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THE IMPACTS OF OVER-EDUCATION ON ECONOMIC GROWTH IN MALAYSIA

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Abstract: *This article is developed purposely to explore the impacts of over-education on economic growth in Malaysia. Therefore, the sample data utilized is the Time Series Data from the period of 1984 to 2016 gathered from other reliable sources. Moreover, this study incorporates several different tests of empirical methods which are Augmented Dickey Fuller (ADF) and Philip Perron Unit Root Test, Johansen Co-Integration Test and Vector Error Correction Model (VECM) Test. As a result, the finding derived from Johansen Co-Integration Test has illustrated that there is a long-term relationship between the impact of over-education and the country's economic growth in time series data. Furthermore, the VECM Test has indicated that over-education has a long run causality with GDP. However, the results obtained from the Wald Test present that GDP is not influenced by over-education but, the reverse is true where over-education is influenced by GDP at 0.01 significance level. Hence, overall, there is a negative long term relationship between over-education and economic growth in Malaysia.*

Keywords: *Over-education and Economic Growth*

Introduction

Nowadays, many highly developed countries such as Japan, South Korea and Singapore have acknowledged the importance of education to the people whereby those who are educated would benefit from the economic growth (Malaysia Education Blueprint, 2013). Hence, according to Arus (2014), the national higher education system plays very crucial role in developing educated and knowledgeable society which tremendously affect national progress. Initially, an individual accomplishment in higher education could open more doors towards developing beneficial skills, increasing social status and gaining entrance to a network as a platform towards social enhancement (Organization for Economic Cooperation and Development (OECD), 2013). Hence, this functions as a key tool in order to increase the human capital level of the workforce. On the other hand, at country level, increase in the number of highly educated workers in the workforce allows greater productivity measured as gross

national product (GDP). This is because, education is generally perceived as a key ingredient for improving countries' economic well-being, via higher productivity and more innovations. This view seems in line with the augmented neoclassical growth theory (Mankiw et al., 1992) where education can increase the human capital inherent in the labour force, which in turn, leads to labour productivity improvement and thus transitional growth towards a higher equilibrium level of output.

Henceforth, with this aspiration, the government of Malaysia has moved forward by employing a lot of resources and efforts on education specifically the tertiary education in order to raise the number of students' enrolment in universities. The expenses put on education was only RM 4.4 billion back in 1985 and it gradually rose to RM 24.4 billion until RM 56.7 billion in 2015). This massive amount of investment is targeted to support and encourage more individuals to further their studies at tertiary level, thus enhancing the quality of labor force. Significantly, there is a positive outcome whereby the number of students enrolled at tertiary level of studies has been on an increasing trend from 43 000 in 1985 to almost 620 000 in 2015, which is an increase of 14.3 (refer figure 1).

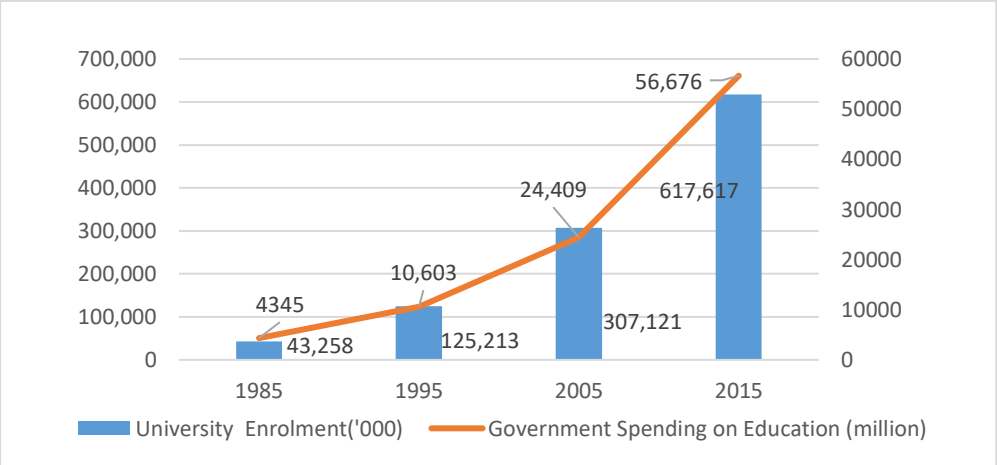

Figure 1. The data of university enrolment and government spending on education from year 1985 to 2015.

As a result of huge investment in education, the number of graduates produced by Higher Education Institutions (HEIs) in Malaysia as a whole recorded a growing trend (refer left or right side of Figure 2). This is due to the growing number of higher education institutions in the country that produce the rising number of graduates over the years. In the Fourth Malaysia Plan (4^{th} MP), the total number of graduates successfully produced by HEIs was 22,168, had increased to 116,673 in the Seventh Malaysia Plan (7^{th} MP) and nearly 200,000 in the Tenth Malaysia Pelan (10^{th} MP). Consequently, the number of highly educated workers who joined the labour market has also escalated.

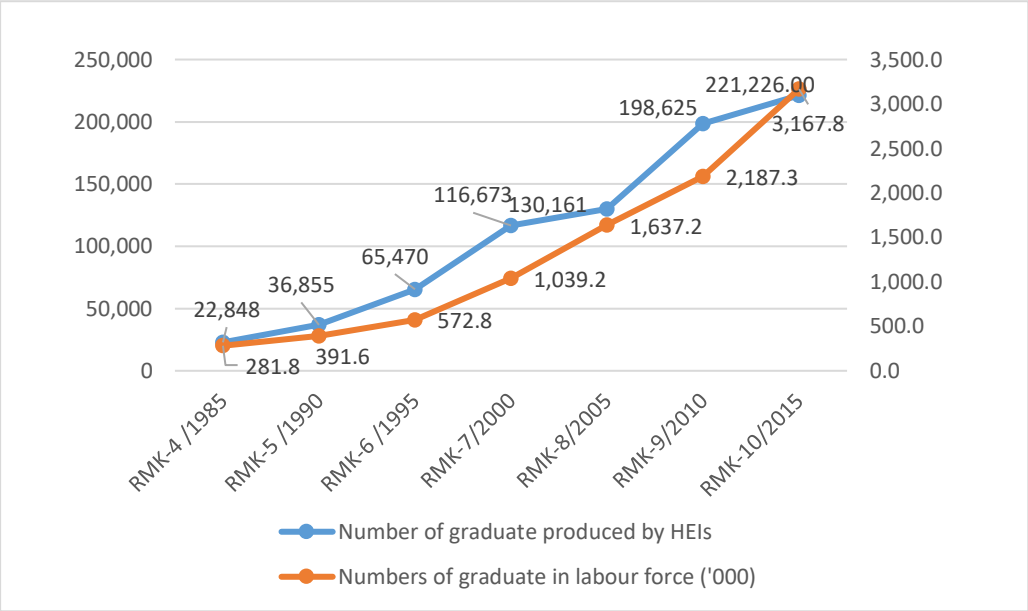

Figure 2. Number of graduates produced by higher education institutions and Number of graduates in the labour force, Malaysia, 1982-2015.

Moreover, the growing number of highly educated workers may as well proliferate outstanding innovations, contemporary knowledge of latest technological advancements, products, and processes which extensively promote a country's development as highlighted in the endogenous growth (Lucas, 1988; Romer, 1990; Aghion and Howitt, 1998). Consequently, these highly educated workforce would not only push the country to move forward with more latest technologies and competitive products, but also facilitate the country in transmission of sufficient knowledge to comprehend and practice new information as well as to effectively apply other technologies invented by other countries. Besides these excellent progress and resources which have been adopted and conferred towards improving the quality of the labor force since the last decades, there are conversely countless of unresolved challenges in facing the labor market. Apart from the increasing number of graduate unemployment,[1] there are some evidences which illustrate the rising cases which they do not with the number of job opportunities resulted in skills shortage and over-education. Zakariya (2017) stated that "skills shortage" can be explained as there is an insufficient of workers with a particular skill in order to fulfill the demand. In other words, the quality and type of education possessed the workforces do not match the demand of the industry. Meanwhile, "over-education" is defined as a worker who has higher education or level of qualification than the jobs' requirements (Zakariya, 2014).

[1] Though the general unemployment rate has stayed at around 3.5% between 2000 and 2015, graduate unemployment has increased from 15.2% to 34% over the same period (Department of Statistics, 2016).

Table 1: The numbers of an employed person with education level and an occupation with education level from year 1982 to 2015 (multiple years).

Year	Employed with level of education ('000)			Occupation with level of education ('000)		
	Primary	Secondary	Tertiary	Primary	Secondary	Tertiary
1982	3068.2	1861.9	318.2	3184.7	1577.1	487.2
1986	2991.9	2340.1	428.1	3300.8	1870.0	589.4
1990	2968.6	3129.2	587.3	3843.5	2176.9	664.6
1994	2850.5	3862.3	801.2	4106.0	2476.0	932.0
1998	2963.3	4505.3	1131.0	4448.0	2892.3	1259.3
2000	2858.7	5071.7	1338.7	4610.2	3246.6	1412.3
2001	2775.5	5135.3	1441.7	6188.1	7,209.9	1152.2
2002	2789.2	5163.3	1588.4	6187.8	7,194.5	1269.8
2006	2524.7	5774.3	1975.2	6604.2	7,771.6	1395.5
2010	2561.2	6549.6	2788.6	7426.4	8,951.7	1594.1
2015	2195.8	7587.0	3853.3	9239.1	9,941.2	2180.6

In Malaysia, between 1982 to 2000 (refer Table 1), Malaysia's economy experienced the shortage of skilled workers, especially among those with tertiary level of education since the number of jobs provided which required tertiary education exceeded the number of available workers who had such qualification. However, the incidence continuously decreased every year. For example, in 1982, the number of skilled workers shortage were around 160 000 and the figures continuously declined to 73 600 in 2000. Skill shortage incidence has led firms to hire unqualified workers who had a diploma or workers with post-secondary education to fill the vacancies (World Bank, 2008).[2] Nevertheless, after the year 2000, the job vacancies available in the economy were not enough to occupy all the highly educated workers produced by HEIs. This situation could be seen whereby the number of tertiary jobs did not suffice to cater for the number of employed people who possessed tertiary education. This discrepancy has been bigger from one year to another year and was called as 'over-education' incidence in the labor market.

Literature Review

Theoretical of Over-Education (Human Capital Theory)

Education is placed under human capital theory. It is viewed as a testament to economic performance by removing the concept of confinement as a human capital that will support technological change, research and innovation, and increased productivity in competitiveness (Fitzsimons, P. 1999). This theory was introduced by Schultz (1961) and was extended by Becker (1964). Becker (1996) explains that growth in physical capital is a small part of revenue growth. Education and training actually play a more important role in the growth. Education and training will increase the productivity of workers where knowledge and skills that the worker will increase their income generation. This theory emphasizes the importance of

[2] The survey (World Bank, 2009) reported that firms in the manufacturing sectors take about four to six weeks to fill a vacancy for a professional or a skilled production worker which seems a quite long.

education and training as the key to engaging in new economics. Therefore, higher education is an important component in strengthening human capital productivity.

In relation to Human Capital Theory, the suggestion that firms are willing to take full advantage of their workforce skills by adjusting their production processes in response to any change in the relative supply of labor explicitly from the repeated Becker assumption that employees will always pay their marginal product. Wages are always in line with the marginal product of individual workers, which will be determined by the level of human capital that they have accumulated through either formal education or on-the-job training. Therefore, over-education, associated with under-utilization workers and wage rates under marginal products, will appear entirely inconsistent with the labor market's view.

Concepts of over-education

The concept of over-education can be traced back to the 1970s when Freeman (1971, 1976) identified that decreasing returns to education in the United States, existing questions regarding the surplus production of graduates. According to Rumberger (1981), Tsang and Levin 1985, over-education can be defined in three dimensions: (1) as increased the number of labour force that have a higher education (degree and above) in the labour market; (2) as the self-command by worker of greater educational activity skills than their jobs required, through expanded access to knowledge and skills; or (3) as not fulfilled expectancy of the educated with respect to their occupational achievements resulting from a relatively stagnant labor market enlargement compared to the expanding upon of the higher education sector. Generally, over-education can occur when people with qualifications are more than required in a job.

Many studies have demonstrated that the growing number of young workers having overeducated at the beginning of their careers (Stijn Baert, Bart Cockx, 2012). Osman and Shahiri (2013) stated that one of the factors which affects an individual's workability is based on the level of education. Therefore, individuals with higher education levels would find it less difficult to join the workforce with satisfactory and guaranteed income. Likewise, Chevalier (2000) claimed that the increasing students' involvement in education has led to the increase in the number of workers in the labor market. Hence, all this has led to the phenomenon of over-education. Over-education is a situation whereby the level of education obtained is higher than the jobs available in the market (Boll & Leppin, 2014). On the other hand, under-education depicts the situation in which the number of educated workers is lower than that required education in a particular job. In contrast, if education acquired employees to work on a particular type of work which is required by the level of education is denoted as adequate education (Juwita, 2011).

The incidence of over-education in Malaysia has been reviewed and examined at individual level ((Hock-eam Lim, Rich, & Harris, 2008;Zulkifly, Ishak, & Abu Hassan, 2010; Lim, 2010, 2011, 2013; Zakariya & Mohd. Noor, 2014; Zakariya, 2014a, 2014b and in general around approximately 33% of the employed respondents were over-educated for their jobs. Most previous studies have shown that over-education has several negative impacts on individual and firm level. Table 2 shows the summary of the impacts of over-education in selected countries.

Table 2: Impacts and Trends of over-education in selected countries.

No.	Study	Country	Year Data	Sources of Data	Impact of over-education
1.	Dieter Verhaest And Eddy Omey (2006)	Flemish	1999-2002	SONAR	Cannot validate
2.	Chun-Hung A. Lin And Chun-Hsuan Wang (2005)	Taiwan	1993, 1996, 1999	Directorate-General of Budget, Accounting and Statistics (DGBAS)	Less earning, less working experiences
3.	Yuping Tsai (2010)	U. S	1979–2005	Panel Study of Income Dynamics	lower-ability worker, lower return to education.
4.	Mehta, Aashish, Felipe Jesus, Quising, Pilipinas, Caminque, Shiela (2010)	India, Thailand, Philippines	1993 & 2005(India), 1991 and 2004(Philippines), 1995Q3 and 2005Q3(Thailand)	National Sample Survey (India), Labor Force Survey (Philippines & Thailand)	shortage of skilled jobs, low return to education.
5.	Andrea Diema (2015)	Swiss	2004, 2006, 2008, 2010	Swiss Federal Statistical Office's (BFS) graduate survey	less job satisfaction

Measurement of Over-Education at Macro Level

There were three methods employed to measure over-education. All of the methods which are Job Analysis, Subjective Method and Mean Method are using measures over-education at micro level. In doing so, the Job Analyst approach will employ in order to measure over-education at the macro level. The method has also known as objective approach, uses information provided by professional job analysts regarding the qualifications required for an occupation. Perhaps, the most recognised source for such information is the Dictionary of Occupational Titles (DOT) and in this case, the Malaysia Standard Classification of Occupations (MASCO) is employed.

There are at least three MASCO been published by the Ministry of Human Resource (MOHR) – 1988, 1998 and 2008. To comply with this condition, there are three different MASCO employed here to identify educational required for major group occupations. First is MASCO 1988, used for employment data between 1982 to 2000, while MASCO 1998 for a period of 2000 – 2008) and lastly MASCO 2008 for 2008 and onwards). This makes it necessary to understand the dynamics of the linkages between education and labor market.

Using the MASCO, the over-education measured by comparing actual education/qualification attained by employing persons with the typical education/qualification for a given occupation set (major group). If an employed person's actual qualifications is greater than what are determined by a professional job analyst for a given job, then the worker is deemed overeducated. If, however, the qualifications are lower than what the job requires, then the worker is considered as undereducated. Workers are then matched if the actual and required qualifications for the job held are similar.

Findings

In order to study the effects of over-education on economic growth in Malaysia, this study will use a variety of methods to analyse the data. There are three indicators of OE employed, i.e. - the actual number of overeducated workers (OE), dummy (DOE) and percentage of over-education (POE) in order to examine the effects of over-education on economic growth in Malaysia. But, this article only focuses on OE specification.

Unit Root Test

In Econometrics, many variables are non-stationary, in order to ensure that the data are stationary, the Unit Root Test was initially performed before Co-integration Test. This test was also executed to avoid limitation regression. Thus, variables that have mean values and variances vary according to this time is a non-stationary variable and has a unit root. Next, False regression will exist if budgeting is made in the time series. By that is, if the variable that has the root unit is said to be integrated at degree 1 or I (1), then the differential process should be applied to the variable applicable to change its shape to stationary.

Table 3: ADF and PP Unit Root Test

Test	Augmented Dickey Fuller (ADF)				Philip Perron (PP)			
Variable	Level		First Difference		Level		First Difference	
	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept	Intercept	Trend & Intercept
logGDP	-0.419 (0.9068)	-1.860 (0.6750	-5.409*** (0.0000)	-5.402*** (0.0000)	-0.419 (0.9069)	-2.235 (0.4703)	-5.475*** (0.0000)	-5.587*** (0.0000)
logC	0.391 (0.9812)	-3.213 (0.0819)	-4.571*** (0.0000)	-4.540 *** (0.0000)	0.409 (0.9818)	-3.376* (0.0546)	-4.481*** (0.0002)	-4.448*** (0.0018)
logI	-0.182 (0.9406)	-2.683 (0.2431)	-6.464*** (0.0000)	-6.439*** (0.0000)	0.218 (0.9733)	-2.739 (0.2202)	-6.737*** (0.0000)	-6.685 *** (0.0000)
logG	0.230 (0.9739)	-3.049 (0.1188)	-4.843*** (0.0000)	-4.770*** (0.0005)	0.191 (0.9717)	-3.134 * (0.0984)	-4.842*** (0.0000)	-4.771*** (0.0000)
logX	-2.464 (0.1245)	0.161 (0.9955)	-4.174*** (0.0007)	-4.887*** (0.0003)	-2.354 (0.1552)	0.215 (0.9959)	-4.240 *** (0.0006)	-4.842*** (0.0004)
logM	-1.910 (0.3272)	-0.458 (0.9850)	-3.916*** (0.0019)	-4.220*** (0.0042)	-1.816 (0.3726)	-0.582 (0.9798)	-3.880 *** (0.0022)	-4.097 *** (0.0064)
OE	1.244 (0.9963)	-1.352 (0.8745)	-4.715*** (0.0001)	-5.332*** (0.0000)	1.613 (0.9979)	-1.228 (0.9047)	-4.686*** (0.0001)	-5.200 *** (0.0001)

*Note: *, ** and ***indicate the significant level at 0.10, 0.05 and 0.01 level of confident, respectively. (Mac-Kinnon, p-value) in bracket and t-statistic without bracket*

The overall results obtained from the Augmented Dickey-Fuller Unit Root Test and Philip-Perron show that the results acquired are not significant at the first level and the difference is significant. In other word, all the variables are non-stationary at level but are stationary at the first difference. Therefore, all the variables are integrated of order one, I (1). Since the variables

are integrated at order 1, the long run relationship between the variables was examined using Johnsen Co-integration test.

Johnsen Co-integration Test

The first integration test is Unit Root Test ADF and Unit Root Test PP to indicate that all variables are not stationary at levels below intercept and intercept and trend while they are stationary at first difference under both intercept and intercept and trend. Based on the result, all the variables fulfill the pre-condition of Johnsen Co- Integration Test.

The co-integration test is done based on the method proposed by the Johansen (1988) to determine the existence of a co-integration vector in a non-stationary time series. This test also criticized a number of co-integration vectors to allow hypothesis testing to be performed on vectors the co-integration. Two tests were provided by the method Johansen to determine the number of co-integration vectors, the trace test and the maximum test eigenvalue. If a non-zero vector can be identified by the tests, then this means there is a long-term relationship between the variables.

Table 4: Co-integration Test

Model	**Null Hypothesis**	**Trace Statistics**		**Maximal Eigen Value Statistics**		**Result**
		Statistics	**5% Critical Value**	**Statistics**	**5% Critical Value**	
Lag Length: 3#	r ≤ 0	407.6**	124.2	186.7**	45.28	**Statistical Trace and Maximum Eigen values showed five Co-integration vectors.**
	r ≤ 1	220.8**	94.15	77.15**	39.37	
	r ≤ 2	143.7**	68.52	63.72**	33.46	
	r ≤ 3	79.98**	47.21	35.39**	27.07	
	r ≤ 4	44.59**	29.68	25.83**	20.97	
	r ≤ 5	18.76**	15.41	16.80**	14.07	
	r ≤ 6	1.9591	3.760	1.959	3.760	

*Note: ** denotes significant level at 0.05 , Critical level obtained from Osterwald-Lenum (1992),*
#: Lag length based on AIC value.

The finding shows that both tests which are Trace Statistics and Maximum Eigen Value Statistics are significant at the level 5% significance and the null hypothesis shows that there is no co-integration successfully rejected. Both tests are as well proving that there is at least five co-integration vectors between the independent variables and GDP. The existence of this co-integration indicates that there is a long run relationship between the independent variable and GDP. Table 5 shows Long Run Analysis.

Table 5: Long Run Analysis

Dependent Variable (GDP)	Independent Variable							
	logC	logI	logG	logX	logM	OE	Constant	Durbin Watson stat
Coefficient	-1.05***	-0.15***	-0.22***	-0.71***	0.90***	0.0004***	1.62	1.43
Standard Error	0.0101	0.0055	0.0093	0.0092	0.0105	7.61e-06	-	-

Following empirical model is derived on the basis of empirical results obtained from Table 5.

$$\mathbf{logGDP= 1.62+1.05(logC)+0.15(logI)+0.22(logG)+0.71(logX)-0.90(logM)-0.0004OE+\epsilon_t}$$

Specifically, for the long-term equation shows that the GDP values have a positive long term relationship with the private consumption, government expenditure, investment, and exports. These are statistically significant at 0.01. By contrast, imports and OE shows have a negative long term relationship toward GDP with significant 0.01.

Vector Error Correction Model (VECM)

Although the co-integration test has confirmed the existence of a long-term relationship between the country's revenue with aggregate volume and aggregate expenditure, the test cannot identify the causal relationships between the variables studied. Therefore, the vector error correction model (VECM) test should be done. This model is a vector auto regression (VAR) model constrained to test the non-stationary time series has been identified as co-integrated. This VECM model specification allows error correction to be adjusted in the short term so that endogenous variables return to equilibrium in the event of any deviations from long-term balance. In VECM, the long run Granger causal relationship is identified in ECT-1 value for each variable.

***Table 6*: Vector Error Correction Model**

variable	Short Run Causality / Wald Test							Long Run Ect-1 (t-statistic)
	Δlog GDP	**ΔlogC**	**ΔlogI**	**ΔlogG**	**ΔlogX**	**ΔlogM**	**ΔOE**	
Δlog GDP		4.5432 (0.103)	0.81625 (0.665)	1.4006 (0.496)	2.0993 (0.350)	3.3812 (0.184)	0.20569 (0.902)	0.8727938 (0.6463)
ΔlogC	4.3276 (0.115)		0.89436 (0.639)	0.40905 (0.815)	3.5927 (0.166)	2.3558 (0.308)	0.23526 (0.889)	0.1587635 (0.6922)
ΔlogI	5.8681 ** (0.053)	3.9965 (0.136)		1.0944 (0.579)	2.6462 (0.266)	0.64502 (0.724)	0.41784 (0.811)	-1.359321 (2.7878)
ΔlogG	14.242 *** (0.001)	13.698 *** (0.001)	0.13648 (0.934)		19.089 *** (0.000)	11.943 (0.003)	3.9713 (0.137)	1.185095** (0.7973)
ΔlogX	4.0743 (0.130)	13.037*** (0.001)	1.3477 (0.510)	2.6801 (0.262)		10.465 *** (0.005)	1.2602 (0.533)	1.269849 (0.8915)
ΔlogM	1.6279 (0.443)	2.0189 (0.364)	1.7854 (0.410)	0.4177 (0.812)	1.8788 (0.391)		0.08797 (0.957)	0.6985321 (1.2293)
ΔOE	9.1323 *** (0.010)	16.985 *** (0.000)	2.4182 (0.298)	3.5064 (0.173)	8.6647 *** (0.013)	11.56 7*** (0.003)		-2422.227** (989.529)

*Note: *, ** and ***indicates the Significant at 0.10, 0.05 and 0.01 level of confident.*
(Standard Error value) in bracket for long run granger causality.

The result shows that the coefficient of Ect-1 for the OE variable is negative at – 2422.23 and statistically significant at 0.05. This means that the over-education has a long run granger causality toward GDP. By contrast, the over-education variable in the short run is statistically significant at 0.01 which means that there is a short run granger causality. This suggest that in

the short run, GDP is not influenced by over-education but, the reverse is true where over-education is influenced by GDP at 0.01 significance level.

Conclusion

This paper is developed significantly to analyze the implications of over-education on Malaysia's economic growth. Based on the empirical evidence employed in this research, the incidence of over-education in Malaysia is represented by 7.7 percent of the workers nationwide. The results gathered by Johnsen Co-integration propose that a long run relationship exists between over-education and economic growth in Malaysia. Last but not least, the VECM is applied to discover whether or not over-education affects economic growth. The findings depict that over-education has long run granger causality on economic growth and statistically significant at 0.05. In addition to this, based on Wald test, the results illustrate that GDP is not influenced by over-education but, the reverse is true where over-education is influenced by GDP at 0.01 significance level. Therefore, in conclusion, over-education has a negative long-term relationship with economic growth in Malaysia.

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