

Overeducation and Its Effect on Wages: The Case of Young Workers in Malaysia

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Abstract: *This article presents two main objectives: i) to examine the occurrence and determinants of overeducation on young workers in Malaysia, and ii) to examine the effect of overeducation on wages. The analysis covered data of 3,070 young workers using the first survey of The School-to-Work Transition of Young Malaysians (SWTS) study in Malaysia conducted in 2017/2018. Overeducation and overskilling was high at 23.0% and 10%, respectively, when compared to other developing economies. By gender, the probability of being overeducated and overskilled was higher in females than males. The probability was also higher among young workers whose parents have lower education level. Fields of study related to education, health, welfare and services have higher probability for overeducation. Those in arts and social sciences, and general field of study have higher probability to be overskilled. Family-economic status factor suggested that it was essentially linked to the probability of finding a job. This study found that the wage penalties of 21.3% and 6% were due to overeducation and overskilling, respectively. By considering the potential of sample selection bias, the Heckit sample correction method was applied. This study provides a novel analysis of overeducation among young people in the Malaysian context, which has not been previously explored.*

Keywords: overeducation, over skilling, school-to-work transition, youth, Malaysia

1. Introduction

Skill mismatch is serious among the workforce, especially those with tertiary education qualification (Robst, 2007; Zakariya, 2014b, 2017). This can be of great concern among workers, policy makers and the country due to its consequences, especially on wage penalty and wastage of country's human resources (due to underutilisation of workforces and inefficient allocation of country's resources) (Hartog, 2000; McGuinness, 2006; Caroleo and Pastore, 2018). According to the International Labour Organization (2019), high and persistent levels of unemployment are very often attributed to mismatches between jobs and skills, low salary offered, and poor working conditions.

The purposes of this article are to examine the determinants of overeducation and overskilling among young workers, and to analyse the effect of overeducation and overskilling on wages received by young workers. This study utilised data from the first study on The School-to-Work Transition of Young Malaysians (SWTS) conducted in 2017/2018 (Khazanah Research Institute, 2018). The structure of this article involves three main sections. The first section

covers issues and a brief literature on overeducation that explicitly focus on young workers. The second section describes further the SWTS data and the econometric methodology utilised in this article. The third section discusses the determinants of overeducation and overskilling using a binary logistic regression model and also its effect on the wages of young workers. In most previous studies, the effects of skill and educational mismatch on wages have been heavily criticized for not taking into account important econometric problems on sample selection bias. The Heckit sample correction method was applied to address the potential of sample selection bias in the analysis. The final section then outlines the main findings and conclusions of the analysis.

The main contributions of this article can be summarised into three important points: (1) the use of the first SWTS dataset available in the Malaysian context, (2) addressing the issue of overeducation and its effect on wages among young workers which was not well addressed in previous studies, especially in the Malaysian context; and (3) addressing important econometric problems by considering sample selection bias in the analysis.

2. Determinants of Education-Job Mismatch and its Effect on Wages: A literature context

Determinants of education-job mismatch (overeducation and overskilling) among young workers in Malaysia

In the Malaysian context, the determinants of skills mismatch in education and jobs (education-job mismatch) in the earlier career stage particularly among young people have not been well explored in the literature. Recent literature on education-job mismatch in the Malaysian context is mainly generalised among university graduates (Zakariya, 2017; Shahidan, Ismail and Jumali, 2019), and employees in certain sectors (Ismail and Jajri, 2012; Zakariya, 2014b, 2014a; Ismail *et al.*, 2015), with lack of focus on young workers. Although several previous studies in similar areas have been conducted in high-income countries (Karmel, 2017; Pastore, 2019; Quintini & Martin, 2014; Di Pietro and Urwin, 2006) and the transitional economies (Di Pietro and Urwin, 2006; Farooq, 2011; Pastore, Sattar and Tiongson, 2013; Kabir, 2015; Meroni and Vera-Toscano, 2017; Akhtar, Muhammad and Noreen, 2018; Wen and Maani, 2018), they only focused on the economic and structure reform perspectives rather than youth employment outcome.

The concept of Assignment Theory which encompasses the allocation of employees for a particular job depends on the matching of educational level and employment. From the context of young workers, it is worth to investigate other possible explanatory factors which may influence education-job mismatch. The younger generation encounters a higher probability of education-job mismatch. Previous studies have reported mixed findings on individual and employment characteristics, which have a significant impact on education-job mismatch. From the existing literature, education plays an essential role as a determinant of education-job mismatch. For the context of this article, education plays a vital aspect in securing a matching job. In the occurrence of overeducation, job seekers will tend to 'bumping down' their qualification to match the job. This may be due to the oversupply of graduates, and they had to compete with those who are less educated (Borghans and Grip, 2002), and also limited opportunities for high-skilled jobs in the labour market (Iriondo and Perez-Amaral, 2016). Therefore, better-educated job seekers will work in fields related to their educational background, but at a lower level of employment. However, the situation is less useful for those with less education due to limited opportunities to move to lower levels of employment. Hence, it is hypothesized that the education level of youths is positively (or negatively) correlated with

the probability of being overeducated (or undereducated). Another aspect is that education provides knowledge and skills needed to meet the demands of the labour market.

Furthermore, gender may also affect the chances of education-job mismatch. Previous studies have stated that in general, women have fewer prospects in the job market compared to male workers (Chung-Khain Wye and Rahmah Ismail, 2012; Rahmah Ismail, Hazrul Izuan Sahri, et al., 2015; Wan Liyana Mariah Wan Zainal Abidin, 2016). Women are also exposed to unemployment risk, and they tend to accept jobs that are not commensurate with their education level. In terms of age, older workers have a higher probability of mismatch compared to younger workers. This may be due to skill obsolescence in the rapidly changing nature of work and technology advancement (Shevchuk et al., 2015; Witte and Kalleberg, 1995). The relative value of educational qualifications and the required skills declines throughout the career phase, influenced by new skills and expertise needed (e.g., reskilling, upskilling and experience) which accumulate with age (Witte and Kalleberg, 1995).

As already mentioned, recent studies on education-skill mismatch among Malaysians are generalised to university graduates (Zakariya, 2014a, 2017) and mostly not in the local context (for example Akhtar et al., 2018; Di Pietro and Urwin, 2006; Kabir, 2015; Meroni and Vera-Toscano, 2017; Wen and Maani, 2018). There is also lack of literature focusing on young workers, except for a recent study by Karymshakov and Sulaimanova (2019). The study examined factors influencing job mismatch and their effects on earnings among youth in Kyrgyzstan. The findings demonstrated that there was a significant difference between youth with tertiary and non-tertiary educational levels hired with the wrong match (under and overeducated). Those without tertiary educational qualifications were more likely to match their jobs. However, analysis of the effect of overeducation on earnings showed different results, depending on how overeducation was measured. Overeducated young men received significantly lower earnings compared to their well-matched counterparts under the objective approach. The subjective approach, on the other hand, indicated that there were positive effects of overeducation on the earnings of young people. Previous study also has emphasized the importance of education in ensuring smooth SWT—the longer the study period, the shorter the transition process. However, completing tertiary education is not enough to secure good and satisfying jobs (Kamalbek and Burulcha, 2018).

The effect of education-job mismatch (overeducation and overs killing) on earnings of young workers

The Theory of Human capital recommends that productivity is determined by an employee's actual educational level, while Job Competition Theory suggests that job characteristics determine productivity. These two theories have contrast consequences for the determinant of earnings. For instance, under Theory of Human Capital, earnings are determined by actual educational attainment, while Job Competition Theory indicates that earnings are determined by the education levels required. On the contrary, Assignment Theory assumes that employees with similar education levels, skills training, or experience are not correspondingly productive, and their productivity depends on the jobs that match them. This situation which affects both actual and required educational levels will have a significant influence on employee earnings. For the context of this study, the Mincer Schooling Model (Mincer, 1974) may be best to explain the effect of mismatch on the earnings of young workers.

The general hypothesis is that penalty loss is more significant due to the mismatch based on the number and type of schooling which use fewer educated human capital than a mismatched employee based on the quantity of education and training (Zakariya, 2014a). Most previous

studies have investigated the effect of overeducation on earnings among graduates and the general population (Bauer, 2002; Caroleo and Pastore, 2018b; Hartog, 2000). In the Malaysian context, a recent study by Ismail *et al.* (2015) investigated the effect of overeducation and undereducation on earnings. However, it only focused on employees in services and manufacturing sectors. Based on the analysis by Mincer Schooling Model (Mincer, 1974), overeducated employees tended to receive fewer earnings compared to well-matched employees. On the other hand, those undereducated employees received a negative return from education. In another study, Zainizam Zakariya (2014) examined the effect of over and undereducated employees in the manufacturing sector. The study found that there was an impact of education-job mismatch in Malaysia, implying that the knowledge is not transferable between jobs and education level of employees. This finding is also consistent with that of Ismail *et al.* (2015). However, study by Mohamad Idham Md Razak *et al.* (2014) neglected the monetary impact in the occurrence of under or overeducation which started among graduates' population.

3. Data and variables

This study utilised data from the first study on The School-to-Work Transition of Young Malaysians (SWTS) conducted in 2017/2018 (Khazanah Research Institute, 2018). It explored the profiles and characteristics of young peoples from schools, tertiary education and those already in the labour market; at the same time, it discovered aspirations of young workers and their labour market progress. The information-rich dataset from SWTS enabled this study to focus on school-to-work transition among young people in Malaysia. The SWTS instrument was adopted from the study by the International Labour Organization (n.d), considering the Malaysian context and the objectives of this study. The SWTS instrument is unique and has been tested in more than 34 low and middle-income countries. The SWTS conducted in Malaysia has five components in terms of labour market supply and demand. The five components were (i) youth in upper secondary education, (ii) youth in tertiary education institutions, (iii) young job seekers, (iv) young workers and (v) employers from micro, small, medium and large enterprises. Overall, SWTS gathered information from 25,000 respondents, but this study utilised data from young workers comprising 4,565 respondents. Young worker referred to youth aged between 15 to 29 years old. In an international context generally, young worker refers to those aged between 15 to 24 years in the population (United Nations, n.d.; International Labour Organization, 2013). The selection of young workers aged between 15-29 years was due to their long period of being in the education institutions which was more than 24 years old. Owing to incomplete and missing information, about 3,070 respondents were included in the analysis. Data was stored in an Excel file, and the analysis was performed using Statistical Package for the Social Sciences (SPSS) and R-software.

There were two important mismatch aspects measured in the study, namely overskilling and overeducation. Overskilling is an individual's assessment of their competencies developed during their study but underutilised in their current job (Caroleo and Pastore, 2018), while overeducation refers to qualifications higher than those required for a particular job. To measure overskilling, respondents were questioned "*Is your education/training useful for your current job?*" with three outcomes: (1) Very Useful; (2) Somewhat Useful; and (3) Not Useful. Most responses to overskilling were (2) Not Useful, while the remaining was classified as not overskilling. The measurement of overskilling in this study is also in line with studies by Dolton and Silles (2008) and Caroleo and Pastore (2018). Overeducation was measured using the objective approach or known as Job Analyst method (JA method). JA method classified mismatch based on the minimum educational level required for a particular job. A similar

methodology has been proposed by the International Labour Organization (2018). If the person has qualification higher than the education level required for a particular job, it is defined as overeducation. If the person has qualification lower than the requirements for a particular job, it is defined as undereducation. On the other hand, well-match is defined as a person's qualification that match the education level required for a particular job. The classification of overeducation was used in this study and analysed to achieve the objectives. Table 1 summarises the variables used in the analysis.

4. Methodology

Binary Logistic Regression Model

To answer the first objective of this article, a logistic regression model is utilised since the outcome variable is binary. In this case, the outcome variable will be (1) over-educated and (0) not over-educated; and (1) over skilling and (0) not over skilling. The goal in logistic regression is to model $\Pr(y = 1|x) = F(x\beta)$, hence, a logit transformation is used, as follows:

Let $I = \Pr(y = 1|x)$, can also be written as $\pi(x) = E(y|x)$, while odds ratio can be expressed as follows:

$$Odds = \frac{P}{1 - P} = \frac{\pi(x)}{1 - \pi(x)}$$

The logistic transformation of the odds (logit) serves as dependent variables, expressed by the following equation:

$$Log(Odds) = \ln\left(\frac{P}{1 - P}\right) = \ln\left(\frac{\pi(x)}{1 - \pi(x)}\right) = \beta x$$

In the case of single predictor (independent variable), the equation is $g(x) = \beta_0 + \beta_1 x$. Hence, the log odds of the predictor as follows:

$$\pi(x) = \left(\frac{e^{\beta_0 + \beta_1 x}}{1 + e^{\beta_0 + \beta_1 x}}\right) = \frac{\exp(x\beta)}{1 + \exp(x\beta)}$$

The regression model, taking together the dependent variable above with all the independent variables, the full model of logistic regression can be written as follows:

$$\text{Logit}(P) = a + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \dots$$

Table 1: List of variables

Objective	Dependent Variable	Independent Variables	Measurements
To examine the determinants of overeducation and over skilling among the young workers.	1. Overeducation (1=Yes; 0=No)	1. Gender	1=Male; 0=Female
		2. Age	in years
	2. Over skilling (1=Yes; 0=No)	3. Marital status	1= single/never married; 0= married
		4. Location	1=urban; 0=rural
		5. Highest education level	1=Non-tertiary; 2=Short-cycle tertiary; 3=Tertiary
		6. Field of study	1=Education, health, welfare and services; 2= Arts, humanities, social sciences and business; 3=Science, mathematics and computing; 4= General; 5=TVET/non-tertiary;
		7. Parents highest education	1=No formal education; 2=Non-tertiary; 3=Short-cycle tertiary; 4=Tertiary
		8. Family economic status	1=Poor, 2=Middle Class; 3=Well-off/Rich
		9. Employment sector	1=Agriculture-Related; 2=Mining; 3=Manufacturing; 4=Services; 5=Construction
		10. School-to-work transition (STWT)	in months
To examine the effect of overeducation and over skilling on wages received by the young workers.	Ln Monthly wages	1. Overeducation	1=Yes; 0=No
		2. Over skilling	1=Yes; 0=No
		3. Gender	1=Male; 0=Female
		4. Age	in years
		5. Marital status	1= single/never married; 0= married
		6. Location	1=urban; 0=rural
		7. Highest education level	1=Non-tertiary; 2=Short-cycle tertiary; 3=Tertiary
		8. Field of study	1=Education, health, welfare and services; 2= Arts, humanities, social sciences and business; 3=Science, mathematics and computing; 4= General; 5=TVET/non-tertiary;
		9. Parents highest education	1=No formal education; 2=Non-tertiary; 3=Short-cycle tertiary; 4=Tertiary
		10. Family economic status	1=Poor, 2=Middle Class; 3=Well-off/Rich
		11. Employment sector	1=Agriculture-Related; 2=Mining; 3=Manufacturing; 4=Services; 5=Construction
		12. School-to-work transition (STWT)	in months

OLS regression

On its second objective, this paper estimates the relationship between the incidence of education-job mismatch and young workers' wages. Most prior studies had utilised bivariate or multivariate discrete choice estimation and modelling or Mincer earning functions (Allen and van der Velden, 2001; Zakariya, 2013; Arshad and Ghani, 2015; Sharma and Sharma, 2017). A Mincerian functions in estimating wage differences between education-job matches and unmatched could be expressed as follows:

$$\ln Y_i = \alpha_i + \beta_i X_i + \gamma_i M_i + \varepsilon_i$$

Where $\ln Y_i$ is the wage income (in logarithmic term) and regressed on the young workers individual characteristics (X_i) such as location, employment outcome and characteristics, and education-job mismatch.

The Heckit Model estimation

In the analysis, we control the possibility of omitted heterogeneity bias that would be arise due to measuring the status of overeducation among the employed person by using (Heckman, 1979). By using this method, the OLS estimation will be corrected for the employment opportunities of the most skilled and motivated among the personal attributes that could lead to overeducation if they were employed (Caroleo and Pastore, 2018). The Heckit Model estimations is as follows:

$$\ln Wi = r^{ols} O_i + \sum_{i,j=1}^n \beta_j X_{i,j} + u_i$$

Where

$\ln Wi$ is the natural log of monthly wage of young worker (i)

$X_{i,j}$ are the set of control variables that assumes to affecting wages

Coefficient estimates are represented by β_j

Dummy of individual i is over-educated or under skilled is represented by O_i , and r^{ols} is the estimated coefficient.

Weight estimation

To address the bias in the analysis due to sample imbalance and to ensure the analysis reflected youth labour market population in Malaysia, the analysis utilised sample weighting. Sample weight is a measure that determines an individual sample weight to match the target population. Information from the statistics of Labour Force Survey 2018 (Department of Statistics, 2019) was used as the population baseline for the dataset containing information on young workers aged 15-29 years. It is also known as post-stratification weight (to balance the sample with the population after data is collected). In this case, weighting procedure was applied for three main demographic characteristics, namely location (urban or rural), gender and age. **Error! Not a valid bookmark self-reference.** summarises the distributions of weighted and unweighted dataset of young workers population in Malaysia based on Department of Statistics (2019). The total population of young workers in Malaysia aged between 15-29 years in 2018 was close to 3.9 million. The unweight sample were then weight with the inverse of the adjusted probability to obtain sample for population number. The weighted sample was found to be close to the population size of young workers Malaysia in 2018.

Table 2: Sample distributions, based on young worker sample in SWTS dataset (unweighted and weighted)

List of variables	Population (%)	Unweighted (%)	Weighted (%)
Gender			
• Male	2,249,700 (58.0)	1,183 (38.5)	2,263,480 (58.0)
• Female	1,626,500 (42.0)	1,887 (61.5)	1,636,463 (42.0)
Location			
• Urban	3,062,000 (79.0)	2,322 (75.6)	3,198,014 (82.0)
• Rural	814,200 (21.0)	748 (24.4)	701,928 (18.0)
Age			
• 15 – 19 years old	329,700 (8.5)	279 (9.1)	331,719 (8.5)
• 20 – 24 years old	1,448,700 (37.4)	1,382 (45.0)	1,457,573 (37.4)
• 25 – 29 years old	2,097,800 (54.1)	1,409 (45.9)	2,110,649 (54.1)
Total		3,070 (100.0)	3,899,942 (100.0)

5. Analysis and Results

Size and sample description

Table 3 displays the descriptive analysis (in mean) of young workers according to mismatch status and demographic characteristics. The overeducated and overskilled young workers accounted for about 23% and 10%, respectively. The findings are in line with previous study by McGuinness, Pouliakas and Redmond (2017) who concluded that the occurrence of mismatch was higher in the developing economies compared to developed economies. The overeducation rates among the young workers aged between 15 to 29 years vary among countries. A study by Sparreboom and Staneva (2014) found that the rate of overeducation among the young workers ranged from 1.6% (in Malawi) to 63% (in Samoa), with total average of 16%. Among youths between the ages of 15 to 29, the rate of overeducation also considerably varies from one country to another. For instance, Sparreboom & Staneva (2014) who used job analysis measure found that overeducation rates in 28 developing countries ranged from 1.6% in Malawi to 62.8% in Samoa with an average of 15.7% (Figure 10)— the figure was higher (by 2.7%) than the ever-education among young people in Europe (International Labour Organization, 2014). Among overeducated young workers, 14% perceived that they were overskilled, more than half were males, mostly single and from urban area. As expected, the percentage of overeducation was persistent among those with tertiary education qualification. Among those overskilled, one-third were overeducated, more than half were males, more than one-third have non-tertiary education, and majority were from urban area and single. The occurrence of education-job mismatch also led to inefficiency in the workforce and would encounter negative returns to their wages. As shown in **Table 3**, those overeducated (RM1,715) and overskilled (RM1,743) young workers earned below the overall average wage (RM1,892). The findings verify the theoretical explanation that overeducation is associated with wage penalty (Caroleo & Pastore 2018; Morsy & Mukasa 2019).

Table 4 depicts the proportion of overeducated and overskilling by month after graduation. In this study, the length of transition of young workers from education to satisfactory job was examined. This is generally defined as the passage of young people from the end of their education stage to their first satisfactory job. Until they are satisfied with their type of employment and provide sense of social security and permanency, the transition cannot be considered complete (Elder, 2009). The results showed that more than half of overeducated and overskilled young workers were still in transition for more than 2 years (24 months). For young workers in transition, securing their first job after graduation may or may not be their first transited job. They will continue searching for a job in the labour market, or they may have to dismiss from the labour market for some times for family matters, such as having a family

and raising children. For whatever reason, it makes sense that the average length to their transited employment is longer than the length of their first employment. The finding is consistent with Dimova et al. (2016) where the transited employment is longer in four middle east countries and north Africa (Egypt, Jordan, Lebanon, Palestine and Tunisia) for an average of about 21.4 months. In this study, the mean of STWT was 39.01 months. However, in the case of Kyrgyzstan, the average length of transition for transited employment was slightly longer around 15 to 16 months (Karymshakov and Sulaimanova, 2019). In the context of labour market transition in Malaysia, it is clear that the country has a problem in providing a good and satisfactory job for young workers effectively. An overeducated youth requires less average time to secure his first job soon after graduation. The potential for economic and country growth will be difficult owing to cost for social and economic assistance and allocation to support more young workers with difficulties finding matching transited employment in the labour market.

Determinants

Table 5 shows the estimates for the binary logistic regression of the probability of being (a) overeducated and (b) over skilled. In the table, the odd ratios—a relative risk of being overeducated/over skilled for young workers in certain characteristics listed with respect to the default (reference) item. Overall, the logistic model produced a significant model estimate ($p\text{-value} < 0.001$) and pseudo-R value of 0.176 and 0.231, respectively. The probability of being overeducated was higher among the urban population from wealthy/rich families working in the mining sector, manufacturing, services and those with longer STWT period. Based on the field of study, those in education, health, welfare and services-related field have higher probability of being overeducated compared to other fields. The results also showed that the probability of overeducation was higher among females but lower as workers became older, and higher among those who were already married. Meanwhile, the probability of being over skilled was higher among those with short-cycle tertiary education (those with skill certification and pre-university qualifications). The distribution of education-job outcomes based on field of study undoubtedly influenced the occurrence of overeducation in particular. Those in the arts, humanities, social sciences and business as well as general courses were found to be more inclined to over skilled.

The effect of education-job mismatch on wages

Table 6 depicts the results of wage gap obtained from the OLS estimations for both (a) overeducated and (b) overskilled young workers. The overall models were significant ($p\text{-value} < 0.001$) with R^2 value of 0.255 and 0.231, respectively. The findings indicated that the wage gap was relatively higher for overeducated (21.3%) but slightly lower for overskilled (6.0%). As already mentioned, the earnings received by both overeducated and overskilled young workers were lower than total average. Hence, the OLS results shown in **Table 6** could explain the effect of overeducation and overskilling on wages independently in two separate model estimates. Other control variables, such as gender, age, marital status, locality and STWT also significantly contributed to wage increases or decreases for undereducated and overskilled young workers. However, the correction of the sample selection procedure showed that the wage gap for overeducation was slightly increased to 20.2% but remained the same for overskilling (6%).

The results of the sample correction estimates followed the Heckman's model estimate presented in **Table 7**. The Heckman's two steps procedure was utilised through (i) the main Mincerian earning equation, and (ii) the binary logistic regression estimates for probability of mismatch. As developed from Caroleo and Pastore (2018), the analysis is applied such that

both steps should contain the same regressors. Instrumental variables were selected based on criteria that would affect the probability of mismatch (overeducated/overskilling) other than wages. This suggests that the set of regressors in the binary logistics estimate is a subset in the OLS. The sample selection correction based on Heckit's estimates indicated that the results were relative to the estimates with overeducation and overskilling. The two-step Heckman's sample selection model involves a regress of probit model to find an Inverse Mills Ratio, which was not included in this study. The coefficients on the inverse Mills ratio for both probit models of overeducated and overskilled were 0.988 (t-value > 0.05) and 0.745 (t-value > 0.05), respectively. Therefore, the analyses failed to reject the absence of sample selection bias. Equally important in the analysis, there were no significant practical differences in the slope coefficient estimates.

Table 3: Descriptive statistics (mean shares) for young workers

Variable	Overall	Overeducated	Match	Undereducated	Over skilled	Non-over skilled
Over-educated	0.23	1	1	1	0.31	0.22
Over skilled	0.10	0.14	0.09	0.12	1	0
Gender (Male=1)	0.58	0.53	0.57	0.69	0.63	0.58
Age (years)	24.43	24.55	24.39	24.41	24.00	24.48
Marital status (Single=1)	0.78	0.81	0.78	0.72	0.83	0.77
Location (Urban=1)	0.82	0.81	0.83	0.81	0.82	0.82
Education level						
• Non-tertiary	0.33	0.10	0.36	0.62	0.37	0.33
• Short-cycle tertiary	0.14	0.04	0.12	0.38	0.14	0.14
• Tertiary	0.53	0.86	0.52	0.00	0.49	0.53
Field of study						
• Education, health, welfare and services	0.12	0.15	0.13	0.01	0.10	0.12
• Arts, humanities, social sciences and business	0.23	0.38	0.22	0.01	0.18	0.24
• Science, mathematics and computing	0.20	0.32	0.19	0.03	0.23	0.20
• General	0.40	0.13	0.42	0.81	0.43	0.40
• TVET/non-tertiary	0.05	0.02	0.04	0.13	0.06	0.05
Parents highest education level						
• No formal education	0.05	0.03	0.05	0.08	0.04	0.05
• Non-tertiary	0.65	0.60	0.65	0.78	0.70	0.65
• Short-cycle tertiary	0.10	0.12	0.10	0.06	0.09	0.10
• Tertiary	0.20	0.26	0.21	0.08	0.18	0.21
Family economic status						
• poor	0.20	0.17	0.20	0.25	0.28	0.19
• middle class	0.77	0.81	0.77	0.74	0.69	0.78
• well-off	0.03	0.02	0.03	0.01	0.02	0.03
Employment sector						
• agriculture-related	0.02	0.02	0.02	0.01	0.00	0.02
• mining	0.03	0.01	0.03	0.07	0.02	0.03
• manufacturing	0.09	0.08	0.08	0.16	0.12	0.08
• services	0.83	0.85	0.84	0.72	0.81	0.83
• construction	0.04	0.05	0.04	0.03	0.05	0.04
Total wages (RM)	1,891.97	1,714.90	1,108.40	1,501.29	1,743.39	1,909.30
STWT (months)	39.01	40.91	35.45	35.03	42.32	34.56

Table 4: Duration of overeducation and over skilling (in %)

Employment outcome	Less than 12 months	12 to 24 months	More than 24 months
Overeducation	27.8	12.5	59.7
Over skilled	29.0	13.0	58.0

Table 5: Determinants of overeducation and over skilling among the young workers

Variable	(a)	(b)
Dependent variable:	Overeducated	Over skilled
Gender (Male=1)	0.983***	0.905***
Age (years)	0.946***	0.946***
Marital status (Single=1)	0.927***	0.790***
Location (Urban=1)	1.189***	1.006
Education level		
• Non-tertiary (default)		
• Short-cycle tertiary	0.764***	1.206***
• Tertiary	0.027***	1.099***
Field of study		
• Education, health, welfare and services (default)		
• Arts, humanities, social sciences and business	0.732***	1.129***
• Science, mathematics and computing	0.776***	0.768***
• General	0.265***	1.026**
• TVET/non-tertiary	0.266***	0.669***
Parents highest education level		
• No formal education (default)		
• Non-tertiary	0.750***	0.586***
• Short-cycle tertiary	0.781***	0.690***
• Tertiary	0.775***	0.635***
Family economic status		
• Poor (default)		
• middle class	0.913***	1.714***
• well-off	1.429***	1.653***
Employment sector		
• agriculture-related (default)		
• mining	3.184***	0.356***
• manufacturing	1.465***	0.153***
• services	1.375***	0.230***
• construction	0.941***	0.178***
STWT (months)	1.003***	1.005***
Constant	38.227***	75.683***
Observations (weighted)	909,792	408,924
Observations (unweighted)	748	311
R ²	0.176***	0.231***

Note: *p<0.05; **p< 0.01;***p<0.001.

Figures presented in the table represent odd ratios—a relative risk of being overeducated/over skill for young workers in a given characteristics listed with respect to the default (reference) item. For example, the estimated odds ratio for overeducated male is 0.983, the corresponding groups of young workers have 98.3 per cent lower probability to experience overeducation than female.

Table 6: OLS earnings equation for the case of over education and over skilling

Variable	(a)	(b)
Dependent variable:		
	Monthly wages (in log)	
Overeducation	-0.213***	
Over skilling	-	-0.060*
Gender (Male=1)	0.153***	0.156***
Age (years)	0.053***	0.055***
Marital status (Single=1)	-0.069***	-0.073***
Location (Urban=1)	0.103**	0.111***
Education level		
• Non-tertiary (default)		
• Short-cycle tertiary	0.069*	0.062
• Tertiary	0.259***	0.178**
Field of study		
• Education, health, welfare and services (default)		
• Arts, humanities, social sciences and business	-0.059*	-0.077**
• Science, mathematics and computing	-0.142***	-0.157***
• General	-0.037	-0.057
• TVET/non-tertiary	-0.043	-0.062
Parents highest education level		
• No formal education (default)		
• Non-tertiary	0.063	0.058
• Short-cycle tertiary	0.119*	0.116*
• Tertiary	0.114**	0.112*
Family economic status		
• Poor (default)		
• middle class	0.096***	0.091***
• well-off	0.310***	0.328***
Employment sector		
• agriculture-related (default)		
• mining	0.296***	0.333***
• manufacturing	0.047	0.064
• services	-0.013	0.000
• construction	0.076	0.082
STWT (months)	-0.002***	-0.002***
Constant	5.872***	5.815***
R ²	0.255	0.231
F-statistics	49.68***	16.26***

Note: *p<0.05; **p< 0.01;***p<0.001.

Table 7: Earnings equations with Heckman's sample selection correction

Variable	Monthly wages (in log)	
<i>Dependent variable:</i>		
Overeducation	-0.202***	
Over skilling	-	-0.060**
Gender (Male=1)	0.086**	0.447***
Age (years)	0.074***	-0.038
Marital status (Single=1)	-0.089**	-0.356**
Location (Urban=1)	0.118***	0.330***
Education level		
• Non-tertiary (default)		
• Short-cycle tertiary	0.198**	-0.701
• Tertiary	-0.233***	-0.33
Field of study		
• Education, health, welfare and services (default)		
• Arts, humanities, social sciences and business	0.028*	-0.253**
• Science, mathematics and computing	-0.140***	0.359***
• General	-0.373	-0.349
• TVET/non-tertiary	-0.400	1.108
Parents highest education level		
• No formal education (default)		
• Non-tertiary	0.025	1.296
• Short-cycle tertiary	0.088*	0.812
• Tertiary	0.019**	1.084*
Family economic status		
• Poor (default)		
• middle class	0.112***	-0.939
• well-off	0.369***	-0.438
Employment sector		
• agriculture-related (default)		
• mining	0.285***	1.314
• manufacturing	0.084	2.640
• services	-0.008	2.106
• construction	0.039	2.332*
STWT (months)	-0.003***	-0.011***
Constant	5.720***	-2.917
R ²	0.255***	0.231***

Note: *p<0.05; **p<0.01;***p<0.001.

Two-step Heckman's sample selection model involve a regress of probit model, to find an Inverse Mills Ratio which is not included in this article. The coefficient on the inverse Mills ratio for both probit model in overeducated and over skilled were 0.988 (t-value > 0.05) and 0.745 (t-value > 0.05) respectively. Therefore, the analyses fail to reject the absence of a sample selection bias.

6. Discussion and policy implications

The purpose of this study is to examine the determinants of education-job mismatch, and its effect on the employment wages of young Malaysians. The School-to-Work Transition survey (SWTS) dataset of young workers collected in 2017/2018 was utilised to achieve the two objectives. Total sample included in the analysis was 3,070 young workers aged between 15-29 years. This study provides a novel analysis of overeducation among young workers in the Malaysian context, which has not been previously explored. Several important findings and discussions from the analysis are listed as follows:

- The occurrence of overeducation and over skilling among young workers in Malaysia is a serious phenomenon, which requires further policy attention. Although the rates of over skilling was slightly lower than that of overeducation, we hypothesised that this was due to low skill signals (Caroleo and Pastore, 2018). If they are able to match the job to their education qualification, they are given low-skill tasks or paid equivalent of low-skill tasks due to lack of work experience. This analysis also indicated that the rates of overeducation among young workers were higher compared to previous studies conducted in the developing economies. When a country is well developed in human resources with higher education attainment, it is important to ensure the quality of employment in the country sufficiently meets the supply of labour. Hence, the focus on human capital stock with more labour force equipped with tertiary-education should also be shifted. The primary question that must be addressed by policymakers is how the country could enhance the quality of human capital with more efficient allocation.
- The transition length of young workers to a satisfactory and good jobs (transited) in Malaysia is also certainly lengthy. More than half of those over-educated and over skilled young workers are still in transition for more than 2 years (24 months). For young workers in transition, securing the first job after graduation may or may not be their first transited job. They will continue searching for a job in the labour market, or they may have to dismiss from the labour market for some times for family matters, like having a family and raising kids. Therefore, young people need more assistance in terms of securing a good and match job during their transition.
- In subsequent analysis, we investigated possible determinants of mismatch. Various factors significantly affected both overeducation and under skilling which were heavily dependent on the social status, education and other demographic backgrounds of young workers as already mentioned in the literature section. Another important determinant for mismatch was the field of study. It clearly showed that those in the education, health, welfare and services-related field have higher probability of overeducation compared to other fields. To address this issue, it is important to guide young people to choose the appropriate field of study to meet the demand for labour upon graduation. Findings from Khazanah Research Institute (2018) indicated that most young people seek advice regarding education from parents and guidance counsellors, but what is unclear is whether they have the correct information about the job market. What is more important is that young people should be given a realistic education to achieve realistic employment opportunities in future. Up-to-date and real-time information on the labour market and demand is crucial and needs to be communicated to the relevant segments of the population, not merely young people. It is imperative to consider establishing skill anticipation to complete the labour supply with the required future skills. Therefore, it would encourage policymakers, young people as early as in secondary schools and employers to provide better training and education options to enhance human capital development skills.
- The results also showed that the probability of overeducation was higher among females and those who were married. Women generally have fewer prospects in the job market than their male counterparts and are also known to have higher unemployment risk. This could lead to overeducation and over skilling. If policies fail to make women better off in the labour market, this will affect their participation rate in the labour force. As we acknowledge that women excel academically especially in higher learning institutions, their opportunities to contribute to the economy through the labour market should also be acknowledged. Hence, a robust and inclusive family-friendly policies should be implemented to help women contribute to the labour market.

- The findings indicated that the wage gap was relatively high for overeducated but slightly lower for over skilled. The Heckit sample selection procedure increased the wage gap for overeducated young workers, but not for over skilled. Thus, it was evidenced that both overeducation and over skilling would cause wage penalties as discussed in the literature.
- Another important policy implication from the analysis is on the role of the national economic policy which will result in its ability to provide sufficiently skilled employment to tertiary-educated workers in addressing the issue of education-job mismatch. While technology has historically improved the quality of the labour market, it is important for businesses, especially small and medium firms, to constitute a larger share in the labour market to innovate. Government should help businesses to create skilled jobs through new technology adoption, and invest more in training, reskilling and upskilling (Brunello & Wruuck 2019; Wye & Ismail 2012).

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