The Educational Mismatch of Native and Immigrant Workers in Malaysia

Borhan Abdullah[1]

[1]*Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah*
Jalan UMS, 88400, Kota Kinabalu, Sabah, Malaysia

Abstract - This paper utilizes Productivity and Investment Climate Survey (PICS) 2007 data to explore the educational mismatch of native and immigrant workers in Malaysia and the effect of educational mismatch on wages and wage differentials between native and immigrant workers. This paper employs realized method with the mean approach to identify the educational-occupational mismatch. Findings show that the incidence of undereducation gives workers an advantage in terms of earnings, while overeducation has a negative impact on workers' earnings. Besides, this paper reveals that natives will earn higher wages for being undereducated and as expected, the immigrant is penalized more than the native for being overeducated. Thus, this paper suggests that the educational mismatch partly explains the wage differentials between native and immigrant workers in the Malaysian labor market.

Keywords - Educational mismatch, Native-immigrant wage differentials, Migration

I. INTRODUCTION

The educational mismatch is a situation in which the educations of workers are not matched with the education required for their job. The educational mismatch could occur in two situations either (1) the worker has an excess of education, or (2) the worker has a lack of education for a job. The educational-occupational mismatch can be identified by comparing the highest education that the workers attained with the required education for their jobs.

Based on previous studies, there is a high possibility of an immigrant getting a job that does not match their education. For these reasons, this study will explore the wage differentials between natives and immigrants by concentrating on the educational mismatch in the Malaysian labor market. This study will examine the educational mismatch effects on earnings and its responses on the wage differentials between native and immigrant. Hence, two questions need to be answered (1) What are the consequences of the educational mismatches for earnings? and (2) What are the implications of the educational mismatches on the native-immigrant wage differentials? Based on these two questions, this chapter will expand the literature on educational mismatch and wage differentials, especially in the Malaysian context.

In Malaysia, some previous studies explore the educational mismatch effects on earnings (Such as Osman and Shahiri (2013) and Zakariya (2014)). The studies are focussing on the overeducation due to the increasing number of educated unemployed. According to Osman and Shahiri (2013), there are an increasing number of high education employments from 15% in 2001 to 24% in 2011. The increasing number of the educated labor force is due to the government policy, where it reduces the public education fees, provides subsidies, education funds, education loans, and many more. These policies have increased the number of the educated labor force, although it also gives many challenges especially in terms of educational mismatch. Osman and Shahiri (2013) study the occupational mismatch and educational inflation on 1,117 workers in Southern Peninsular Malaysia found that the occupational mismatch exists in the Malaysian labor market. Besides, among other important findings, the study also suggests that workers are less likely to be overeducated for their jobs. This result is comparable to a study by Zakariya (2014) on job mismatch in Malaysia on manufacturing and service sector using Malaysia Productivity Investment Climate Survey (PICS) 2007 data.

Therefore, this study will explore the educational mismatch in Malaysia and its effects on the native-immigrant wage differentials. To the best of the author's knowledge, no previous studies have investigated the effect of the educational mismatch on the wage differentials between native and immigrant workers in the Malaysian labor market.

Most of the empirical studies reported that the educational mismatch would affect not only employees but also employers. Two theories underpin this study to explore the educational mismatch: (1) the human capital theory and (2) the assignment theory. Human capital theory suggests that workers should be paid based on their productivity. In the theory, individual productivity can be measured by human capital such as knowledge from education, skills from training, experience, and tenure from working, and other traits such as abilities, talent, and intelligence. Thus, human capital is a signal of an individual's productivity and is used to determine wage (Di Pietro

& Urwin, 2006) (H. A Hasrul, P.B Rahimah & U. AndysahPutera, 2016).

Assignment theory concentrates more on the demand side (Hartog, 2000). In which the allocation of the workers is said to be optimal if the highly skilled workers are allocated for the complex job, and the less skilled workers are hired to do a simple job (Allen & van der Velden, 2001). Hence, wages will be determined not only by the characteristics of the workers, as discussed in the human capital theory, but also by the characteristics of the job itself. Thus, although workers have the same level of education, they might have different wages if they were working in different jobs that required different levels of education.

II. LITERATURE REVIEW

The study of the educational mismatch is not new in labor economics. The literature on the educational mismatch has grown for the last 30 years. Duncan and Hoffman began this study in 1981. In the study, they were investigating the job mismatch by focussing on the education that the workers attained and the required education for their jobs (Hartog, 2000). Two types of job mismatch were the main focus of the previous studies: educational mismatch and skill mismatch.

An educational mismatch can be divided into two types: undereducation and overeducation. Mendes de Oliveira, Santos, and Kiker (2000) stated that the incidence of undereducation is due to the process where the market requires capital substitutes to compensate for the lack of education. Thus, undereducation can be defined as an event when the individual's education is insufficient for the job, while the employer believes that the individual has sufficient capital substitute such as skills to compensate for the lack of education and to be hired for the job. Thus, workers are considered to be undereducated when their education level is lower than the required for their jobs (Miller & Chiswick, 2009).

Individuals are considered to be overeducated for their jobs when their education exceeds the education required for their jobs (Groot & Maassen Van Den Brink, 2000; Johnston et al., 2015; Joona, Gupta, & Wadensjö, 2014). Miller and Chiswick (2009) define the overeducation as surplus years of schooling in which education is greater than the 'usual' education level for the job.

A. The Effects of Educational Mismatch
According to Allen and Van der Velden (2001), the effects of overeducation on individuals in the labor market are more intense than undereducation. For this reason, most empirical studies were focussing on overeducation because overeducation brings more issues than undereducation. Allen and van der Velden (2001) stated that the overeducated workers would earn lower wages than workers with the same level of education but work in an appropriate job.

Undereducated workers will earn more than an individual with the same education level and work in the appropriate job with their education.

Undereducation and overeducation give different effects on earnings. Some studies found that the undereducated workers would have higher earnings than those who have the same education level and work in a job that appropriates to their education (Battu & Sloane, 2002; Di Pietro & Urwin, 2006; Verdugo & Verdugo, 1989). According to Verdugo and Verdugo (1989), individuals who are undereducated for their jobs are more productive and have excellent performance. Allen and van der Velden (2001) supported this finding, claiming that being undereducated will increase the productivity ceiling of workers and lead to higher productivity. Overall, there seems to be some evidence to indicate that the overeducation can be said to be a disadvantage, while undereducation is an advantage for the individual's earnings (Johnston et al., 2015).

In previous empirical studies, educational mismatch has been shown to affect the earnings of natives and immigrants differently. Nielsen (2011) found that immigrant is more likely to be overeducated for their job than native. However, in a comprehensive study by Joona et al. (2014), the authors suggest that immigrants are more likely to be undereducated than perfectly matched for the job.

Educational mismatch incidence is expected to be higher for an immigrant than native. Besides, it would give a greater effect in reducing wages of an immigrant than native workers. For instance, Nielsen (2011) found that immigrants with foreign education will be penalized more for being overeducated. Joona et al. (2014), examining the overeducation of immigrant workers in Sweden, found that the overeducation will increase earnings for native and immigrants than correctly matched in the same kind of job but less than correctly matched workers. Overeducation will increase the native's earnings by 6.0 percent, but only 1.7 percent of an immigrant. They explained that the reason for the immigrant being rewarded less than the native worker is the imperfect transferability of human capital across countries. Thus, it can be seen that foreign education will increase the possibility of being overeducated (Battu & Sloane, 2002).

The educational mismatch is correlated with low earning (Bender & Roche, 2013). The existence of wage differentials between natives and immigrants also could be due to the educational mismatch. Previous studies also found that the immigrant is more likely to become undereducated and overeducated than native. Besides, the immigrant would experience higher education penalties than native (Nielsen, 2011; Nieto et al., 2013). Thus, the educational mismatch would widen the wage gap.

According to Nieto et al. (2013), the wage differentials between native and immigrant does not disappear after several years. This is because the

immigrant's assimilation pace is slow. If the immigrant fails to assimilate into the local labor market, they will have difficulty obtaining the same wage as natives. If they cannot or will not assimilate for a longer period, they will turn out to be hired for a low paying job because human capital such as education can depreciate over time, which means that the education (knowledge) become out of date (Bender & Heywood, 2011).

III. METHODOLOGY

An educational mismatch can be measured by comparing the individual education level with the education level required for a job.

Johnston et al. (2015) used the EOM model to compare individual education levels with the calculated norm by using the model approach in each type of job. The mode approach defines the norm of the education level in each type of job as the modal or the most frequent event. However, this approach requires clear desegregation of the occupational level (Kropko, 2008). To minimize the measurement error in identifying the undereducation and overeducation, the modal of the education level must be at least 60 percent of each type of job (Mendes de Oliveira et al., 2000). Due to these reasons, the model approach is not suitable to be applied in this study because the desegregation of the occupational for PICS 2007 data is too general. Besides, when calculating the mode of the education level for each of the jobs, the modals are less than 60 percent. Therefore, in this study, the mean approach will be used to identify the required education for each type of job followed by the EOM method to determine undereducation and overeducation. The EOM method can be derived using the following equation:

$$EOM_i = E_{ij} - \overline{E_j}$$

Where, EOM_i is the educational-occupational mismatch for individual i, E_{ij} refers to the respondent i in occupation j's highest educational qualification and $\overline{E_j}$ is the mean qualification level for the workers in the occupation j. Based on the PICS data, this study categorizes workers' education into 6 levels and each level is coded with a number. The highest education level, Degree, is coded as 6 followed by other education levels to the lowest education level coded as 1.

The level of education is measured using the actual education level rather than the number of years in education to minimize the measurement error and also the education acquired abroad might have a different number of years than that acquired locally.

A. OLS regression of wage equation

The analysis begins with the investigation of the effect of educational mismatch on earnings. There are three models developed, and the main objective in

each of the models is to estimate the impact of educational mismatch on earnings along with other variables, such as formal education related to the job and also the interaction between these two variables in explaining the wage variation. This study applies the following three models.

Model 1
$$Wage_i = \beta_0 + \beta_1 X_i + \beta_2 Educ_i$$
$$+ \beta_3 Undereducation_i + \beta_4 Overeducation_i + e_i$$

In model 1, the dependent variable, $Wage_i$, is the log hourly wage. X_i is the vector of control variables that consist of gender, nationality, marital status, geographical area, the firm's size, trade union membership, the month of training, tenure and its squared, and potential experience and it's squared. The $Educ_i$ is a set of dummies of the education level that consists of degree, diploma, and upper secondary education, while the lower education is selected to be the reference group of education. Education would be expected to have a positive effect on earnings. An individual who attains more education would earn higher earnings as compared to those who have less education. Besides, in this model the educational mismatch indicators are also included; Undereducation and Overeducation, while Adequate education is the reference group for the educational mismatch, e_i is the error term that is expected to be zero, and i is the individual.

Model 2
$$Wage_i = \beta_0 + \beta_1 X_i + \beta_2 Educ_i$$
$$+ \beta_3 Undereducation_i + \beta_4 Overeducation_i +$$
$$\beta_5 Jobinrelatedfield_i + e_i$$

In Model 2, the variable of the 'Job in related field' is introduced. This dummy variable will explain the effect of the appropriate formal education to the job on earnings. Some studies ignore the formal education that is related to the job. According to Robst (2007), the wage effects vary depending on the field of study. This factor could be one of the important determinants of earnings because, although workers have the same level of education their wages might differ due to the differences in their field of education. Workers with formal education related to the job would be more productive in their job. Thus, they would be more likely to earn higher wages.

Model 3
$$Wage_i = \beta_0 + \beta_1 X_i + \beta_2 Educ_i$$
$$+ \beta_3 Undereducation_i + \beta_4 Overeducation_i +$$
$$\beta_5 Jobinrelatedfield_i + \beta_6 Undereducation_i$$
$$* Jobinrelatedfield_i + \beta_7 Overeducation_i *$$
$$Jobinrelatedfield_i + e_i$$

Model 3 shows the interactive variables for overeducation and undereducation in the Job-related field. The interaction terms are included because the educational mismatch might have a different effect on earnings depending on the values of the Job in a related field.

The three models also will be applied to analyze the effect of educational mismatch on native and immigrant wages separately and the nationality variable, *Native*, will be excluded in the earning estimations.

IV. RESULTS

A. Incidence of Educational Mismatch

Table 1. The Incidence of Educational Mismatch

	Undered ucation (%)	Adequate education (%)	Overedu cation (%)
All	36.14	40.62	23.24
Male	38.29	40.32	21.39
Female	33.66	40.97	25.37
Native	34.71	41.64	23.65
Immigrant	50.46	30.41	19.14
Degree	0.00	50.13	49.87
Diploma	21.08	24.75	54.17
Upper Secondary	17.54	60.05	22.41
Lower education	76.11	23.21	0.69
Management	44.22	25.81	29.97
Professional	43.55	55.21	1.24
Skilled	39.67	41.58	18.75
Unskilled	27.60	33.78	38.62
Non-production job	28.56	50.35	21.08
Apprentice	43.22	38.98	17.80

This study used the cross-section data obtained from the Productivity and Investment Climate Survey (PICS) 2 for 2007 collected by the Economic Planning Unit and Department of Statistics Malaysia in collaboration with the World Bank. The PICS includes 1200 firms in the manufacturing sector, which is 32.1 percent of the population, and 300 out of 2502 establishments for the service sector. The PICS contains random samples of 13,533 workers in various sizes of firms that employ both immigrant and native workers that work informal sectors. Immigrant workers contribute 9.07 percent of the total sample and all the immigrants are legally registered.

Table 1 presents the percentage of undereducation, adequate education, and overeducation in the Malaysian labor market as measured based on the

EOM with the mean approach. The percentage of workers who are adequately educated is about 41 percent, whereas undereducated and overeducated are 36 percent and 23 percent, respectively.

Native workers are typically adequately educated for their job. About 41 percent of natives were classified as adequately educated, with 34.7 percent undereducated and the remainder over-educated. Immigrant, however, is more likely than native to be undereducated for their job. About half of the immigrants in the labor market are classified as undereducated, while 30.42 percent of immigrants are adequately educated and the remaining are classified as overeducated. These figures offer initial evidence of the wage differentials between natives and immigrants due to the educational mismatch.

B. Educational Mismatch Effects on Earnings

The analysis begins with regressing the wage equation by including all samples using the Ordinary Least Squares (OLS). The main concern of this analysis is to investigate the effects of educational mismatch on earnings, along with other variables that might affect earnings such as the education level, the field of education related to the job, and the control variables.

Table 2. OLS Regression of Wage Equations of Pooled Samples

	Model 1	Model 2	Model 3
Undereducation	0.180***	0.168***	0.147***
	(0.017)	(0.017)	(0.021)
Overeducation	-0.201***	-0.177***	-0.232***
	(0.017)	(0.017)	(0.024)
Job in related field		0.148***	0.106***
		(0.013)	(0.020)
Undereducation *Job in related field			0.05
			(0.028)
Overeducation* Job in related field			0.101**
			(0.032)
Constant	0.137***	0.119**	0.138**
	(0.040)	(0.040)	(0.041)
R-squared	0.353	0.359	0.361

Notes:
(1) The dependent variable is the log of hourly wages
(2) Numbers in parentheses are standard errors.
*(3) * Statistically significant at p<0.05*
*(4) ** Statistically significant at p<0.01*
*(5) ***Statistically significant at p<0.001*

Table 2 displays the coefficient and the standard errors for all variables that were used in each of the

earning equation models. As shown in model 1, without controlling the formal education related to the job, the undereducation increases earnings by 18 percent compared to workers with the same level of education who are working in a job in which their education is considered as appropriate. However, workers who have excessive education for their job will earn 20.1 percent lower rates of return than those who have the same education level, when their education is adequately matched to their job. This result might be true because the overeducated workers could be employed in a low-paying job because they are less productive as compared to other workers in the same job (Verdugo & Verdugo, 1989) due to the lack of skills which are needed for the job.

In model 2, it shows that the Job in the related field does not affect much on the coefficient of undereducation and overeducation. Individuals who work in a job that is related to their formal education will earn 14.8 percent more compared to workers who work in a job that is not related to their education. Intuitively, individuals who have an education related to their job likely have the knowledge and skills that are required for the job. For this reason, they will be more productive as compared to other workers who do not have an education related to the job.

Model 3 introduced the interaction between educational mismatch and the field of education related to the job. It can be seen that workers who are classified as overeducated and acquired a formal education related to the job will earn an additional 10.1 percent more than the other overeducated workers. This result suggests that workers who are overeducated and work in a related field of education benefited substantially in terms of earnings.

Based on the analysis of this section, shows that the educational mismatch is significantly affecting the earnings of the workers. Table 2 expound that undereducated workers earn a higher rate of return in the labor market compared to those who have the same education level and work in a job that considers appropriate with their education. On the other hand, overeducation has an adverse effect on the earnings of the workers. Workers classified as overeducated will relatively earn lower wages compared to the adequately educated workers.

This section also provides strong evidence that formal education related to the job has a positive effect on earnings. This result pointed out that workers with the knowledge and skills that are appropriate to the job are able to get higher earnings, which is comparable to Zakariya (2014). Also, overeducated workers will benefit from working in a job that is related to their field of education. It can be concluded that the educational mismatch is significantly affecting the worker's earnings. The result is compatible with both theory and previous studies (such as Allen & van der Velden, 2001; Di Pietro & Urwin, 2006; Nielsen, 2011; Verdugo &

Verdugo, 1989; Zakariya, 2014; among others) on educational mismatch.

C. Educational Mismatch Effects on Native and Immigrant Earnings

Table 3. OLS Regression of Wage Equations of Native and Immigrant Subsamples

	Model 1		Model 2		Model 3	
	Native	Immigrant	Native	Immigrant	Native	Immigrant
Undereducation	0.209***	-0.026	0.196***	-0.021	0.179***	-0.023
	(0.018)	(0.052)	(0.018)	(0.052)	(0.023)	(0.058)
Overeducation	-0.177***	0.446***	-0.155***	0.418***	-0.189***	0.530***
	(0.018)	(0.073)	(0.018)	(0.072)	(0.026)	(0.084)
Job in related field			0.139***	0.200***	0.111***	0.124
			(0.014)	(0.044)	(0.021)	(0.078)
Undereducation*Job in related field					0.037	0.007
					(0.030)	(0.101)
Overeducation*Job in related field					0.062	0.346**
					(0.033)	(0.123)
Constant	0.452***	0.711***	0.424***	0.638***	0.437***	0.647***
	(0.036)	(0.138)	(0.036)	(0.138)	(0.037)	(0.139)
R-squared	0.334	0.139	0.339	0.153	0.339	0.16

Notes:
(1) The dependent variable is the log of hourly wages
(2) Numbers in parentheses are standard errors.
*(3) * Statistically significant at p<0.05*
*(4) ** Statistically significant at p<0.01*
*(5) ***Statistically significant at p<0.001*

In conducting this analysis, the sample was divided into two, immigrant and native, and the analysis was conducted separately. Table 3 presents the results of the determinants of wages of native and immigrant workers.

In model 1, it shows that natives who are classified as undereducated for the job will earn higher wages than natives who are adequately educated. On the other hand, overeducation reduces earnings for both natives and immigrants. However, when comparing the coefficients of overeducation between native and immigrant, it can be seen that immigrants are penalized more than natives for being overeducated for their job. Considering the effect of the undereducation and overeducation on native and immigrant earning indicates that immigrant is penalized more for being overeducated meanwhile, the immigrant also has no significant evidence of getting any reward for being undereducated in their job as natives do. Thus, this could be one of the reasons for the wage differentials that exist between

natives and immigrants that exist in the Malaysian labor market as discussed in the previous chapter of this study.

Furthermore, the returns of working in a job that is related to the field of education are greater for an immigrant than a native worker, as shown in model 2. Having education related to the job will increase wages of immigrants by 20 percent and 13.9 percent for natives.

In model 3, the interaction between educational mismatch and education related to a job is included. For the immigrant, being overeducated and working in a job that is related to their field of education will significantly increase their wages by 34.6 percent compared to overeducated immigrants with the inappropriate field of education for their job. It could be true because if immigrants have excess education and their education is related to the job, they will be more productive than other immigrant workers, increasing their earnings. In addition, the interaction of Overeducation and jobs in related fields decreases the negative effect of Overeducation on wages of immigrant workers to 18.4 percent. Thus, Jobs in the related field could reduce the wage differentials between native and immigrant workers who are considered as Overeducated.

This finding clearly shows that immigrant and native workers will be penalized for being overeducated in their job. In contrast, natives will earn higher wages than adequately-educated natives if they are undereducated for their job. By comparing the effect of overeducated between native and immigrant's earnings, it suggests that immigrant tends to get a relatively higher penalty for being overeducated than native workers. Therefore, educational mismatches partly explain the wage differentials between native and immigrant workers in the Malaysian labor market.

V. DISCUSSION AND CONCLUSION

This study found that the incidence of overeducation is slightly lower, there are only 19.14% for immigrants and 23.65% of natives are undereducated for their jobs. This result is somewhat comparable to other previous studies in the Malaysian labor market (see Osman & Shahiri, 2013 and Zakariya, 2014). Zakariya (2014) for instance, found that workers are less likely to be overeducated, about 18.62% in the manufacturing sector and 11.79 % in the service sector.

The undereducated natives are paid more than the adequately educated natives, while there is no significant evidence for the undereducated immigrant. However, the overeducated natives and immigrants suffer from the wage penalty. When comparing the magnitude of the coefficient, immigrants are penalized more than natives for being overeducated. This result is in agreement with the findings of Nielsen (2011) that immigrants are more prone to be overeducated than natives because an immigrant will accept any job that has been offered, especially when they are being discriminated against. Robst (2007) also stated that immigrants would accept any job offered by the employer to receive on-the-job training for their future prospects. These findings preliminarily suggest that if immigrants are undereducated, they will not be as rewarded as natives are. If the immigrants are overeducated, they will be penalized more than natives. This clearly shows that the educational mismatch could partly explain and even widen the wage differentials between native and immigrant workers in the labor market.

In this study, the variable of formal education related to the job is included in the estimation to measure the impact of knowledge and skills on earnings. This proves that education related to a job positively affects the earnings of native and immigrant workers at different magnitudes. Education appropriate to the job has a greater impact on immigrants' earnings as compared to natives' earning, especially when the immigrants are overeducated. On the other hand, skills increase the likelihood of being adequately educated for both natives and immigrants. However, for natives, skills will increase the incidence of undereducation and at the same time reduce the risk of overeducation.

From the findings of this study, several contributions can be made to the current literature. This study has revealed that the educational mismatch partly explains the wage differentials between native and immigrant workers in the Malaysian labor market. This study also enhances our understanding that the native-immigrant wage differentials exist because immigrants are penalized more than natives for being overeducated. Additionally, workers who attained a formal education related to their job potentially will increase their earnings, but at the same time, it also will increase the probability of being undereducated. Finally, this study has confirmed that skills and education can compensate for one other in the Malaysian labor market.

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