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The Relationship between Educational Attainment and Economic Growth In Malaysia

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ABSTRACT

This paper aims to examine the relationship between educational attainment and economic growth in Malaysia by using data from 1982 to 2011. Johansen co-integration is employed to analyze the data. Findings show that educational attainment is related to economic growth. The Granger causality model is used to measure the causal effect of educational attainment and economic growth. The results indicate that primary and tertiary education does not Granger cause economic growth and vice versa. Causality runs from no formal and secondary education to economic growth. Therefore, the government should increase investment on education to increase the economic growth.

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INTRODUCTION

The importance of education has been addressed by numerous previous empirical studies. Solow [26] was the earliest researchers in this area. Then it was continued by Denison [9], employing the same approach as Solow but slightly different as he considered explicit account for education. In his study, he found that increasing level of education is caused by 16 percent of the growth of total potential output. Sheehan [24] has listed some direct benefit that country's gain from education that included on increases in productivity, labors' income, country's economic growth and literacy rate.

According to Ismail [11], education is considered as a long term investment that leads to a high production for a country in the future. Dollar and Gatti [10] stated that advanced education sector can cause the economic and social development. Hence, most of the developed and developing countries emphasize on the enhancement of educational sector. Jorgenson and Stiroh [12] found that education contributes to the economic growth by 8.7% for the period of 1959 to 1998. Education also plays a role in giving a huge impact to the economic development. Investments in human capital yield a private return in the form of greater employment opportunities and higher lifetime earnings. Thus, greater employment opportunities and higher lifetime earnings yield to the increase in the total output of goods and services formed. Therefore, making an investment on human capital is needed [22,6,]. Chandra [7] stated that education has become more important in the improvement of human capital. Economic growth meaning from Musai and Barghi [17] is continual increase of per capita national production in a country and considered as a criterion for testing economic performance of a society and increase of its growth rate leads to improvement of social welfare. However, none of the study attempted to find the relationship between different level of education and economic growth as we have various different levels of education such as primary, secondary and tertiary education. Not all of these levels of education can contribute to intensifying the economic. Therefore this study is to examine the relationship between different levels of education (primary, secondary, and tertiary) and economic growth in Malaysia.

2.0 Overview of education in Malaysia:

Two main goals of the New Economic Policy (NEP) were to eradicate poverty and restructure society. The role of the Ministry of Education is important in order to help the Government achieve its goal is in which to implement the New Economic Policy that requires trained academics and experts. The community education is the most effective tool to eliminate the poverty and restructure the society as well as upgrading the national economy. In New Economic Policy Report (2012), the Malaysian Government has specified the Thrust Two in

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Ninth Malaysia Plan to augment the National Capacity for Knowledge and Innovation and Nurturing Citizens with "First Class Mentality". Dato' Seri Abdullah Bin Haji Ahmad Badawi, the fifth prime minister stated that the most treasurable assets of a nation are the people. Therefore to develop human capital, the boosting of the mentality and intellectual capacity of a nation was emphasized in the Ninth Malaysia Plan. He also said that if Malaysian request to become a knowledge-based economy, a developed country and maintain that developed status, the priority must be on the development of human capital. But, in the context of globalization, high class of human capital is highly necessary. Three main strategies that adapted to developed "First Class Mentality" is raising the volume and the mastery of knowledge while strengthening the nation's capabilities in science, R&D and innovation, and cultivating a cultured society that keeps strong moral values.

However, Ramesh [21] in his report to UNICEF stated that since the Asian financial crisis early 1997, the government expenditure in education had declined from 1990 to 1996. According to Ablett and Slengesol (2000), the situation caused upset to the growth-encouraging balance between physical capital and human capital. The export prices plunged, the stock market cracked, the currency fell, or bonds default. Households cut their expenditure on the things that did not have any benefit. In addition, education was at risk due to the decline in economic growth. Education can have numerous desirable effects and it is one of the indicators that should be focused to be a developed country. Augustine [3] found that education is reflected as an investment that lets individuals to be prepared knowledge and skills that enhance their employability and prolific capacities that would manage to higher incomes in the future.

According to the Ministry of Education Report (2012), in Malaysia, 20 public and 21 private universities and more than 400 colleges, polytechnics and industrial training institutes that suggest options guiding to certificate, diploma, degree and post graduate degree qualifications. Total admission in public institutions of higher learning is anticipated to successful of five year development plans. The Malaysian government realized that the higher demand for skilled manpower occurred because of the increase in inflows of foreign capital in the late 1980s [25]. Government increased the number of private institutions in technical subjects and provided facilities for pre university as well as certificate and diploma programs.

1.1.3 Pattern of educational attainment by labor force on Malaysia:

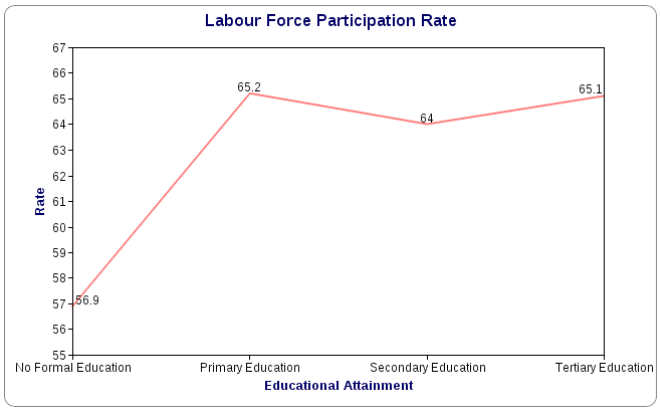

Fig. 1.1: Pattern of educational attainment by labor force on Malaysia, 2011.

Based on figure 1, the educational attainment by labor force in Malaysia in 2011, no formal education accounted for 56.9% and was the lowest among others educational attainment. The primary education was the second highest with 65.2%. This was due to the poverty and made this group of people not continue their education to the following level. The group of people that graduated after secondary education was 64 percent. In Malaysia, there are several employers that hired labor force with secondary education and not with tertiary education. For the tertiary education, Malaysia recorded 65.15 labor force with bachelor degree, master or Phd and they were employed in crucial sectors and industries. However, Malaysia still lacked higher educational attainment in labor force as the labor force with primary education was still high.

3.0 Literature Review:

There are numerous approaches employed by previous studies. Lin [14], Aziz, *et al*. [4], and Odit, *et al*. (2010) used Cobb Douglas model to explore the effects of education on economic growth. Lin [14] has examined the possible differential effects of curricular structure and four academic disciplines in higher education in Taiwan on the economic growth from 1965 to 2000. By using Cobb Douglas model, his result revealed that in overall, higher education delivered a positive and significant effect on Taiwan's economic development and most prominent role played by natural science major. Moreover, his result also exposed that

three of these four disciplines in higher education, economic growth in Taiwan from 1965 to 2000 generally provide a positive effect. Using the same model for the period of 1972 to 2008 to investigate the returns of higher education on economic growth in Pakistan, the results confirmed that the earnings of higher education have a positive impact on economic growth of Pakistan [4]. The same model and results have been found by Loening [15], better skilled and educated labour force emerges to have a positive and significant impact on economic growth. Odit, *et al*. [20] agreed that human capital was reflected as an engine for improvement of the output level. There also have evidence that human capital increases productivity, signifying that education really is productivity-enhancing

Most of empirical studies revealed that education is the determinant of the economic growth such as Asteriou and Agiomirgianakis [2], Changzeng and Jin [8] and Musila and Belassi [17]. The Johansen co-integration approache has been employed to reveal the results. Asteriou and Agiomirgianakis [2] examined the correlation concerning human capital and economic development in Greece. Using the Johansen co-integration analysis, and Granger causality test, they found that co-integrating relationship between education and the GDP per capita. The findings explained that a positive long-run relationship GDP is co-integrated with all educational variables, whereas the causal direction runs through educational variables to GDP growth with the exclusion of higher education where there occurs reverse causality. Changzeng and Jin [8] applied the same method and the same objectives. The data period from 1978 to 2004 were collected. The results showed that there is positive relationship between educational equality and the quality of economic growth but there are some limitations of the study which are in time duration.

Musila and Belassi [17] have conceded out their study on Uganda in order to examine the connection between government education expenditure per worker and economic growth in Uganda. For their analysis, they will use Error correction model and Johansen Co-integration to analyze the impact of education on the economic growth from 1965 to 1999. From their studies, both of them indicate that every worker's expenditure in education to have positively correlated on a country's economic growth. They also found that from error correction model, in developing countries, government expenditures on education are critical for economic growth and in Uganda in particular. In the case of Uganda, the education sector in the levels of per capita expenditure and literacy rate are low, hence it is challenging to see how economic growth can expand without providing sufficient fund for the education sector

Danacica, Belascu and Ilie [9] studied the casual relation between higher education and economic growth in Romania from 1980 to 2008. They have using Vector Auto Regression (VAR) model and Granger causality test in their research to analyze the more than 20 years of data. For the result, they outcome with empirical evidence of a long run relationship between higher education and gross domestic product per capita in during the analyzed period in Romania. Several studies employed the Generalized Methods of Moments (GMM) to analyze the relationship between education and economic growth [23]. Seetanah [23] investigated the empirical link between education and economic performance in 40 African countries for the time period in 20 years of 1980 to 2000. He has used Cobb-Douglas production function, Generalized Methods of Moments (GMM) and growth equation as analysis method in his research. According to his analysis, he found that education has been an influential element in the economic growth process in developing countries and the optimistic link had found in the literature. An observation had estimated the result is lower from similar studies. Kuo and Yang [13] has examined how and to what degree of knowledge capital and technology spillover is a factor to regional economic growth in China. To determine the relationship among the education and economic growth, they have applied the Cobb-Douglas production function and GMM method in their research. They testified that both of the internal source of in-house R&D and external source of technology imports, indeed have significantly positive impacts on accelerating economic growth. Technology is one of the factors that determine the economic growth in education

4.0 Methodology:

This study conducted an empirical analysis on the variables, namely, real gross domestic product, primary, secondary, tertiary and no formal education. Data from 1982 to 2011 were collected to determine the relationship between the educational attainment and economic growth. Equation 1 expresses the estimating equation used in this study:

$$GDP_t = \beta_0 + \beta_1 Primary_t + \beta_2 Secondary_t + \beta_3 Tertiary_t + \beta_4 NO_t + \varepsilon_t \quad (1)$$

Where GDP_t is real gross domestic product, $Primary_t$ is the number of labor force who have primary education , and Secondary is the number of labor force who have secondary education, Tertiary is the number of labor force who have tertiary education, NO is labour force who have no formal education and ε is stochastic. To obtain the best results, the equation must show all variables to determine the percentage of change in the dependent variable when the independent variable changes approximately by one percent.

$$\ln GDP_t = \beta_0 + \beta_1 \ln Primary_t + \beta_2 \ln Secondary_t + \beta_3 \ln Tertiary_t + \beta_4 \ln NO_t + \varepsilon_t \quad (2)$$

4.1 Unit Root Test:

Unit root test is to determine the stationary and non-stationary property of each variable. All variables must be tested in the levels and in the first difference. Consider the equation below:

$$\Delta Y_t = \beta_{1+} \beta_2 t_+ \delta Y_{t-1} + \alpha \sum_{i=1}^{p} \Delta Y_{t-1} + u_t \quad (3)$$

where Y is our variable of interest, Δ is t the time trend and the difference operator, t is the time trend, P is the number of lagged term and u is the white noise residual of zero mean and constant mean and constant variance. ($\alpha_1,\alpha_2,\beta_1,...\beta_m$) is a set of parameters to be estimated.

4.2 Co-integration Test:

Co-integration test is used in this study to examine the long-run relationship between all variables. Consider the following levels of VAR, with X_t defined as the log of population, energy consumption and GDP.

$$X_t = c + \sum_{j=1}^{p} \Gamma_j \Delta X_{t-j} + \varepsilon_j \quad (4)$$

If the variables in X_t are I(1), the VAR in Eq. (4) is not stationary. If no co-integration exists, statistical inference is not possible by using the usual tests. Given this condition, the difference of the series should be determined and a first difference VAR of the form should be estimated

$$\Delta X_t = c + \sum_{j=1}^{p} \Gamma_j \Delta X_{t-j} + \varepsilon_j \quad (5)$$

Integration vectors give rise to the stationary variable. If this is the case, the VAR in Eq. (5) can be written as

$$X_t = c + \sum_{j=1}^{p} \Gamma_j \Delta X_{t-j} + \prod X_{t-1} + \varepsilon_t \quad (6)$$

In Eq. (6), II is a rank *r* matrix that can be divided as

$$\prod = \alpha\beta' \quad (7)$$

where α is a 3 × *r* loading matrix and β is a 3 × *r* matrix of co-integrating vectors, *r* being the number of co-integrating vectors. Following the Johansen procedure (Ighodaro, 2010), the number of co-integrating vectors were tested by using the co-integrated VAR as in Eq. (6).

4.3 Granger Causality Test:

The Granger causality test is to investigate the causal relationship between two variables. If the p value of the variable Y is significant, it can be concluded that X does have Granger cause to Y and vice versa. The test is based on the equation below.

$$Y_t = \gamma_0 + \sum_{z=1}^{p} \gamma_z Y_{t-z} + \sum_{i=1}^{q} \lambda_i X_{t-1} + \mu_t \quad (8)$$

$$X_t = \varphi_0 + \sum_{z=1}^{p} \delta_z X_{t-z} + \sum_{i=1}^{q} \Psi_i Y_{t-1} + \varepsilon_t \quad (9)$$

where *Yt* and *Xt* are the variables used, μ_t and ε_t are the error terms, and *t* is the time period *z* and *i's* are the number of lags. The null hypothesis is $\lambda_i = \Psi_i = 0$ for all *i*. In the alternative hypothesis that $\lambda_i \neq 0$ and $\Psi_i \neq 0$ for at least some *i's* if the coefficient λ_i are significant but Ψ_i are not significant, then *X* does Granger causal to *Y*. However, if both coefficients are significant, then causality runs both directions

5.0 Findings:

Table 1 shows the results of unit root tests based on the Augmented Dickey Fuller (ADF). The results show that all the variables of real gross domestic product, non formal, primary, secondary and tertiary education are non-stationary in the level with constant and constant with trend. But in the first difference test, the results for all variables show that they are significant at one percent, suggesting that all the variables are stationary. The

null hypothesis is rejected and the alternative hypothesis is accepted. Therefore, Johansen co-integration can be performed

Table 1: Unit Root Test.

	Intercept		Intercept + Trend	
	Level	First Difference	Level	First Difference
No Formal Education (NO)	-0.3933 (0.8977)	-4.3032* (0.0026)	-2.2373 (0.4545)	-5.6332 (0.0000)*
Primary Education (PE)	-1.7422 (0.4004)	-6.4441* (0.0000)	-2.5941 (0.2853)	-5.1056* (0.0017)
Secondary Education (SE)	1.5296 (0.9990	-5.4084 (0.0001)*	-2.0916 (0.5271)	-6.3031* (0.0001)
Tertiary Education (TR)	-0.2911 (0.9147)	-5.1270* (0.0003)	-2.7166 (0.2376)	-5.0828* (0.0017)
Gross Domestic Product (GDP)	-0.9933 (0.7422)	-4.2965* (0.0023)	-1.0956 (0.9126)	-4.3128** (0.0103)

Note: *, ** and *** indicates the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significance level.

The optimal lag selection was conducted based on the Akaike Information Criterion (AIC) and it is shown in Table 2. The lag length for the Johansen co-integration test minimizes the AIC. Lag 3 was selected. Johansen co-integration is then applied. The results are shown in table 3 that one co-integrating equation exists at 5%. Therefore, the results show that both Maximum Eigen Statistic and Trace Statistic are presence in Malaysia economy at 5 percent levels among the two variables. It is means that, the long-run equilibrium relationship between no formal education, primary education, secondary education, tertiary education and GDP do exist.

Table 2: Co-integration Test.

Rank	Max-Eigen Statistic	Critical Value (Eigen) at 5%	Trace Statistic	Critical Value (Trace) at 5%
r = 0	37.7804*	33.8769	96.2844*	69.8189
r ≤ 1	31.9511	27.5843	58.5040	47.8561
r ≤ 2	16.9511	21.1316	26.5530	29.7970
r ≤ 3	8.4803	14.2646	9.6018	15.4947
r ≤ 4	1.1215	3.8415	1.1214	3.8415

L.R test indicates one co-integrating equation at the 0.05 level

Since the Co-integration Test cannot be used to define the direction of the relationship between the variables, Pairwise Granger Causality test is conducted to determine whether the pair of time series data has a correlation or not (causal between 2 variables).

Table 3: Pairwise Granger Causality Test.

Null Hypothesis	Obs.	F-Statistic	Prob.
Secondary Education does not granger cause Tertiary Education Tertiary Education does not granger cause Secondary Education	27	0.1282 1.6353	0.9423 0.2129
GDP does not granger cause Tertiary Education Tertiary Education does not granger cause GDP	27	0.8230 0.7850	0.4965 0.5163
Primary Education does not granger cause Tertiary Education Tertiary Education does not granger cause Primary Education	27	1.1518 3.6423**	0.3526 0.0303
No Formal Education does not granger cause Tertiary Education Tertiary Education does not granger cause No Formal Education	27	1.5706 0.8031	0.2277 0.5068
GDP does not granger cause Secondary Education Secondary Education does not granger cause GDP	27	2.0088 4.0813**	0.1451 0.0206
Primary Education does not granger cause Secondary Education Secondary Education does not granger cause Primary Education	27	0.2197 1.5869	0.8815 0.2239
No Formal Education does not granger cause Secondary Education Secondary Education does not granger cause No Formal Education	27	0.9253 2.4865	0.4467 0.0900
Primary Education does not granger cause GDP GDP does not granger cause Primary Education	27	2.4972 1.5011	0.0891 0.2448
No Formal Education does not granger cause GDP GDP does not granger cause No Formal Education	27	3.2594** 1.7958	0.0430 0.1804
No Formal Education does not granger cause Primary Education Primary Education does not granger cause No Formal Education	27	3.5364** 0.7326	0.0334 0.5447

This study used various forms of proxies for education attainment. Table 6 presents the pairwise Granger causality among no formal, primary, secondary and tertiary education and real GDP. The results indicate that tertiary and primary education do not Granger cause GDP, and vice versa. However, no formal and tertiary education do Granger cause GDP without feedback.

Conclusion:

This paper investigated the relationship between educational attainment and economic growth in Malaysia. The data from 1982 to 2011 were collected. The ADF unit root test was employed. All variables were found to be non-stationary in level and stationary in first difference. Johansen co-integration model was then applied and showed that a relationship exists between various educational attainment and economic growth. Co-integrating the equation of economic growth yields a negative coefficient and significance. This result confirms that a relationship exists among the variables in the long term. Finally, the Granger causality tests was conducted and the results show that tertiary and no formal education can have an effect on economic growth while the other level of education do not contribute to the economic growth. This paper will be instrumental in the formulation of policies to ensure that economic growth can be enhanced. The government should increase the investment on education to have an increase in the economic growth. Investments in education can have a desirable impact on the greater employment opportunities and higher lifetime earnings. Therefore, it can create greater employment opportunities and higher lifetime earnings yield to increase total output of goods and services. Although this study has achieved its aims, there were unavoidable limitations. First, this study does not consider other variables such as capital to avoid the omitted variable bias. Second, the existence of structural breaks is ignored in this study while testing for unit root which may be misleading the results. Therefore a test for unit root should include structural breaks.

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