Impacts of educational mismatches on job satisfaction

The case of university graduates in Cambodia

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Abstract

Purpose – Education-job mismatches, especially overeducation or vertical mismatch, are generally found to lower the worker's job satisfaction, which may generate the counter-productive behaviors, such as high rates of absenteeism and turnover in developed countries. The purpose of this paper is to examine the impacts of educational mismatches from their both forms and dimensions (match, overeducation, horizontal mismatch and double mismatch) on the job satisfaction among university graduates in Cambodia.
Design/methodology/approach – To deal with the sample selection bias owing to the unobserved job satisfaction of unemployed graduates, this paper applies the Heckman probit model on a survey conducted with 19 higher education institutions in Cambodia.
Findings – Results indicate that a half of graduates suffer at least one type of educational mismatch and the both forms of mismatches adversely affect the job satisfaction with the strongest impact from the double mismatch case.
Research limitations/implications – The authors take into account the sample selection bias, but are not able to deal with the unobserved heterogeneity, such as individual competences and preferences. With the panel data, it would be possible to isolate those individual fixed effects.
Practical implications – The findings underline the importance of improvement in the quality of higher education in Cambodia that seems to play a main role in this education-job mismatch problem. Creating the occupational counseling for the high school students would be also helpful to orientate students to the majors strongly needed by the labor market.
Originality/value – This paper focuses on all forms and dimensions of mismatches and takes into account the sample selection bias in the context of a low-income country where the increasing rate of enrollment in higher education seems to be accompanied by an increasing rate of education-job mismatches. Previous research works focused mostly on overeducation and in developed countries.

Keywords Higher education, Job satisfaction, Heckman probit regression, Sample selection bias, Vertical and horizontal educational mismatches

Paper type Research paper

1. Introduction

The average level of education has risen successively and considerably worldwide during the past several decades (Barro and Lee, 2001; OECD, 2014). This increase in educational levels has positively contributed to individual earnings and economic growth as predicted by the human capital theory (Becker, 1964) and endogenous growth theory (Lucas, 1988), yet vertical educational mismatch or overeducation also has emerged as a serious concern, particularly in developed countries. Overeducation refers to an excess of education, beyond the level needed to perform a certain job (Rumberger, 1981; Hartog, 2000). Besides overeducation, horizontal mismatch also exists when people's occupations do not match their fields of education (Robst, 2007). The existence of these mismatches raise questions on their effects on individual outcomes in the labor market, such as the job satisfaction.

From the sociological perspective, education-job mismatches adversely affect job satisfaction because the worker's expectations on the social position and type of work are not fulfilled like they thought when they invested in their higher education (Capsada-Munsech, 2017). The job dissatisfaction may create counter-productive behaviors, such as high rates of

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absenteeism and turnover, which can harm firm productivity and subsequently economic growth (Tsang and Levin, 1985). Additionally, the lack of pleasure in the job, may deteriorate the workers' mental health and make them depressed (Kornhauser, 1965; Gal *et al.*, 2008; Bracke *et al.*, 2013; Artés *et al.*, 2014). Hence, this may also provoke negative effects on the country's development.

In Cambodia[1], concern on the education-job mismatches among university graduates also exist, even though the enrollment rate in higher education is still low. This could be very costly for the development of Cambodia if these mismatches have negative effects on individual outcome such as job satisfaction, which may also discourage younger generation to invest in their education in the future.

Thus, this paper aims at examining the impacts of educational mismatches on the job satisfaction among university graduates in Cambodia. This paper is structured as follows: Section 2 reviews the literature, Section 3 describes the data, Section 4 presents descriptive statistics, Section 5 describes the method and results and Section 6 concludes.

2. Literature review

Job satisfaction is a positive emotional state resulting from the appraisal of one's job experiences (Locke, 1976). Several factors may affect an employee's job satisfaction. For instance, in the two-factor theory, Herzberg *et al.* (1959) mentioned that job satisfaction and dissatisfaction are explained by different factors, called motivation and hygiene, respectively. Factors that relate to job satisfaction are called motivators and include achievement (placing employees in a position that use their talents well), recognition (the honor given to employees for an outstanding performance), work itself (showing employees that their work is crucial for the company), responsibility (giving employees power to decide and be responsible for their decisions), opportunity for advancement (promoting employees to a higher position based on their performance); while the factors that relate to job dissatisfaction are salary, working condition (work environment and facilities), company policy and administration (an organization's policies and procedures should be clear), interpersonal relationships (good relations with peers, managers and subordinates), status (an employee's social rank in a group) and job security (a freedom from the layoff threat). Job characteristic theory (Hackman and Oldham, 1976) also proposes a framework in which there are a number of core job characteristics that impact job satisfaction: skill variety (the degree to which a job requires various skills and abilities), task identity (the degree to which workers are involved in the entire process), task significance (the degree to which the job affects other people's lives), job autonomy (the degree to which the job provides the employee with significant freedom or independence) and job feedback (the degree to which workers receive information about their performance).

Based on these two theories, we formulate four hypotheses to be tested:

H1. Jobs that provide higher economic and social rewards (salary, career prospects and job status) would make employees more satisfied with their jobs.

H2. Jobs that allow for a higher level of personal development (learning new things, having new challenges and autonomy) would increase the employees satisfaction.

H3. Jobs with a higher quality of life (having enough time for family and leisure) should make people more happy with their jobs.

H4. Jobs making employees feel they have done something useful for the society should increase their job satisfaction.

Based on the job satisfaction theories mentioned above, we can also see that when a university graduate is not working in a job that fits his education acquired, he may be less

satisfied with his job. For example, in the motivator-hygiene theory (Herzberg *et al.*, 1959), achievement refers to placing employees in position that use their talents well, and they should feel that they are adequately challenged in their jobs. Thus, a university graduate may feel that he achieves something less than his potentiality when he is employed in a job that does not match his educational level, which requires less skills and abilities. However, it is possible that certain workers prefer a job requiring a lower educational level to learn specific skills related to the job, necessary for a better career promotion in the future as mentioned by the career mobility theory (Sicherman and Galor, 1990) or because they may face less job pressure (McGuinness and Sloane, 2011). If this is the case, working in a mismatched job should not cause a lower job satisfaction, and the problem of education-job mismatches observed in Cambodia should not be a serious concern.

This theoretical debate is not solved by the empirical literature either. For a case study of the US Bell companies, Tsang (1987) finds that one additional unit in mean years of overeducation decreases the job satisfaction by 3.3 percent. The negative impacts of mismatches on job satisfaction also exist in different European countries (Battu *et al.*, 1999; Verhofstadt and Omey, 2003; Verhaest and Omey, 2006; Fleming and Kler, 2008 Diem, 2015; Congregado *et al.*, 2016), yet Badillo Amador *et al.* (2008), Green and Zhu (2010) and Sloane (2014) do not find any such negative impacts. Thus, the following hypothesis is as follows:

H5. Overeducation might decrease job satisfaction among university graduates in Cambodia.

Despite several empirical studies examine the impacts of overeducation on job satisfaction in developed countries, less research works analyze the context of developing countries and the case of horizontal mismatches even though their effects appear to be comparable to the vertical form (Domadenik *et al.*, 2013). From the theoretical point of view, it is possible that some graduates must accept a job in a different field because they cannot find a job in their preferred field (Thurow, 1976), and then, they might be not satisfied. However, it is also possible that graduates may change their career interest (Robst, 2007), consequently, working in a job that does not match their field of education should not affect their job satisfaction. Thus, the following hypothesis is as follows:

H6. Horizontal mismatch might decrease job satisfaction among graduates in Cambodia.

By combining *H5* and *H6* together, we suspect that the effects of education-job mismatches should be stronger if graduates face a double mismatch (overeducation and horizontal mismatch). The following hypothesis is as follows:

H7. The double mismatch would decrease job satisfaction and its effect is stronger than overeducation or horizontal mismatch alone.

This research contributes to the literature on three main points. First, we examine the effects of education-job mismatches on job satisfaction from their both forms (vertical and horizontal) and also the combination of these two forms (a double mismatch) in a developing country, namely Cambodia, that has just moved from a low income to a lower middle income status in 2016, while other previous research works focus mostly on overeducation and advanced economies. Cambodia represents indeed an interesting case to consider given its remarkable rise in the enrollment rate in higher education but with an increasing concerns on unemployment and education-job mismatches. For instance, the enrollment rate in higher education has increased from just 2.5 percent in 2000 to 15.9 percent in 2011 (World Bank's website[2]) with the number of students rises from 20,000 in 2001 to 250,000 in 2014 (Un, 2015). Nevertheless, the unemployment rate of graduates is much higher, 7.7 percent in 2012, than people with only secondary education, 2.7 percent (NIS, 2013). Furthermore, around 50 percent of students are enrolled in economics, management and law majors, while Cambodia is lacking of graduates in engineering (Madhur, 2014). Second, besides the typical

variables controlled in the previous literature, we control the match between the graduates' evaluation on the importance and the real implications of several job attributes (such as salary, personal development, etc.) in their current occupations. Being able to control these variables that may have strong impacts on the overall job satisfaction should make our results more robust. Third, most of studies seem to ignore the selection bias problem owing to the non-employed graduates sample that could be mismatched if they chose to work (Caroleo and Pastore, 2018). According to the job competition (Thurow, 1976) and the assignment models (Sattinger, 1993) that suppose the high-skilled-job opportunities are limited and there exists a skill heterogeneity among graduates, sample selection bias may arise because of the fact that the educational mismatch appears first of all in the form of a higher probability of non-employment among some graduates and only at a later stage it takes the form of a penalty on individual outcomes in the labor market (Caroleo and Pastore, 2018). Consequently, we will use the Heckman probit model to deal with this issue, applied on a survey data financed by the French-speaking University Agency, known as AUF, and conducted by the French cooperation[3] at the Royal University of Law and Economics among 19 higher education institutions in Cambodia

3. Data

3.1 Data description

There exist no data available in Cambodia that aims at analyzing the problem of education-job mismatches. This study must rely on a survey that seeks to study the employability of bachelor's graduates from 19 higher education institutions (HEI) in Phnom Penh, the capital of Cambodia. The survey has been conducted from January to April 2011 among graduates who had received their bachelor's degree in 2008 from eight aggregated fields of study:[4] economics and management, engineering and architecture, information and computer technologies (IT), sociology and humanities, social sciences in English language, tourism and hospitality, law and public affairs and sciences. This means that they were interviewed between 30 and 34 months after their graduation. The lists of graduates were initially provided by the Ministry of Education, Youth and Sport. Some of these lists were completed and updated together with universities. The interviews were conducted by phone, using the phone numbers provided by the lists or the phone numbers provided by the fellows at the moment of the interview.

The number of study population were 9,462 graduates. A sample of the graduates was extracted from the whole population, with the objective of getting a limited margin of error. The criterion was to get an estimate of the rate of unemployment with a margin of +/−2 percent with a risk of 95 percent for each field of study within each university. The average sampling rate was 53 percent with a maximum of 97 percent for engineering (due to a small number of graduates in that field) and a minimum of 27 percent for IT (due to a high number of graduates in one institution). The average answering rate was 80 percent, and the majority of no responses were due to the impossibility to get the right phone number of the graduates. Our sample contains 4,025 graduates in total.

The current study excludes self-employed people from the initial dataset, because there are no detailed information available to evaluate the required schooling for their jobs, and thus impossible to define their education-job match status. Observations that offered no information on occupation and other key variables were also dropped. The final sample thus contains 3,211 university graduates who are representative of the study population, and in which 92 graduates are unemployed at the moment of survey[5].

3.2 Measuring education-job mismatches and other variables

To measure the incidence of mismatches, we employ the job analysis (JA) that is known as an objective measure. Based on the JA measure, each occupation classified by the

International Standard Classification of Occupations Code (1-digit) is assigned to the required level of education mentioned in the International Standard Classification of Education (ISCED). For example, graduates working in the positions classified as managers, professionals and technicians/associate professionals, are considered as matched workers because these positions require tertiary education. Other occupational levels such as clerical support workers and elementary occupations do not require higher education. Consequently, graduates in these occupations will be considered as overeducated[6]. Tables I and II specify the process of matching the occupational class to the educational level required.

The data also include information about the specialty of each bachelor's degree acquired from the different universities, which supports an objective determination of the presence of a horizontal mismatch. By reviewing the study program and job prospect of each specialty offered by each university, the author compares these descriptions with each individual occupation to discern if each graduate's job corresponds with his or her field of study. Table III shows the matching between occupations and fields of study.

Our results indicate that 35.43 percent and 33.25 percent of graduates are overeducated and horizontally mismatched, respectively. The incidence of educational mismatches for each category of mismatch is provided in Figure 1.

Based on the Figure 1, we observe that only a half of graduates work in a matched job to their education, while the rest faces at least one type of educational mismatch. Thus, education-job mismatch could be a problem to carefully consider. Additionally, the incidence of horizontal mismatch is comparable to the vertical form, hence, the literature that focuses solely on overeducation may neglect another important source of mismatches. More importantly, 18.47 percent of graduates also face a double mismatch.

Next, the data also possesses information regarding the overall job satisfaction ranking from 1 (very dissatisfied) to 5 (very satisfied). We recode this variable with a dummy

ISCO-08 occupational class	ILO skill level	ISCED-97 educational level
1. Manager	3 + 4	6, 5a and 5b
2. Professionals	4	6 and 5a
3. Technicians	3	5b
4. Clerks	2	4, 3 and 2
5. Service and sales	2	4, 3 and 2
6. Skilled agricultural	2	4, 3 and 2
7. Craft and related	2	4, 3 and 2
8. Plant and machine operators	2	4, 3 and 2
9. Elementary occupations	1	1

Source: iscoISCO-08, volume Iisco

Table I. Correspondence between occupational class and educational level

Skill level	Educational level	Description of educational level
4	6	Second stage of tertiary education (advanced research qualification)
	5a	First stage of tertiary education, 1st degree (medium duration)
3	5b	First stage of tertiary education (short or medium duration)
2	4	Post-secondary, non-tertiary education
	3	Upper secondary level of education
	2	Lower secondary level of education
1	1	Primary level of education

Source: iscoISCO-08, volume Iisco

Table II. Description of educational level required for each skill level

Field of education	Matching jobs (ISCO-08 3-digit codes)
Economics and Management	134, 143, 231, 232, 241, 242, 243, 262, 263, 264, 331, 332, 333, 334, 411, 412, 413, 421, 431, 432, 522
Engineering and Architecture	132, 214, 215, 216, 231, 232, 233, 311, 312, 313, 315, 515
Social sciences in English language	111, 112, 121, 122, 133, 134, 141, 143, 216, 231, 232, 233, 241, 242, 261, 262, 263, 264, 265, 334, 341, 343, 351, 352, 411, 412, 413, 511, 521, 522, 524
Sociology, Humanities and Arts	112, 216, 231, 232, 233, 234, 262, 263, 264, 265, 341, 511
Sciences	211, 212, 231, 232, 233, 311, 331, 421, 431
Information and Computer Technologies	112, 121, 133, 134, 231, 232, 233, 251, 252, 351, 352, 524
Tourism and Hospitality	112, 122, 134, 141, 231, 232, 243, 264, 341, 343, 441, 511
Law and Public Affairs	111, 121, 231, 232, 242, 261, 262, 263, 264, 334, 335, 341

Source: Author's estimation by reviewing the job prospects described for each specialty in each university

Table III.
Field of education and matching jobs

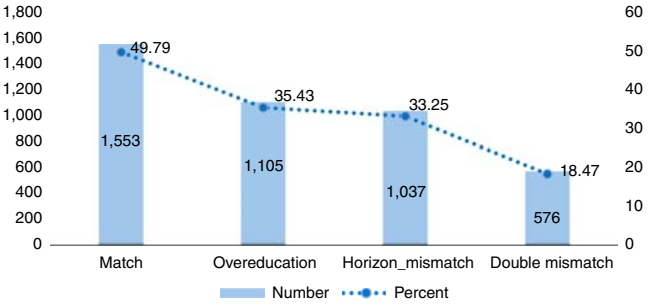

Figure 1.
Number and percent of graduates by category of education-job mismatch

variable equaling 1 (satisfied) if workers indicate the value of 4 or 5, and 0 (not satisfied) if the value is from 1 to 3. It is indicated that 63.64 percent of graduates are overall satisfied with their jobs.

To estimate the impacts of education-job mismatches on the individual job satisfaction, several variables related to individual attributes, fields of study and firm characteristics are needed to be controlled because those variables may affect the individual job satisfaction.

More importantly, the survey questionnaire also provides information regarding the graduates' evaluations on the importance of several job attributes (evaluated from 1, not important at all, to 5, very important) such as job autonomy, job stability, opportunities to learn new things, job challenge, career perspective, high salary, good social status, possibility to do something useful for the society, possibility to reconcile working and family time and job leisure. We consider this evaluation as the graduates' preferences on those job attributes. Next, the employed graduates also evaluate the implications of those job attributes in their current jobs (evaluated from 1, not implied, to 5, very implied in the job). These two evaluations allow us estimating if the importance of those job attributes evaluated by graduates is realized in their current jobs or not. Indeed, if the implications of those job attributes in their current jobs equal or exceed their preferences, we consider that their expectations for each job attribute are met. Controlling these variables is necessary because they may have impacts on the overall job satisfaction, as stated in our above hypotheses (*H1–H4*).

4. Descriptive statistics

Table IV presents the descriptive statistics[7].

VARIABLES	Mean	SD	Mean satisfaction
Dependent variable			
Job satisfaction	0.64	0.48	
Indicators of mismatches			
No mismatch	0.50	0.50	0.67
Overeducation	0.35	0.48	0.60
Horizontal mismatch	0.33	0.47	0.61
Double mismatch	0.18	0.38	0.60
Individual attributes			
Male	0.64	0.48	0.62
Age at the end of study	21.84	3.98	0.62
Married	0.25	0.43	0.67
Being born in Phnom Penh	0.51	0.50	0.63
In charge of family	0.45	0.50	0.58
Fields of study			
Law-Eco-management	0.49	0.50	0.58
Social Sciences in English	0.15	0.36	0.63
Engineering	0.05	0.21	0.73
Firm's characteristics			
Public sector	0.23	0.42	0.64
Fixed-terms contract	0.30	0.46	0.66
Permanent contract	0.31	0.46	0.67
Work in a small firm	0.10	0.30	0.70
Implications of job attributes			
Job autonomy	0.58	0.49	0.59
Job stability	0.62	0.48	0.59
Chance to learn new things	0.56	0.50	0.61
Job challenge	0.52	0.50	0.59
Career perspective	0.53	0.50	0.58
High salary	0.31	0.46	0.63
Good social status	0.56	0.50	0.57
Doing useful things for society	0.64	0.48	0.59
Having time for family	0.63	0.48	0.55
Job leisure	0.60	0.49	0.55
Observations		3,211	

Table IV.
Descriptive statistics

Based on the descriptive statistics, we observe that graduates working in a matched job tend to be much more satisfied than other graduates. Nevertheless, we observe that other variables may affect the job satisfaction as well. Thus, an econometric estimation is needed to estimate the real impacts of education-job mismatches on job satisfaction.

5. Method

The descriptive statistics have shown that many variables, besides mismatches, may affect the job satisfaction. Furthermore, there also exist graduates who are unemployed at the moment of survey, and consequently, we cannot observe their job satisfaction. Thus, to identify the impacts of mismatches on job satisfaction with a possible sample selection bias, we propose the Heckman probit model (Van de Ven and Van Praag, 1981) with the following estimation:

$$y_j^* = x_j\alpha + mismatch_j\beta + u_{1j} \quad latent\ \ equation. \tag{1}$$

Such that y_j^* defines the job satisfaction, x_j is a vector of independent variables (including individual attributes, fields of study, firms characteristics and implications of other job attributes in relation to graduates' expectations), $mismatch_j$ reflects the observed categorical variable of educational mismatches, u_{1j} defines the error term, and α and β are unknown parameters, such that β represents the estimated effect of educational mismatches on job satisfaction, *ceteris paribus*.

Nevertheless, we observe only the binary outcome in case:

$$y_j^{probit} = \left(y_j^* > 0\right) \quad probit \ \ equation. \tag{2}$$

Thus, the dependent variable is not always observed. Rather, the dependent variable for observation j is only observed if:

$$y_j^{select} = \left(z_j^*\gamma + mismatch_j^*\beta + u_{2j} > 0\right) \quad selection \ \ equation, \tag{3}$$

where:

$$u_1 \rightarrow N(0,1),$$
$$u_2 \rightarrow N(0,1),$$
$$corr \ \ (u_1, u_2) = \rho,$$

When $\rho \neq 0$, standard probit techniques applied to the first equation yield biased results, while the Heckman probit model provides consistent, asymptotically efficient estimates for all the parameters in such models. However, for the model to be well identified, the selection equation should have at least one variable that is not in the probit equation. Otherwise, the model is identified only by functional form, and the coefficients have no structural interpretation.

Thus, besides individual attributes and fields of study, in the selection equation, we add other variables such as type of university, scholarship status, double training, internship during study and previous monthly job experiences that may affect the probability of being employed.

6. Results

Table V presents the regression results. Models 1–4 examine the impacts on job satisfaction from working in a matched, vertical mismatched, horizontal mismatched and double mismatched job, respectively. Only significant variables are reported in the Table V, while all control variables can be found in the Tables VI and VII.

Looking at the Wald test result in the Table V, we see that the test value is highly significant, which rejects the null hypothesis of $\rho = 0$. Consequently, using the standard probit model can yield bias results owing to the sample selection bias, and the Heckman probit model is consistent and more efficient in this case. Next, we use the Likelihood-ratio test to compare the Heckman probit model with instruments and the nested model without instruments, we find that the LR χ^2 value is high, equals to 331.68 and significant at 1 percent level[8].

Indeed, being employed is not a random process. In the selection equation estimation, we observe that graduates who used to intern during their studies and have longer previous job experiences are more likely to be employed. In the context of low quality in education and limited skilled-job opportunities, typically found in developing countries, employers may stress more importance on the professional background of graduates, rather than just rely on their diplomas. This suggests that university students should look for volunteer jobs, and internship should be compulsory, so that graduates can acquire professional knowledge, useful for finding a job when they finish their studies. We also notice that graduates from the

Variables	Model 1	Model 2	Model 3	Model 4
No Mismatch	0.123** (0.048)			
Overeducation		−0.120** (0.052)		
Horiz. Mismatch			−0.107** (0.050)	
Double mismatch				−0.131** (0.062)
Male	−0.107** (0.051)	−0.110** (0.051)	−0.097* (0.050)	−0.101** (0.050)
Age at the end of study	0.031*** (0.007)	0.031*** (0.007)	0.032*** (0.007)	0.031*** (0.007)
In charge of family	−0.183*** (0.050)	−0.186*** (0.050)	−0.187*** (0.050)	−0.190*** (0.050)
Law-Eco-Management	−0.191*** (0.058)	−0.177*** (0.058)	−0.212*** (0.058)	−0.201*** (0.058)
Engineering	0.229* (0.132)	0.239* (0.132)	0.237* (0.132)	0.241* (0.132)
Public sector	0.116* (0.067)	0.122* (0.067)	0.124* (0.067)	0.126* (0.066)
Fixed-terms contract	0.272*** (0.061)	0.268*** (0.061)	0.273*** (0.061)	0.268*** (0.061)
Permanent contract	0.249*** (0.060)	0.249*** (0.060)	0.248*** (0.060)	0.247*** (0.060)
Work in a small firm	0.322*** (0.086)	0.329*** (0.086)	0.312*** (0.085)	0.322*** (0.086)
Chance to learn new things	0.110** (0.053)	0.112** (0.053)	0.108** (0.053)	0.110** (0.053)
High salary	0.312*** (0.056)	0.312*** (0.056)	0.312*** (0.056)	0.312*** (0.056)
Having time for family	−0.183** (0.075)	−0.183** (0.075)	−0.189** (0.075)	−0.190** (0.075)
Job leisure	−0.266*** (0.074)	−0.269*** (0.074)	−0.264*** (0.074)	−0.266*** (0.074)
Selection equation:				
Being employed				
Previous monthly job experiences	0.081*** (0.005)	0.081*** (0.005)	0.081*** (0.005)	0.081*** (0.005)
Internship	0.338*** (0.125)	0.337*** (0.125)	0.337*** (0.125)	0.336*** (0.125)
Public university	0.430*** (0.154)	0.429*** (0.154)	0.432*** (0.154)	0.432*** (0.153)
Observation	3,211	3,211	3,211	3,211
Censored	92	92	92	92
Log pseudolikelihood	−2,155.58	−2,156.17	−2,156.49	−2,156.55
Wald test of indep. eqns. (chi2 value) (H_0: $\rho = 0$)	8.10***	8.09***	8.23****	8.19***

Notes: Robust standard errors are in brackets. *$p < 0.1$; **$p < 0.05$; ***$p < 0.01$

Table V.
Impact of education-job mismatches on job satisfaction

public universities are less likely unemployed. In fact, many private HEI in Cambodia gained official recognition without following a clearly defined process (Ford, 2015). By international comparison, many of those HEI are very small with narrow academic and resource bases (Mak, 2005). Additionally, the competition among those private institutions led to the lowering of fees, followed by the reduced revenue, and coupled with the inattention to support quality, results in weak HEI and expressed in high graduates' unemployment rate (Ford, 2015). Thus, a choice of university seems to be crucial in Cambodia.

Next, from the main equation, we observe that several individual attributes affect the job satisfaction such as men and persons that need to be in charge of their family tend to be less satisfied. According to a research, women are happier at work because they tend to choose more fulfilling work, more enthusiastic, lower aspiration and expectations (www.nafe.com/8-surprising-reasons-women-are-actually-happier-at-work-than-men), while the responsibility on the family may put more pressure on workers to expect more from their jobs, making them less satisfied. Older workers are found to be happier as found by Lee and Wilbur (1985). Perhaps, thanks to their maturity, older workers adapt to the lifework better than young persons. Fields of study also impact job satisfaction such as graduates in management and related fields are less satisfied, while graduates in engineering are happier. As there are too many graduates in management related fields, this may put them under some pressures of keeping their jobs or positions. Firms characteristics and sector of activity also affect job satisfaction. Indeed, workers with fixed or permanent work contracts are more satisfied than worker without work contract. Given that 73 percent of employment in Cambodia were accounted for by micro, small and medium-sized enterprises, and most of

Variables	Description
Individual attributes	
Men	1 if men, 0 otherwise
Married	1 if married, 0 otherwise
Age at the end of study	Continuous variable
Birthplace	1 if in Phnom Penh or Kandal, 0 otherwise
In charge of family	1 if having members in family to be in charge, 0 otherwise
Fields of study	
Law-Economics-Management	1 if graduated in management and related fields, 0 otherwise
Social sciences in English	1 if graduated in social sciences in English, 0 otherwise
Engineering	1 if graduated in engineering or related fields, 0 otherwise
Firms characteristics	
Public sector	1 if working in the public sector, 0 otherwise
Fixed-term contract	1 if having a fixed-term contract, 0 otherwise
Permanent work contract	1 if having a permanent work contract, 0 otherwise
Small firms	1 if working in a small firm less than 10 staff, 0 otherwise
Implications of job attributes (in relation to graduates' expectations)	1 if the implication of the job attribute equals or exceeds the graduates' expectations, 0 otherwise
Job autonomy	
Job stability	
Chances to learn new things	
High salary	
Job challenge	
Career development	
Social status	
Doing useful for societies	
Reconciliation working and family time	
Job leisure	

Table VI. Controlling variables for main equation

Variables	Description
Indicators of mismatches	
Match	1 if match, 0 otherwise
Overeducation	1 if overeducation, 0 otherwise
Horizontal mismatch	1 if horizontal mismatch, 0 otherwise
Double mismatch	1 if double mismatch, 0 otherwise
Individual attributes	
Men	1 if men, 0 otherwise
Married	1 if married, 0 otherwise
Age at the end of study	Continuous variable
Birthplace	1 if in Phnom Penh or Kandal, 0 otherwise
In charge of family	1 if having members in family to be in charge, 0 otherwise
Fields of study	
Law-Economics-Management	1 if graduated in management and related fields, 0 otherwise
Social sciences in English	1 if graduated in social sciences in English, otherwise
Engineering	1 if graduated in engineering or related fields, otherwise
Other educational and professional background	
Public university	1 if graduated from public universities, 0 otherwise
Study scholarship	1 if got scholarship for their studies, 0 otherwise
Double training	1 if graduated from two disciplines, 0 otherwise
Internship during studies	1 if interned during studies, 0 otherwise
Previous monthly job experiences	Continuous variables

Table VII. Controlling variables for selection equation

them (about 95 percent) are in the informal sector (ADB and ILO, 2015), we have reasons to believe that workers without contract might be in the informal sector that is characterized by poor working conditions. Working in the public sector increases job satisfaction because it is known that in Cambodia, the job pressures in public sector is generally much lower than in private sector. Surprisingly, graduates working in a small firm less than ten staff are more satisfied. Perhaps, in bigger firms, graduates face more pressures and the tasks might be more specialized, while in small firms, graduates might be able to learn various skills from management to operation, which may positively affect their job satisfaction.

Regarding the match between the implications of job attributes relative to what expected by graduates, we clearly see that the jobs that provide chances for graduates to learn new things/skills, and especially good salary, do increase their job satisfaction as suggested by the two-factors theory (Herzberg *et al.*, 1959), but other job characteristics such as job status and job autonomy do not have influences on the job satisfaction, as mentioned by the job characteristics model (Hackman and Oldham, 1976). This leads to partly confirm *H1* and *H2*. Nevertheless, it is surprising that graduates who report to have a great time for leisure and family tend to be less satisfied. This is against our *H3* that jobs with a higher quality of life should make people more happy with their jobs. Perhaps, those jobs might provide too much free time beyond what graduates wish for, making graduates feel that they are unproductive with less achievement, which conforms to the Herzberg's motivation model. Then, we do not find evidences for *H4* about the impact of doing something useful for the society on the employees' job satisfaction. Thus, the role of task significance (the degree to which the job affects other people's lives) is rejected in our case study.

Finally, after controlling many variables and sample selection bias, we still observe the negative impacts of education-job mismatches on job satisfaction. Indeed, graduates who work in a matched position are more satisfied, while working in a mismatched job, either vertical or horizontal, can lower job satisfaction, especially the case of a double mismatch. This shows that overall, graduates did not prefer mismatched job in exchange for better career opportunities, for less job pressure or because they change their career interest, but because they are rather not able to find the suitable jobs to their education. Consequently, as mentioned by the job characteristic theory (Hackman and Oldham, 1976) and the two-factor theory (Herzberg *et al.*, 1959), graduates might not fully use their skills and abilities in that type of job that might be more routine, less challenging and thus, they achieve less results than what they want to do. As a result, graduates with mismatched jobs have lower job satisfaction, which confirms our hypotheses *H5–H7*. Table VIII below estimates the marginal effects of the impacts of education-job mismatches on graduates' job satisfaction.

From the Table VIII, graduates with an education-job match are 4.66 percent more satisfied than other graduates who face at least one type of educational mismatch. In contrast, overeducated graduates are 4.53 percent less satisfied than non-overeducated graduates, which is higher than the case of horizontal mismatches (−4.07 percent). Furthermore, when

Variables	Impacts	Compared to
No mismatch	+4.66%**	Mismatched workers
Overeducation	−4.53%**	Non-overeducated workers
Horizontal mismatch	−4.07%**	Non-horizontal mismatched workers
Double mismatch	−4.98%**	Non-double mismatched workers
Overeducation	−4.74%**	Workers with an education-job match
Horizontal mismatch	−4.69%**	Workers with an education-job match
Double mismatch	−5.34%**	Workers with an education-job match

Note: $^{**}p < 0.05$

Table VIII.
Impacts of education-job mismatches on job satisfaction (marginal effects)

graduates suffer both forms of mismatches, the negative impacts increase to 4.98 percent, which is conformed to what found by Béduwé and Giret (2011) that a double mismatch has a stronger effect on job satisfaction among vocational graduates in France.

Following the same method of calculation, we can compare the impacts from each type of mismatches to graduates with a matched job with the expense of lower sample size[9]. Results indicate that vertical and horizontal mismatches reduce the job satisfaction with similar impacts, by 4.74 and 4.69 percent, compared to matched graduates. The negative impact also increases up to 5.34 percent for the case of double mismatch. Thus, the literature that neglects the horizontal mismatch case ignores an important source of problem. Overall, our results suggest that educational mismatch is a main issue that is needed to be carefully considered in Cambodia because with lower job satisfaction, the graduates' productivity might be reduced, and thus, the recent expansion of higher education would be not fully beneficial to the country. Furthermore, a high turnover rate and some counter-productive behaviors observed among several educated workers in Cambodia that can affect the development of firms, reported by development partners such as ILO and ADB, might be partly a result of a low job satisfaction that is due to education-job mismatches.

7. Conclusion

This paper examines the impacts of education-job mismatches from their both forms and dimension (vertical, horizontal and double mismatches) on the job satisfaction among university graduates in Cambodia. To deal with the sample selection bias, we employed the Heckman probit model, and the regression results show that education-job mismatches adversely affect the job satisfaction with the strongest impact from a double mismatch, followed by vertical and horizontal mismatches, despite several variables related to individual attributes, fields of study, firm characteristics and implications of job attributes are controlled for. This shows that, overall, working in a mismatched job is not a graduates' choice, but rather the impossibility to find a suitable job to their education. Being employed in this kind of job makes graduates unable to exploit their skills and thus, they achieve less results than what they wished for when they decided to invest in higher education.

Our results suggest that Cambodia has to be more attentive on the expansion of its higher education sector: they should not focus only on the quantity but also the quality of higher education. Creating the occupational counseling for the high school students would be also helpful to orientate students to the majors strongly needed by the labor market. Programs allowing students doing more internship to apply their theoretical knowledge in the real practices should be also created. Evaluation on each university performance should be conducted and results should be disseminated to public, so that students can make a better choice and universities will compete more in terms of quality. Indeed, the negative impacts of educational mismatches on the graduates' job satisfaction, may generate counter-productive behaviors such as high rates of absenteeism and turnover that were actually already observed and reported by many employers in Cambodia. These behaviors can surely cost firms in terms of a limited productivity and subsequently the firm expansion, which can be bad for the country's development.

This paper contributes to the literature in several ways. Indeed, we examine the case of a developing country that has just upgraded to a lower middle income status and consider the both forms of mismatches together with the possible sample selection bias. Too little studies have analyzed the impacts of mismatches in developing countries, and only a little of research works in developed countries have considered the horizontal form and the combination effect of their both forms. Most of previous literature also seem to ignore the sample selection bias when they analyze the impacts of mismatches on individual outcomes in the labor market. Anyways, we acknowledge few limits of this paper. First, the survey was not initially designed to analyze the education-job mismatches, thus, besides the JA

measure, we cannot employ other methods to measure their educational mismatches. Second, we take into account the sample selection bias, but not able to deal with the unobserved heterogeneity such as individual competences and preferences. With panel data, it would be possible to isolate those individual fixed effects. These limits require thus further research works on this issue.

Notes

1. Cambodia is located in the Southeast-Asia region and has just moved from the low-income status to lower middle income country at mid-2016.
2. Data link: https://data.worldbank.org/indicator/SE.TER.ENRR?locations=KH
3. It is a department in cooperation with French universities to offer bachelor's and master's degrees in economics-management and law at RULE, accredited by both RULE and French universities.
4. A detail on study majors including in these aggregated fields is available in the Appendix.
5. By comparing the means and standard deviations of all variables used in our analysis before and after the eliminations of those observations, we do not remark any important gaps to consider.
6. One limit of using this measure to estimate the rate of overeducation is that the same job title may not mean that workers are performing the same tasks, and thus workers can be required to possess different educational levels. Nevertheless, other measures of overeducation also possess other drawbacks (see the literature review of McGuinness (2006) and Sala (2011) for a further discussion on this matter). Additionally, the use of this measure is also constrained by the data availability. For instance, previous researches on this issue in developing countries, including Cambodia, conducted by the International Labour Organization and Asian Development Bank also employ this same method by assigning the ISCO with 1-digit level to the ISCED (e.g. Sparreboom and Staneva, 2014; ILO and ADB, 2015).
7. For the continuous variables (age at the end of study), the observed mean satisfaction is evaluated for the two last quartiles. Then, the job satisfaction, firm characteristics and the implications of job attributes are only observed among the employed graduates (3,119 observations).
8. STATA does not provide us the command to directly test the quality of instruments of the Heckman probit regression, but the LR test allows us finding that including those instruments in the model is much better than not doing so.
9. First, in our regression analysis (Table V), we keep only graduates who are either matched or overeducated. Next, we redo by keeping only matched graduates and graduates with a horizontal mismatched job. Finally, we focus solely on graduates with a matched or a double mismatched job.

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Further reading

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Appendix

(1) Economics and management major comprises specialties such as: economics sciences, business management, accounting, marketing, finance and banking and other related skills.

(2) Engineering and architecture major consists of specialties such as: civil engineering, electrical and energy engineering, industrial and mechanical engineering, architectural designs and other related skills.

(3) Information and computer technologies major comprises specialties such as: computer sciences, management information system and other related skills.

(4) Sociology and humanities major consists of specialties such as: Khmer literature, geography, history, philosophy, sociology and other related skills.

(5) Social sciences in English language major comprises specialties such as: english literature, translation, interpretation, international relation, english for business, professional communication and other related skills.

(6) Tourism and hospitality major consists of specialties such as: hotel and tourism management, tourism education and resource, hospitality management, hotel administration and other related skills.

(7) Law and public affairs major comprises specialties such as: business law, public law, public administration and other related skills.

(8) Sciences major consist of specialties such as: mathematics, chemistry, biology, physics and other related skills.

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