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Unemployment duration and educational mismatches: An empirical investigation among graduates in Cambodia.

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Abstract

This article analyzes the relationship between unemployment duration and educational mismatches in their both forms and dimensions (overeducation, horizontal mismatch and double mismatch) among university graduates in Cambodia, using an independent competing-risk duration model. It finds that a half of university graduates face at least one type of educational mismatch, and their unemployment duration after graduation is higher than for those who end in well matched jobs. This suggests that more attention should be paid to ensuring that the quality of higher education as well as the fields of study taken fit the requirements of the Cambodian labor market.

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1 Introduction

In developed countries, education plays a key role against unemployment: The higher educational levels, the lower risks of unemployment (Mincer, 1991). Nevertheless, this evidence seems to be opposite in developing countries where unemployment can be higher among most educated persons (UNESCO, 2013). One of the main reasons to explain this phenomenon can be related to mismatches between the skills produced by higher education sector and what are demanded in the labor market (UNESCO, 2013; Tansel & Taşçi, 2010). Thus, concerns of education-job mismatches also emerge among high-educated persons in developing countries. Two types of educational mismatches can occur. First, overeducation, or vertical educational mismatch, refers to an excess of education, beyond the level needed to perform a certain job (Hartog, 2000; McGuinness, 2006). Second, horizontal mismatch implies that people's occupations do not match their fields of education (Robst, 2007a,b).

Theoretically, the analysis of the relation between mismatches and unemployment duration does not result in a consensus. The job search theory (Jovanovic, 1979) assumes that job seekers can only access to limited information about the available job opportunities. Thus, they face two alternative choices between accepting the first job offer that can be mismatched to their qualification or staying unemployed to wait for a better suitable job. In contrast, as assumed by the job competition model (Thurow, 1976) that workers are heterogeneous and job opportunities are also limited, it is possible that some workers, notably the less competent persons, stay unemployed for a longer duration and are assigned to an undesirable job that does not suit well their education acquired.

The theoretical uncertainty on the relation between unemployment duration and educational mismatches is not resolved by empirical studies in developed countries. While Cuesta (2005) and Pollmann-Schult & Büchel (2005) find that overeducation decrease unemployment duration, Rose & Ordine (2010), Barros et al. (2011) and Lin & Hsu (2013) find the opposite results. Furthermore, there is no research on developing countries and horizontal mismatch concerning this issue yet.

The objective of this article is to investigate if there exists a positive or negative association between unemployment duration and educational mismatches among graduates in Cambodia. This nation offers an interesting case to illustrate the contextual issues in developing countries: With a rapid increasing rate of students enrolled in higher education,[1] the unemployment rate among university graduates reached 7.7% against 2.7% of people with only secondary education (NIS, 2012). Around 50% of students were enrolled in management related fields, while Cambodia needs more graduates in engineering (Madhur, 2014). Among 220 employers interviewed in Cambodia, 73% think that many graduates do not have required skills in the jobs they ask for (World Bank, 2012).[2]

This article contributes to the literature in two main points. First, we extend the research into a developing country on the relation between unemployment duration and education-job mismatches. Second, we consider mismatches in their both forms and all dimensions: No mismatch, vertical, horizontal or double mismatch, by using an independent-competing risks regression applied on a survey data in 2011 from nineteen universities in Cambodia.

[1] The number of students increased from 20,000 in 2001 to 250,000 in 2014 (UN, 2015).

[2] For further information concerning the issues in higher education system and its link to labor market in Cambodia, please refer to these recent reports: ADB and ILO (2015); Ford (2015); Brehm (2016). Some local conditions of the Cambodian labor market are provided in the Appendix: A.

2 Data

The French cooperation[3] at the Royal University of Law and Economics (RULE) in Cambodia conducted the survey that informs this research by phone between January and April 2011, among Cambodian graduates who had received their bachelor's degrees in 2008, around 33 months after their graduation. The 4,025 graduates[4] are randomly selected and representative of nineteen universities in Phnom Penh, the capital of Cambodia. The current study excludes self-employed people from the initial data set, because there is no detailed information available to evaluate if they require a university degree for their business or not.[5] Observations that offered no information about the occupations or the duration of unemployment also were dropped. The final sample contains 3,211 graduates. Note that our final sample still represents the study population.[6]

This survey records the total unemployment spell that graduates had faced since the graduation and if some graduates were still unemployed at the moment of interview that we can code these observations as censored data. The survey also informs us several observed graduates' characteristics such as gender, age, marital status, parents' educational levels, birthplace, types of university, internship, and graduates' preferences for the different job characteristics. Furthermore, the sample provides information about graduates' fields of study and occupations allowing us to calculate the incidence of educational mismatches.

To measure the mismatch incidences, the job analysis (JA) method, which offers an objective measure, is employed. The International Standard Classification of Occupations Code (ISCO-08) and the International Standard Classification of Education (ISCED-97) conform with this objective measure to help define who is overeducated or not. Graduates working in jobs that require skill levels of 3 or 4, which correspond to the occupational levels 1 (managers), 2 (professionals), and 3 (technicians or associate professionals), are classified as matched workers. Other occupational levels that demand skill levels lower than 3 signal graduates who are overeducated. [7]

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.[8]

Our results indicate that 35% and 33% of graduates are overeducated and horizontally mismatched, respectively, yet it is possible that some of them might suffer both forms of mismatches. The incidence of educational mismatches for each category is provided in

[3]It is a department in cooperation with French universities to offer few bachelor's and master's degrees in economics-management and law at RULE, accredited by both RULE and French universities.

[4]The average response rate was 80%, and the majority of no responses were due to the fact that graduates had changed their phone numbers, making interviewers impossible to contact them.

[5]In Cambodian language, when people say they are self-employed, it can refer to owning a small grocery shop in the informal sector or a formal complex business. Without detailed information on their business size and activities, the author cannot define if their jobs match their educational level and fields or not (234 graduates declared they were self-employed).

[6]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.

[7]Two tables specify the process for matching the occupational class to the educational level required are in the Appendix: B.

[8]The matching table can be found in the Appendix: C.

Table I with the relation to unemployment duration.

Table I: Unemployment duration and educational mismatches

		Unemployment duration (Days)	
Variables	Percentage	Mean	Std. Dev.
No mismatch	49.79%	34.67	102.33
Overeducation only	16.96%	38.41	110.77
Horizontal mismatch only	14.78%	28.60	76.36
Double mismatch	18.47%	45.93	145.00
Observations	3,119[9]	36.49	109.80

Besides educational mismatches, there exist other observable factors that can also influence the unemployment duration. It is thus necessary to conduct an econometric analysis to identify the impact of educational mismatches and the effects of graduates' attributes on their unemployment duration.[10]

3 Methods and results

To identify these impacts, two econometric methods are used. First, a single risk regression,[11] which does not consider the type of jobs, is used. Second, an independent competing risk regression takes into account transitions into jobs with four different mismatch outcomes: No mismatch, overeducation only, horizontal mismatch only and double mismatch. For a description of this empirical method, please refer to the article of Edin (1989).

Table II: Results

	Weibull regression	Competing risks regression			
VARIABLES	All employment	Match	Overedu.	Horiz. Mis.	Double Mis.
Male	0.916	1.341***	0.639***	1.194*	0.734***
	(0.060)	(0.064)	(0.051)	(0.119)	(0.058)
Age at the end of the study	1.041***	1.021***	0.941***	1.004	0.966**
	(0.007)	(0.005)	(0.017)	(0.010)	(0.013)
Married	1.204**	1.150***	0.704***	0.902	1.146
	(0.094)	(0.059)	(0.078)	(0.101)	(0.109)

[9] There are 92 censored observations that were unemployed at the moment of interview.

[10] We do not have data on other workers with primary, secondary and vocational educations that allows us comparing the difference between their unemployment spells and education-job mismatches.

We cannot control the business cycle in our regression model because we do not know which individual was interviewed in January, February, March or April.

[11] The test of Schoenfeld residuals show that the hazards are proportional; therefore, the Cox duration model fits our data well. However, this model does not consider the possible existence of unobserved heterogeneity. We propose thus a Weibull regression that takes into account the unobserved heterogeneity but cannot allow for different competing risks. We observe that there is a presence of unobserved heterogeneity, yet we are not able to tell if this presence is due to the fact that we assume the hazards are not proportional, but it is false, or that we assume there are no competing risks, but it is also false.

Table II: Results-continued

	Weibull regression	Competing risks regression			
VARIABLES	All employments	Match	Overedu.	Horiz. Mis.	Double Mis.
Birth place in Phnom Penh	1.092	0.936	0.984	1.067	1.147*
	(0.069)	(0.039)	(0.081)	(0.095)	(0.090)
High level education of parents	1.155**	1.185***	0.955	0.900	0.770***
	(0.076)	(0.050)	(0.083)	(0.087)	(0.067)
Scholarship status	1.634**	1.017	1.086	1.515	0.528
	(0.340)	(0.140)	(0.325)	(0.393)	(0.218)
Internet training	1.375***	1.044	1.191	0.965	0.992
	(0.119)	(0.062)	(0.133)	(0.129)	(0.117)
Double university degree	1.014	1.081*	1.126	0.957	0.772***
	(0.071)	(0.050)	(0.102)	(0.095)	(0.067)
Engineering Sciences	0.566***	1.565***	0.119**	0.638*	0.188***
	(0.091)	(0.117)	(0.120)	(0.148)	(0.077)
Law - Economics - Management	0.883	0.866***	4.274***	0.399***	0.950
	(0.070)	(0.045)	(0.673)	(0.046)	(0.088)
Social Sciences Khmer	1.337**	1.239***	0.372*	0.874	0.917
	(0.174)	(0.098)	(0.192)	(0.157)	(0.165)
Social Sciences English	1.417***	0.948	2.693***	1.058	0.708**
	(0.139)	(0.064)	(0.514)	(0.130)	(0.101)
Study in a private university	1.004	0.974	0.757***	1.302***	1.101
	(0.066)	(0.043)	(0.067)	(0.125)	(0.095)
Internship during study	1.033	1.074*	0.940	0.882	1.131
	(0.066)	(0.046)	(0.079)	(0.081)	(0.087)
Informal job networks	1.451***	0.891**	1.307***	0.979	1.224**
	(0.098)	(0.040)	(0.118)	(0.097)	(0.104)
Expect for a good career development	1.317***	1.055	1.101	0.957	0.842*
	(0.114)	(0.057)	(0.123)	(0.111)	(0.086)
Expect for a good salary	0.758***	0.883**	1.321**	0.784**	1.167
	(0.068)	(0.050)	(0.181)	(0.092)	(0.142)
Expect for a job security or stability	1.441***	1.188***	0.804**	1.054	0.903
	(0.109)	(0.059)	(0.075)	(0.111)	(0.082)
Expect for a job with leisure	1.109	1.434***	0.726	0.590**	0.738
	(0.230)	(0.157)	(0.197)	(0.153)	(0.199)
Expect for an enough time with family	1.177	0.752***	1.183	1.247	1.582*
	(0.238)	(0.077)	(0.316)	(0.321)	(0.424)
Constant	0.104***				
	(0.021)				
ln_p	-0.443***				
	(0.010)				
ln_θ	0.609***				
	(0.024)				
No. of Occurrence	3,119	1,553	529	461	576
No. of Censored observations	92	92	92	92	92
No. of Competing observations	0	1,566	2,590	2,658	2,543
No. of Total observations	3,211	3,211	3,211	3,211	3,211

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

Before we interpret our results, we would like to notify that the coefficients reported in Table II are in terms of hazard ratio. A hazard ratio higher than 1 means that the independent variable is associated with a higher exit rate from unemployment towards a job. In other words, the value higher than 1 is associated with a shorter unemployment duration. In contrast, the value less than 1 signifies that the independent variable is associated with a lower exit rate from unemployment and thus longer unemployment duration. For instance, in the Weibull regression, a one-year increase in graduates' age is associated with a higher exit rate from unemployment by 4.1% $(1.041-1)$. Given that the unemployment duration is inverse to the exit rate from unemployment, we can also say that a one-year increase in age reduces the duration of unemployment by around 4%.[12] We will follow this convention to interpret the effects of other independent variables on unemployment duration:

From the Weibull regression, graduates whose parents finish at least high school degree experience unemployment duration 13% shorter than graduates with lower educated parents. As Hansen & Mastekaasa (2006), Torche (2011), and Capsada-Munsech (2015) suggest, educated parents are likely better informed and share more knowledge with their children. Graduates who got scholarships for their studies and possess knowledge on how to use Internet[13] stay unemployed shorter than other graduates by 39% and 27%, respectively. Next, graduates in engineering suffer unemployment duration by 77% longer than non-engineering graduates. The world economic crisis in 2008 that hit the construction sector in Cambodia in 2008 and 2009 can explain this finding. Graduates who find a job thanks to their family and acquaintance, quit unemployment with a 32% faster in terms of duration than from other channels. Then, graduates with a high expectation for a good career development are found to have the length of unemployment 24% shorter, but a high expectation for a good salary is associated with a 32% longer unemployment duration as predicted by the job search theory that people with higher reservation wages tend to stay unemployed for a longer time.

From the competing-risks regression, it appears that all variables affect unemployment duration differently according to what type of job that graduates exit to. First, gender has no effect in the Weibull model, but it emerges as a good indicator in the competing-risks regression. Being a man helps graduates to exit towards a matched job faster by 25%, yet, the duration of exit towards an overeducated and a double mismatched job is longer by 56% and 36%, respectively. In other words, men are more likely to find a matched job than women (McGoldrick & Robst, 1996). Older graduates, being married and having educated parents also enjoy such advantages compared to younger, single persons and having lower educated parents. Field of study is again an important determinant of unemployment duration in the competing hazards model. Graduates in engineering take longer than non-engineering graduates to get a job on average, but their duration of unemployment before finding a matched job is 36% shorter. However, engineering graduates who end up in a double mismatched job have an unemployment duration that is 5.3 times of the spells known by non-engineering graduates. Perhaps engineering study is a very specialized discipline, making them hard to accept a mismatched job (Dolton & Vignoles, 2000) and prefer to wait for a suitable job after the economic recovery in 2010.

[12] Please find the formula for this calculation in the Appendix: D.

[13] Please note that Cambodia was just a low-income country before 2016, many graduates may not know how to use computer and Internet quite well.

In contrast, graduates in law-economics-management experience a 15% longer duration than other disciplines if they exit to a matched employment, but 77% shorter if they exit to an overeducated job. This result is not surprising given that graduates in this discipline exceeds the demand around 2.5 times between 2009 and 2014 (D'Amico, 2010), and consequently, those graduates may accept more quickly a mismatched occupation. Using the informal job network is associated with a 12% longer unemployment duration before finding a matched job, but 23% shorter for exiting to overeducated positions. Meliciani & Radicchia (2016) argue that using the family/friends network limits the extent of job search, thus reducing spatial flexibility to find a suitable job. People who expect for a good salary enjoy a shorter unemployment duration by 24% for exiting to overeducated occupations, but they experience 27% longer in duration towards a horizontal mismatched job. This finding suggests that graduates might consider that accepting a job that is vertically mismatched is not a serious problem since after years, they might be promoted to a higher position level after acquiring specific skills related to the job (Sicherman & Galor, 1990), but accepting a job that is horizontally mismatched can be a bad decision because the skills that they learned at school related to a particular field might not be re-utilized at all in the future (Robst, 2007a), which can strongly limit their career perspective, and thus their salary. Graduates who expect a stable job have shorter periods of unemployment before finding a matched job, but longer periods of unemployment before ending in a job for which they are overeducated. Similarly, an expectation for a job with ample leisure time is associated with a 69% longer unemployment duration for spells ending in horizontally mismatched occupations. Maybe working in a job that is not related to the field of skills they acquired at university might be boring. Finally, graduates who need to reconcile the family tasks and working time are less likely to exit from unemployment towards a matched position given that they experience an unemployment duration by 33% longer than others before they find a matched job. Perhaps their family tasks constraint them to limit the areas of their job search, making them more difficult to find a matched job.

The competing-risks regression model in Table II allows to predict the baseline cumulative incidence function (BCIF) for each type of occupations (no mismatch, vertical, horizontal and double mismatch) when all independent variables are supposed to equal zero. The BCIF refers to the cumulative probability that graduates remain unemployed. Thus, a higher value of BCIF is associated with a longer unemployment duration. Table III presents the BCIF values for each category of occupations:

Table III: Educational mismatches and unemployment risks

Educational mismatches	Competing risks duration models: Predicted BCIF
Match	0.163
Overeducation only	0.201
Horizontal mismatch only	0.193
Double mismatch	0.316

With the prediction from the competing risks duration models, we see that the BCIF increases with educational mismatches. In other words, on average, the spells of unem-

ployment for graduates that end in mismatched jobs tend to be longer than spells of unemployment for graduates who end in better matched jobs. Notably, graduates with a double mismatched job suffer unemployment duration almost two times larger than the graduates in matched positions (0.316/0.163). This finding supports thus the job competition model (Thurow, 1976) in which education-job mismatches and unemployment spells are positively associated. This model also suggests that educational mismatch is rather a persistent problem, and if it is the case, Cambodia needs to pay more attention to this mismatch problem.

To deal with the educational mismatch problem among university graduates in Cambodia, reducing the job search constraints such as a lack of information in the labor market, a poor public transportation and credit constraints, which limits the workers' capacity to search for a well-suited job as found by Chua & Chun (2016) in six developing countries,[14] might be not enough, because in our findings, graduates in mismatched jobs spend longer time of job search than graduates who end in matched positions. Thus, Cambodia also needs to improve the quality of their education system given that many higher education institutions (HEI) are found to gain official recognition without following a clearly defined process (Ford, 2015). They are very small with narrow academic and resource bases and have no attention to support quality of education (Ford, 2015), such as 78% of 762 employers in Cambodia complain about the preparedness of newly hired university graduates in the survey of Bruni et al. (2013).

4 Conclusion

This article investigates whether there exists a relation between unemployment duration and educational mismatches among university graduates in Cambodia. We use a survey, conducted in nineteen Cambodian universities. Our paper contributes to literature on two main points. First, we extend the research into a developing country regarding the relation between unemployment duration and education-job mismatches. Second, our paper analyzes educational mismatches with their both forms and dimensions (match, vertical, horizontal and double mismatch). Our main result allows to conclude that the spells of unemployment for graduates that end in mismatched jobs tend to be longer than spells of unemployment for graduates who end in well matched jobs.

The findings suggest that Cambodia should focus more on how to improve the quality of education or what students learn and not only the quantity of schooling. Education-job mismatches are found in other researches to affect individual wages, job satisfaction and mental health in a negative manner. Thus, without solving this issue, there exists a doubt to what extent the higher education sector in Cambodia contributes to the country's development despite a rapid increasing rate in the higher education enrollment.

This research faces some limits however. First, if we have access to data on people with only primary and secondary education, we may be able to analyze more completely the problems of education-job mismatches and unemployment spells in Cambodia by different levels of education. Second, we do not know if the mismatch problem is a persistent or a temporary phenomenon. With a panel data, we can answer to this question. Third, we cannot consider the informal sector in our analysis owing to the absence of a precise data. Future researches are obviously needed to complete these gaps.

[14]Those countries are Armenia, China (Yunnan province), Georgia, Laos, Sri Lanka and Vietnam.

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Appendix: A

Table IV: Cambodia's labor market indicators

Indicators	Value	Year
Total population (in million)	15.7	2016
GDP per capita (in current USD)	1,384	2017
Value added by sector (% of GDP):		
Agriculture	27	2015
Industry	32	2015
Service	41	2015
Working age population (% of the total population)	72.2	2012
Labor force participation rate (%)	84.6	2017
Unemployment rate by education level (%):		
Primary	2.3	2012
Secondary	2.7	2012
Vocational	0.6	2012
University	7.7	2012
Formal employment (%)	6.5	2012
Informal employment (%)	60.2	2012
Employment in agriculture (%)	33.3	2012

Sources: World Bank's website and NIS (2012)

Appendix: B

Table V: Correspondence between occupational class and educational level

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: ISCO-08, volume I

Table VI: Description of educational level required for each skill 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: ISCO-08, volume I

Notes: 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 (please see the literature review of McGuinness (2006) and Sala et al. (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 educational mismatch 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 & Staneva, 2014 ; ILO and ADB, 2015).

Appendix: C

Table VII: Field of education and Matching jobs

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
Pure 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

Table source: Author's estimation by reviewing the job prospects described for each specialty in each university, then comparing with individual occupation.

Appendix: D

We denote ϕ_m as the exit rate from unemployment for men and ϕ_f the exit rate for women.

From the "Match column" in the competing risks regression of Table II, we observe that the hazard ratio for the "Male" variable is: $\frac{\phi_m}{\phi_f} = 1.341$.

Given that the duration of unemployment (d) is inverse to the exit rate from unemployment (Lesueur & Sabatier, 2008): $\phi = \frac{1}{d}$, we get: $\frac{d_f}{d_m} = 1.341$.

Thus, the average unemployment spells of women who end in a matched job is 1.341 time ($d_f = 1.341\ d_m$) of the spells of men who also end in a matched position. In other words, women have known an unemployment duration 34% ($1.341 - 1$) longer than men in exiting towards a matched occupation.

Similarly, we can also say that the average unemployment spells of men who end in a matched job equals 0.75 time ($d_m = \frac{1}{1.341}\ d_f$) of the spells of women who also end in a matched position. In other words, men have known an unemployment duration 25% ($1 - 0.75$) shorter compared to women if they exit towards a matched occupation.