			X
7.Master degree			X
8.Doctorate degree			X

Source : Measuring competencies by educational level and job classification, OECD(2007)

Table 3 Correspondence between ISCED educational level and ISCO employment level

ISCED educational level	ISCO employment level		
	Low-skilled	Intermediate	High-skilled
Low-skilled	Matched	Undereducated	Undereducated
Intermediate	Overeducated	Matched	Undereducated
High-skilled	Overeducated	Overeducated	Matched

Source : Measuring competencies by educational level and job classification, OECD(2007)

3.2 Data and Methods

This study uses data from labor force survey in 2006 and 2011. The 2006-occupational groups are based on ISCO-88 while 2011-occupational groups are based on ISCO-08. Thus, ISCO-88 has been converted to ISCO-08 allowing for easy comparison of officials.

After focusing on employed workers aged 15-60 years who work as government, state enterprise, and private employees, the sample size (weighted cases) is 60,585,799 and 63,620,613 workers in 2006 and 2011, respectively. Table 4 lists and defines variables of interest, including mismatch, educational level, educational level by ISCED/ISCO method, occupational groups, occupational groups by ISCED/ISCO method, experience, experience squared, gender, head of household, marital status, years of schooling, field of study, part time job, and small firm.

The incidence of overeducation in Thai labor market is shown by using descriptive statistics. The percentage of overeducation is presented by gender, educational level, fields of study and occupations.

Multinomial logistic regression is used to determine **characteristics of mismatched workers**. The dependent variables are categorical variable, mismatch, valued equal to 1 if workers are overeducated, 2 if workers are properly matched, and 3 if workers are undereducated. In the analysis, we let outcome 2 (being properly matched) as baseline category. The explanatory variables are experience, experience squared, years of schooling, gender, marital status, household head, part time job, and size of firm.

The model is as follows:

$$\log\left[\frac{P(category\ i)}{P(category\ j)}\right] = \alpha_i + \beta_{i1}X_1 + \cdots + \beta_{ik}X_{1k} + \varepsilon_i$$

where X are experience, years of schooling, female, marital status, head of household, part time job, size of firm

In the analysis, we let outcome 2 (being properly matched) as baseline category so we will get two logistic equations:

$$\text{Log}\left[\frac{p(overeducated)}{p(properly\ matched)}\right] = \alpha + \beta_1 exp + \beta_2 exp^2 + \beta_3 married + \beta_4 head + \beta_5\ part\_time + \beta_6 small_{firm} + \beta_7 female * married + \beta_8 years\ of\ schooling + \beta_9 female + \varepsilon$$

$$\text{Log}\left[\frac{p(undereducated)}{p(properly\ matched)}\right] = \alpha + \beta_1 exp + \beta_2 exp^2 + \beta_3 married + \beta_4 head + \beta_5 part\_time + \beta_6 small\_firm + \beta_7 female * married + \beta_8 years\ of\ schooling + \beta_9 female + \varepsilon$$

The probability of being overeducated differs by fields of studies even with same level of education. Because of the negative effect of overeducation on both individuals and society, the analysis of fields on overeducation will focus on overeducated workers. **How the choices of field of study affect the likelihood of being overeducated** is determined by using logistic regression. The dependent variable is overeducation dummy which is equal to 1 if worker is overeducated and 0 if worker is matched or undereducated. The explanatory variables are fields of studies by educational levels (dummy variables). Educational level is categorized into two groups: non-tertiary (upper-secondary and post-secondary) and tertiary (university level). Fields of study are categorized into 8 fields of study. There totally are 16 dummy variables that indicate fields of study in two groups of educational level. Control variables are experience, gender, head of household, marital status, size of firm, and part time job.

Table 4 Definitions of variables

variables	definitions
Mismatch	3 categories by using ISCED/ISCO method including overeducation,
	matched, and undereducation
Educational level	8 categories including pre-school, primary, lower-secondary, upper-secondary,
	post-secondary, bachelor, master, and doctorate
Educational level by	3 educational levels by skills: high-skilled, intermediate, and low- skilled level of education
ISCED/ISCO method	
Occupation	9 categories including1) Managers 2) Professionals 3)Technicians and associate professionals
	4) Clerical support workers 5) Services and sales workers 6) Skilled agricultural, forestry, and
	fishery workers 7) Craft and related trade workers 8) Plant and machine operators and assembler
	9) Elementary occupations
Occupational groups by	3 categories including high-skilled, intermediate, and low-skilled occupations
ISCED/ISCO method	
Experience	Potential experience calculated by subtracting years of schooling and 6 from age
Experience squared	Experience * experience
Female	Dummy variable. Female=1 if female and female=0 if male
Head	Dummy variable. Head=1 if head of household and head=0 if not
Married	Dummy variable. Married=1, and =0 if single or divorced or widowed
Years of schooling	less-than primary = 0-5, primary = 6-8, lower-secondary= 9-11, upper-secondary = 12-17 post-secondary= 14-
	16, bachelor= 16-17, master= 18, and doctorate=21-22
Part time job	Dummy variable. Part time job=1 if working hours per week is less than 35 hours, and =0 if equal to or
	greater than 35 hours
Small firm	Dummy variable. Small firm=1 if working in firm which employs less than 50 workers and =0 if the
	employment is equal to or greater than 50 workers.
Field of study	8 categories including education, humanities & arts, social science, science,
	engineering, agriculture, health, and services
Employed	Dummy variable. Employed=1 if individual is employed and employed=0 if individual is unemployed
fields by educational level	16 categorical variables including 8 fields of study in non-tertiary education and 8 fields
	of study in tertiary education as follows: 1= education non-tertiary 2=education tertiary
	3= humanities & arts non-tertiary 4= humanities & arts tertiary 5= social science non-tertiary
	6= social science tertiary 7= science non-tertiary 8= science tertiary 9= engineering non-tertiary
	10= engineering tertiary 11= agriculture non-tertiary 12= agriculture tertiary 13= health non-tertiary
	14= health tertiary 15= services non-tertiary and 16= services tertiary

In particular, overeducation deserves more attention than undereducation because of its unpleasant outcomes. For an individual worker, being overeducated may hamper earnings, productivity, and job satisfaction. For a society, the prevalence of overeducation results in underemployment and inefficiency in terms of educational resource allocation. This study will place an emphasis on overeducation.

4 Empirical Findings

4.1 Facts on overeducation in Thai labor market

Using OECD definition of educational mismatch, it is found that for the group of employed workers aged 15-60 years, the percentage of overeducated workers has increased from 6.27% in 2006 to 8.51% in 2011. Most of overeducated workers work as clerical support workers and work in elementary occupations. Females have double higher percentage of overeducation than their male counterparts, that is, among overeducated workers, 8.11% (11.28%) are females and 4.81% (6.26%) are males in 2006 (2011). The reason behind this finding is that females have lower job opportunities than males so the former try to study as much as possible to get jobs. In addition, unemployment risk is higher among females so they are inclined to accept jobs that require lower level of education.

Table 5 Educational mismatch by gender

Mismatch	2006			2011		
	Overall	Male	Female	overall	male	female
Overeducated (%)	6.27	4.81	8.11	8.51	6.26	11.28
Undereducated (%)	45.44	51.17	38.21	41.19	48.44	32.23
#observations	60,585,799	33,776,870	26,808,928	63,620,613	35,168,748	28,451,864

By level of education, workers with college education are by far the most likely to be overeducated, and it has increased over time from 67.73% in 2006 to 71.52% in 2011. Next are upper secondary workers (27.45% and 22.33% in 2006 and 2011, respectively) workers with graduate education

(1.83% and 3.32%), and post-secondary workers (2.93% and 2.81%). Note that the opposite is true for workers with doctorate education; their overeducation has gone down from 0.06% in 2006 to 0.03% in 2011. Females have higher percentage of being overeducated than males if they graduate with college education. For example, female workers have 76.12 percent of overeducation while male workers have 56.51 percent of overeducation in 2006.

Table 6 The percentage of overeduction by educational level

Educational level	overeducation-2006			overeducation-2011		
	overall	male	female	overall	male	female
Upper-secondary	27.45	37.55	19.91	22.33	27.95	18.48
Post-secondary	2.93	4.01	2.11	2.81	4.1	1.92
Bachelor	67.73	56.51	76.12	71.52	65.31	75.77
Master	1.83	1.88	1.79	3.32	2.61	3.81
Doctorate	0.06	0.05	0.07	0.03	0.03	0.03

Note: Individuals with less than upper-secondary level are only matched or undereducated workers.

Education in Thailand can be grouped into 3 types: academic, vocational, and teacher. Lower-secondary graduates can choose the type of education they will continue. Academic education is general education in science and arts. Vocational education is based on occupation or employment. Teacher education is designed to equip teacher prospects with knowledge and skills required in teaching students. The result has found that workers with academic education have the highest percentage of overeducation; while, the lowest is among teacher workers (Table 7).

Table 7 The percentage of overeducation by type of education

Type of education	*2006 Overeducation (%)*			*2011 Overeducation (%)*		
	overall	*male*	*female*	*overall*	*male*	*female*
Academic	85.31	83.25	86.84	84.41	84.02	84.67
Vocational	8.58	11.37	6.5	10.11	12.52	8.46
Teacher	6.11	5.38	6.66	5.48	3.45	6.88

Fields of study have been split into non-tertiary and tertiary education[5] because some fields are heterogenous among educational levels. For example, “engineering” is a degree that is highly prestige in the university level but has far lower status in the vocational diploma. From table 8, tertiary workers have higher percentage of overeducation than non-tertiary workers in all fields of study. The percentage of overeducation is the highest among tertiary workers in social science and field becomes engineering among non-tertiary workers.

Regarding occupations, clerical support workers have the highest rate of overeducation (44.41% in 2006 and 43.59% in 2011, respectively) and females have higher percentage of overeducation than males. Over time, the percentage of overeducation has increased across occupations, especially services and sales workers whose overeducation has increased about 5 % from 2006 to 2011 (Table 9). The percentages of overeducation also decrease in clerks, machine operators, and elementary occupations.

[5] Multinomial logistic regression is used in analyzing the determinants of mismatched workers because it is more convenient for a presentation of results in terms of the effects of a covariate on the odds of being overeducated and data satisfies IIA assumption: the independence from irrelevant alternatives assumption which implies that adding the third alternative or changing the characteristics of a third alternative does not affect the relative odds between first and second alternatives.

Table 8 The percentage of overeduction by educational level and fields of study

Fields by educational level	Overeducation (%)	
	2006	2011
Education non-tertiary	0.21	0.04
Education tertiary	7.95	6.72
Humanities & Arts non-tertiary	0.07	0.17
Humanities & Arts tertiary	7.16	6.74
Social science non-tertiary	3.54	3.15
Social science tertiary	59.0	59.4
Science non-tertiary	0.24	0.58
Science tertiary	7.31	7.85
Engineer non-tertiary	4.58	2.97
Fields by educational level	**Overeducation (%)**	
	2006	**2011**
Engineer tertiary	4.98	6.42
Agriculture non-tertiary	0.73	0.29
Agriculture tertiary	1.92	1.78
Health non-tertiary	0.0	0.01
Health tertiary	0.48	0.89
Service non-tertiary	0.25	0.27
Service tertiary	1.56	2.71
total	100.0	100.0

Table 9 The percentage of overeducation by occupations

Occupational titles	2006 overeducation(%)			2011 overeducation(%)		
	overall	male	female	overall	male	female
1.Managers	-	-	-	-	-	-
2. Professionals	-	-	-	-	-	-
3. Technicians and associate professionals	-	-	-	-	-	-
4. Clerical support workers	44.41	25.28	58.7	43.59	25.71	55.85
5. Services and sales workers	15.9	16.87	15.17	20.89	23.62	19.01
6. Skilled agricultural, forestry and fishery workers	0.34	0.58	0.16	0.38	0.68	0.18
7. Craft and related trades workers	4.43	9.21	0.85	5.4	10.67	1.78
8. Plant and machine operators, and assemblers	3.16	4.83	1.91	3.12	5.66	1.38
9. Elementary occupations	31.77	43.22	23.21	26.62	33.67	21.79

Note: There are blanks in high-skilled occupations because these occupations require high skills (see the correspondence between ISCED educational level and ISCO employment level in Table 3).

4.2 Determinants of mismatched workers

In this section, the determinants of mismatched workers are estimated by using multinomial logit model. The likelihood ratio tests for the hypothesis of whether to combine any two of the three categories are rejected so no categories should be combined. Then the results are presented for overeducated and undereducated workers.

The existence of overeducation is consistent with human capital theory as it predicts that discrepancies between job requirement and educational attainment could result from substitution among the various forms of human capital**.** The results in Table 10 reveal the substitution between education and work experience. One more year of experience decreases the odd of being overeducated relative to matched by about 3% (2.3%) and increases the odd of being undereducated relative to matched by 3% (4%) in 2006 (2011). One year of schooling increases the odd of being overeducated versus matched by about 44% (43.4%) and decreases the odd of being undereducated relative to matched by 26% (27.4%) in 2006 (2011).

Gender has a significant impact on the probability of being mismatched in both years. Females have 1.0% (24%) higher probability to be

overeducated in 2006 (2011); while, they have 17% (24%) lower probability to be undereducated than males in 2006 (2011). The explanations are that females have lower job opportunities and Thai society gives a higher importance to males than females. Similarly, married individuals have 5% (1%) higher probability to be overeducated and 40% (43%) higher probability to be undereducated than unmarried individuals. Thus, married individuals have a higher probability to be mismatched workers because individuals cohabiting with their partners may face job search constraints. This is due to the problem of dual job search for couples which is much more difficult to optimize than a single job search.

Table 10 Relative risk ratio of multinomial logit model

Variables	2006		2011	
	log[prob(ov)/prob(m)]	log[prob(un)/prob(m)]	log[prob(ov)/prob(m)]	log[prob(un)/prob(m)]
experience	0.97*	1.03*	0.977*	1.04*
experience squared	0.999	0.999*	0.999*	0.998*
years of schooling	1.44*	0.74*	1.434*	0.726*
female	1.01*	0.83*	1.24*	0.76*
female*married	0.98*	0.74*	0.96*	0.65*
head	0.9*	1.18*	0.83*	1.18*
married	1.05*	1.4*	1.01*	1.43*
part time job	1.17*	0.82*	1.27*	0.9*
small firm	1.43*	0.62*	1.38*	0.64*

Note: * denotes 5% level of significance

The result for married females contradicts the theory of differential overqualification[6]. Married females have 2% (4%) lower probability to be overeducated in 2006 (2011). The reason is that married females are not the main income earner in the family or in some case they may not work at all so they try to find matched jobs to maximize their satisfaction, instead of their incomes if they decide to work outside home.

[6] The theory of differential overqualification, developed by Robert Frank (1978), claims that married women in smaller labor market run a higher risk of working in jobs for which their current qualifications exceed the educational requirements of the job. They are overqualified.

The education-job match is also found to be associated with some characteristics of the job. Overeducation is found to depend negatively on the size of firm. The match is greater in larger firm because there are a lot of positions available for ones to find jobs that match with their educational level (Wolbers, 2003; Witte and Kalleberg, 1995). Having a part- time job increases the odd of being overeducated by 17% (27%) in 2006 (2011). The reason is that it is less profitable for firms to invest in part-time employees because of the risk of workers leaving. Additional to this, employees have a loss of productive skill and they use education as a compensation for skills.

4.3 How fields of study affect the probability of being overeducated

The signs of control variables are almost the same as those in multinomial logit model (Table 10). A little difference is the negative female variable in 2006 turns positive in 2011. The difference between odd ratio for tertiary and non-tertiary[7] fields of study are more salient. Non-tertiary studies have the lower probability to be overeducated relative to the reference group (humanities & arts tertiary) than the corresponding tertiary studies. For example, workers with non-tertiary education have 63 % lower probability to be overeducated workers in 2006. The probability of being overeducated is the least among non-tertiary workers in science and health. Among tertiary education, the probability of being overeducated is lower in health, engineering, and education.

This points out that very specific fields, like health, sciences, or engineering, might be less vulnerable to overeducation than general fields[8], like social sciences, or humanities & arts. The reason is that the costs to entering occupations that do not match with their education are lower for general fields because these fields provide general skills that are transferable among employers. The result is consistent with Robst (2006), that is, graduates

[7] Non-tertiary education is upper-secondary and post-secondary education while tertiary education is university level including bachelor, master, and doctorate degree.

[8] General fields are fields that provide general skills and these skills can be transferable among employers. Specific fields are fields that provide occupational specific skills and these skills cannot be transferable among occupations.

from majors that emphasize general skills have a higher likelihood of mismatch.

5 Summary and conclusion

The study has found that overeducation does exist in Thai labor market. The percentage of overeducation has increased from 6.27% in 2006 to 8.51% in 2011. Women have 1% (24%) higher probability to be overeducated than men. Married workers have higher chance of being overeducated. However, a head of household has lower probability to be overeducated. The incidence of overeducation is higher among workers who have higher level of education and lower years of potential experience. This conclusion is consistent with the trade-off between education and experience in the human capital theory. Job characteristics matter too. The odd of being overeducated will be decreased by size of firm. Working in part-time jobs are more likely to be overeducated.

Tertiary graduates in all fields of study have higher probability to be overeducated than non-tertiary graduates. Among tertiary graduates, those with services education have higher probability and those with health education have the lowest probability of being overeducated relative to those in humanities & arts. In sum, very specific fields, like health, sciences, or engineering, might be less vulnerable to overeducation than general fields, like social sciences, or humanities & arts.

Table 11 Coefficients and odd ratio of logistic regression

Variables	Coeffficients		Odd ratio	
	2006	2011	2006	2011
experience	-0.09*	-0.07*	0.92*	0.93*
experience squared	0.002*	0.001*	1.002*	1.001*
female	-0.04*	0.06*	0.96*	1.06*
head	-0.1*	-0.2*	0.9*	0.82*
married	0.15*	0.07*	1.16*	1.07*
small firm	0.35*	0.24*	1.42*	1.28*
part time	0.18*	0.16*	1.2*	1.17*
Non-tertiary				
Education	-0.98*	-2.34*	0.37*	0.09*
Humanities & arts	-2.89*	-2.02*	0.06*	0.13*
Social science	-2.13*	-2.37*	0.12*	0.09*
Science	-3.57*	-2.8*	0.03*	0.06*
Engineering	-2.3*	-2.73*	0.1*	0.06*
Agriculture	-0.92*	-1.78*	0.4*	0.17*
Health	-	-3.18*	-	0.04*
Service	-2.04*	-2.43*	0.13*	0.09*
Tertiary				
Education	-0.65*	-0.7*	0.52*	0.5*
Social science	0.01*	-0.07*	1.01*	0.93*
Science	-0.29*	-0.42*	0.75*	0.66*
Engineering	-0.61*	-0.37*	0.54*	0.7*
Agriculture	-0.22*	0.12*	0.8*	1.13*
Health	-1.5*	-1.07*	0.22*	0.34*
Service	0.6*	0.54*	1.83*	1.71*

Note: 1) Health non-tertiary is dropped from the analysis as only one health non-tertiary graduate is overeducated.

2) Reference group is humanities & arts tertiary.

3) * denotes 5% level of significance

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