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Human capital and economic growth: Empirical evidence from Malaysia

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ABSTRACT: The objective of this paper is to estimate the long and short run relationship between human capital and economic growth in Malaysia. The study applies rigorous empirical testing to test the validity of the model. Data derived from different sources undergo unit root tests to ensure stationarity at level or first difference. It also utilizes cointegration test, error correction model (ECM), short-run granger causality, variance decomposition and impulse response function to analyze the impact of human capital on economic growth in the long and short run. The results confirmed that education, government expenditure and economic growth have long run relationships. The results of successful human capital development will not be seen in an instant, but rather over a period of time. In line with Malaysia's aspiration to become a high income nation in 2020, efforts must be intensified in developing its human capital.

1 INTRODUCTION

Malaysia's success today is in large partly due to the priority we have given to the development of human capital in the national strategic planning since the early 1990s. Through Vision 2020, Malaysia has declared that, "Our People are Our Ultimate Resource". Since then, the country has given top priority in developing this ultimate resource. Basically, physical development is very important for a developed nation. However, we cannot forget the importance of developing our human resources. The purpose of this study is to investigate the long run and short run relationships between Human Capital and Growth in Malaysia by using time series econometric techniques i.e. the unit root test, cointegration test, error correction model (ECM), short-run granger causality, variance decomposition and impulse response function. The cointegration analysis is becoming more important in time series analysis, since it indicates the possibility of integration and cointegration among the variables in the long run relationship.

2 LITERATURE REVIEW

Human capital is generally believed to play a crucial role in the process of economic growth. Hers (1998) said growth accounting uses the accumulation of production factors to explain economic growth. Growth of GDP is adjusted for growth of the input of the raw production factors labour and capital. The residual of this exercise is the increase in total factor productivity.

According to Bergheim (2005) of the Deutsche Bank Research, human capital is the sum of the abilities and knowledge of individuals. It measuresthe quality of the labour supply and can be accumulated through education, further education and experience. Education is an investment in human capital, while learning is the process of acquiring knowledge or skills through study, experience or teaching. Many authors have discussed the issue of human capital in relation with economic growth. They agree with some of the work which argued that using different human capital proxies in explaining the economic growth will end up with different conclusions. The conclusion can be that human capital contributes either positively or negatively to economic growth.

Romer (1990), using literacy rate, found that human capital contribution is positively significant. Benhabib and Spiegel (1994) argue that literacy rate does not represent a stock variable of human capital and this creates problems in the empirical evidence. They suggest instead school enrolment as the best proxy for human capital. But again, the use of this proxy is debatable. By using school enrolment, Benhabib and Spiegel (1994) found that human capital is negatively correlated to economic growth. However, Mankiw, Romer and Weil (1992) found them to be positively correlated. Previous studies argue that the difference is mainly influenced by the different proxy, data context and methodology used. The discussion of the methodology will be broadly discussed in the next chapter. The study will

capture not only the short run phenomenon, but also the long run relationship between human capital and economic growth.

Jantan and Chen (2005), in their study, tested the role of human capital on output in Malaysia. The estimates for human capital measure show a weak positive impact on GDP. In general, the recent empirical literature on the role of human capital on growth remains inconclusive. The lack of consistency in the existing empirical results is not surprising, given the different proxy measures on human capital.

3 MODEL AND METHODOLOGY

It uses the Cobb-Douglas production function simple growth accounting, which is based on the augmented Solow growth model. In order to generate the differences of the scales among the variables we then use natural log for both sides of the equation. Since this paper also attempts to investigate the influence of government expenditure on education and health, these variables are added to the model. Hence, the model is expressed as follows:

$$\ln Y_t = \alpha + \beta_1 \ln K_t + \beta_2 \ln L_t + \beta_2 \ln EDU_t + \beta_2 \ln POP_t + \beta_2 GOV + \mu_t \quad (1)$$

Real GDP is a macroeconomic measure of the value of output economy adjusted for price changes (that is, inflation or deflation). It is represented by GDP divided by Consumer Price Index (CPI). The other variables which are going to be used are Employed Labour (L), Physical Capital (K) which is represented by Gross Capital Formation divided by Consumer Price Index (CPI). The inclusion of both variables is necessary, since the model is adapted from Cobb-Douglas Model of Economic Growth. Levine and Renelt (1992) also have investigated that both variables are important and should be included in the growth analysis, particularly for the Investment Variable, which is mostly represented by The Gross Capital Formation. In order to acquire the entire amount of capital in Malaysia it involves too much computation and it is very complicated.

The human capital factor that is going to be used in the model is education represented by Gross School Enrolment (EDU) and aggregated by primary, secondary and tertiary years of schooling (Saefullah, 2001). According to Gemmel (1998) and Benhabib-Spiegel (1994), education is the most common used in representing human capital factor. Economists have often resorted to the traditional measures of human capital such as school-enrollment rates (Barro, 1991; Levine and Renelt, 1992; and Levine and Zervos, 1993) and years of schooling (Barro, 1992). Saefullah (2001) mentioned population (POP) should be included in the model because it generates the fluctuations of human capital's contribution to the economic growth. For instance, human capital's contribution to the economic growth may not be affected as population increases even though the human capital investment was increased.

This paper uses annual time series data, based on the Malaysian economy for the period of 1970–2008. The data are extracted from several sources. Gross Domestic Product (GDP), Gross Capital Formation (GCF) and Consumer Price Index (CPI) are taken from United Nation website (http://data.un.org), while Employed Labour (L) is retrieved from Department of Statistics Malaysia. Population in Malaysia (POP) is taken from World Development Indicators. Education factors as representation by human capital factors and Gross School Enrolment and also for the disaggregated Enrolment (Primary, Secondary and Tertiary) are extracted from Educational Planning and Research Division, Ministry of Education. Lastly, Government Expenditure on Education and Health (GOV) are taken from the Department of Statistics Malaysia under the Social Statistics Department.

This study uses Eviews software which is an interactive tool for advanced statistical and econometric analysis.The model applies unit root tests to assess stationary properties of the time series variables. It also utilizes the cointegration test for non-stationary variables at which level they cointegrate. Thus, we can confirm that the regression of the model form is meaningful and it does not lose any valuable long-term information. With the cointegration test, if it indicates that variables are cointegrated, we can conclude that the variables have a long run relationship, and we will proceed with the estimation of the short-run dynamics of the model. In other words, it is the estimation of the error correction model.

The next test is Granger causality test which is to investigate the dynamic interactions between these variables. The test results are based on the bi-variate Granger causality analysis between the variables, we can see whether one variable can cause another variable in this analysis. Thus, aptly, Granger causality is a test of precedence or a test of predictability. The other test is Variance decomposition which measures the percentage of forecast error of variation that is explained by another variable within the short-run dynamics and interactions. Lastly, Impulse response function can give an indication of the causal properties of the system. We can see the results are in line with the variance decomposition and the response of growth to the other variables in the system.

4 EMPIRICAL RESULTS

The result of the ADF and PP Unit Root test; the individual lag is chosen based on SIC. Both tests are conducted with trend and intercept. Except for POP, both ADF and PP tests concur that Y, K, EMP, EDU and GOV are stationary at first difference; they are I(1) at 1%, 5% and 10% confidence level. However, for POP data, the two tests yield slightly different results in term of significance level. The ADF test suggests that it is stationary at first difference at 5% confidence

level. Nevertheless, PP test shows that this variable is stationary at all levels of confidence interval.

This statistical finding shows that all variables which are education, government expenditure, economic growth and other main variables such as physical capital and labor, are not integrated in the first level or integrated of order 0 or I(0). This means that they are not integrated in the present period. The results indicate that human capital contribution to economic growth in Malaysia needs to be seen as a long run contribution rather than a short run one. Since each of the series is stationary, we proceed to examine whether there exists long run equilibrium between economic growth and the independent variables.

Johansen-Juselius Cointegration tests concur in the presence of a long-run equation between variables. Accordingly, these variables are tied together in the long run and their deviations from the long-run equilibrium path will be corrected. The presence of cointegration also rules out non-causality among variables. We also report the cointegrating coefficients in the long-run equation form normalized on GDP(Y):

$$Y=28.91+0.29K3.47EMP+0.145POP+2.22EDU +0.29GOV \quad (2)$$

Based on this long-run equation, there seems to be a positive relationship between GDP, physical capital, population, education and government expenditure on education and health. This result seems to be consistent with Saefullah (2001) when he found evidence of a long-run relationship among GDP, physical capital, education and government expenditure in his analysis using Indonesian data. According to Hers (1998), the education variable is an intermediary input. Referring to the above equation, investment in education may not directly affect the GDP growth in the short run.

The presence of cointegration indicates that at least one of the variables tests react to deviations from the long-run relationship. Here, we investigate whether GDP corrects the disequilibrium.

The dynamic causal link between GDP and the independent variables can be modelled as:

$$\Delta(ly)=h_o+h_{1i}\sum\Delta(lk)_{ti}+h_{2i}\sum\Delta(lemp)_{ti}+h_{3i}\sum\Delta(pop)_{ti} + h_{4i}\sum\Delta(ledu)_{ti} + h_{5i}\sum\Delta(lgov)_{ti} + h_{5i}EC_{t-1} + E_t \quad (3)$$

where EC_{t-1} here is the GDP error term (lagged residual of statistic regression and "Δ" represents the first difference. If the error term is significant, the lagged dependent variables are important in predicting current movement and this also means that the GDP adjusts to the previous equilibrium error and that past macroeconomics variables have significant explanatory power for the current GDP.

Looking at the t-statistics value, the figure shows that it is not significant. It may be due to duration of data; taking annual data instead of quarterly data makes the time span shorter. The other reason is the methodology of collecting data at different time frames will lead to measurement bias. Measurement is never perfect, and we can always expect measurement errors in our data. Our goal, of course, is to keep these errors to a minimum.

After estimating the long-run equilibrium for GDP and any other variables, the next test is Granger causality test which is to investigate the dynamic interactions between variables. The result suggests that the direction of causality is from Y to EDU at 5 percent level of significance. On the other hand, there is no reverse causation from EDU to Y; EDU does not cause Y in the short run, since the result is insignificant.

This result again, verifies Hers' (1998) observation that education enhances economic growth. However the process of education transmission into economic performance needs some adjustment process through a certain period of time, but not in the short term. Regarding government expenditure on health and education, the results show a unidirectional causality from Y to GOV at 1 percent level of significance. In other words, it means that, it is Y that causes GOV; GOV does not cause Y in the short run.

The variance decompositions at 2, 4, 6, 8 and 10 year horizon of each variable. Looking at the interaction between D(LY) and the other variables, we find evidence suggesting the significant role of D(LY) in accounting for variations in other variables. More specifically, there is an increasing trend of D (LEDU) forecast error variance that is attributable to innovations in D(LY) at 1-year to 10-year horizons, from 0.12% to 2.1%. Education does not have a short run impact in the variation of growth, it only shows significant effect at year 10, counting for 2.1% of the variation. Looking at the interaction between growth and government expenditure, its variation in growth at 1-year to 10-year horizons is from 0.03% to 0.10%. The result confirmed that government expenditure may not directly affect GDP growth in the short run.

Meanwhile, the impulse response of D(LY) to other variables in the system and vice versa, is shown in table 4.5. We can see that the results are in line with the variance decomposition. According to the impulse response graph, the respond of D(LY) to D (LEDU), D (LGOV), POP and D (LK) is positive and it is also in line with the result of education with positive coefficient, in the long-run equation.

5 CONCLUSION

This paper examines human capital contribution to the economic growth in Malaysia using a time series analysis. The results confirmed that education, government expenditure in education and health and economic growth have long run relationships. From the long-run equation, there seems to be a positive relationship between economic growth, education and government expenditure on education and health. The results of successful human capital development will not be seen in an instant, but rather over a period of time.

The investment in education may not directly affect the GDP growth in the short run. This statement is

very much in line with the result of Short- run Granger Causality, which shows the direction of causality from economic growth to the education variable. On the other hand, there is no reverse causation from education variable to economic growth; education does not cause economic growth in the short run, since the result was insignificant. Regarding government expenditure on health and education, the results show a unidirectional causality from economic growth to government expenditure. In other words, government expenditure does not cause economic growth in the short run.

The development of human capital has been one of the central strategies in the policy formulation of the Malaysian government. In the Ninth Plan period (2006–2010), efforts were intensified to further develop the country's human capital consistent with the country's aspiration and long-term economic development. A broad range of measures were introduced to improve the access to and quality of education at all levels, to make national schools the school of choice and to produce tertiary institutions of international standing.

It is no surprise then that Malaysia is taking education seriously and has devoted a whole chapter towards it in the 10th Malaysia Plan (10MP) tabled by Prime Minister Najib Tun Razak in Parliament. Developing human capital is the most important investment a country makes and without a talented and creative work force, any country would find it difficult to move forward. The chapter on education in the five-year development plan sets out clearly what the government hopes to achieve so that the people will be able to rapidly and creatively respond to economic changes. The plan is also centred on developing and utilizing knowledge. In this regard, among the specific possible policy measures to be adopted are to: review the education system and shift educational approach from rote learning to creative and critical thinking; reintroduce technical and vocational training colleges in providing skilled workforce; offer intensive training programme for the fresh graduates which encompass workshops, case studies and short attachments with private and public institutions.

The study faces several limitations which include using school enrolment as the proxy for human capital factor. The government expenditure on education and health is included to observe government policies in human capital investment. However, different proxies of human capital variable and economic growth variable may give different results in explaining the relationship between human capital and growth. As a result of that, the explanation of the impact of human capital on growth would be limited to the proxies used. In addition, the data set employed for this study is from 1970–2008, and the results only represent Malaysia. Therefore, analyzing data from different countries may give different outcomes and subject to future research regarding these issues.

The study formulates some suggestions for further research. First, further study may investigate the possible and potential variables which can be included or replaced the previous variables for the improvement of human capital and economic growth analysis. Second, future study may improve the analysis especially in the aspect of research methodology by using other research methods for example: Autoregressive Distributed Lag Model (ARDL) and Dynamic Ordinary Least Squares (DOLS). Finally, given that this study utilizes Malaysia data, the analysis can be further extended to other countries or grouping of countries such as Association of Southeast Asian Nation (ASEAN) and Organization of Islamic Countries (OIC), and investigate if they give similar or different outcomes.

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