

An Empirical Study of Education Expenditure, Health Care Expenditure and Economic Growth in Malaysia using Granger Causality Approach

Wong Sing Yun* and Remali Yusoff

Faculty of Business, Economics and Accountancy, Universiti Malaysia Sabah.

Abstract

Health and education has appeared to be essential factors that contribute in developing the human capital and enhancing the economic growth. Therefore, this paper will empirically analyze the impact of the education expenditure and health care expenditure towards economic growth in Malaysia by employing Pair Wise Granger Causality test. The trend of the public education expenditure and public health care spending time series data over the period of 1980 to 2012 was explored in this study. The empirical findings of the Granger Causality test revealed that there is unidirectional causality that runs from GDP to the public education expenditure. Similarly, a one-way causality was found running from GDP to the public health care spending. The findings of this study may be helpful for the policy-makers to amend the existing policies and budgetary allocation for the health care sector and education sector respectively.

Keywords: *Granger causality test, health care spending, education spending, economic growth.*

1 Introduction

Both the health and education sectors play fundamental roles in contributing to the development of human capital. The importance of these factors contributing towards the improvement of human capital and economic growth has been advocated by Noraina and Nur Azura (2013). According to Rahmah and Selvaratnam (1999), health and education are important determinants that enhance economic growth and development. In the past, there had been many researches that were conducted to investigate the role of education and health care sectors in a country's production level. However, empirical results from the past studies were found to be distinct and contradictory from one another. Although most researches such as Baldacci et al. (2003), Uche et al. (2013), Nasiru and Usman (2012) had tested positive relationship for the variables tested. However, Djafar (2009), Gouden (1967), and Asghar et al. (2012) concluded that there is insignificant relationship found between the education expenditure, health care expenditure on economic growth. The aim of this study will be to investigate the relationship between the education expenditure, health care expenditure and economic growth in Malaysia using the Granger Causality approach.

*Corresponding author Tel.: +60 12 8247308
E-mail address: yunchris37@yahoo.com

This paper will be organized in the following: Section 1.0 begins with a brief introduction on the study. Section 2.0 describes the literature review on the previous researches that were related to this study. Apart from that, Section 3.0 will discuss on the data and methodology employed in this study analysis. Next, Subsection 3.1 will explain on the theoretical model used in the study. Meanwhile, Section 4.0 reveals the result on the empirical study conducted. Finally, Section 5.0 will provide a conclusion on the study conducted.

2 Literature Review

Over the years, numerous studies had been performed on determining the relationship between education expenditure, health care expenditure and economic growth. However, the result of these studies appeared to be distinct and vary for different countries. Some of these early empirical analyses supported the theoretical thinking that an increase of expenditure in education and health care sectors will boost the nation's economic growth. Meanwhile, some studies revealed disputative result which shows insignificant relationship between the variables tested.

Dastidar et al. (2013) stated that the empirical investigations on the relationship between public education expenditure and economic growth have produced mixed findings. Clemente (2004) also stated that the past studies did not have unanimous conclusion regarding the existence of cointegration relationship between the health care expenditure and GDP. Although most studies revealed a significant relationship between the variables, there are some of the studies which reveal otherwise. Tilak (1989) explored the education spending in Latin America and Caribbean region over the period of 1965 to 1980. His study revealed that the GNP per capita and public education expenditure is not significantly related. Meanwhile, a study by Bukenya (2009) did not revealed long run relationship between health care expenditure and economic growth (as measured by the gross state product) in the U.S. states except for the state of Georgia. Faraq et al. (2012) found out that the health spending was not very responsive and sensitive to the income growth.

A study by Muhammad and Rukhsana (2012) discovered triangular causality between the real GDP per capita, per capita education expenditures and per capita health expenditures in Pakistan. Rahman (2011) indicated a significant positive relationship between health expenditure, education expenditure and economic growth in Bangladesh. Meanwhile, Mohd Yahya et al. (2012) also discovered a long-run relationship between the government education expenditure and economic growth in Malaysia. In another study by Noraina and Nur Azura (2013), they revealed significant relationship between economic growth and public social services expenditure (which include education expenditure and health care expenditure) with human capital

indicators in Malaysia. Such studies implied that the increase of public expenditures in education and health care will in turn generate higher economy growth.

Chandra (2011) had earlier applied the same approach to investigate the causal relationship between education expenditure and economic growth in India. It was found out that the causal relationship that runs from economic growth to education expenditure takes place immediately irrespective of the time lag. However, the reverse causal relationship that runs from education expenditure to economic growth takes longer time lag to have effect. Omojimit (2010) revealed uni-directional causal relationship that runs from public education expenditure to economic growth but the reverse did not take place in Nigeria. Yousif (2008) discovered a bi-directional causality between education expenditure and economic growth across the six GCC economies. Similarly, Nasiru and Usman (2012) also tested a bi-directional causality between the health care expenditure and economic growth in Nigeria. However, Morgado (2013) discovered that GDP causes health while health does not affect economic growth in Portugal. Rahman (2011) revealed bi-directional causality between education expenditure and economic growth. Meanwhile, uni-directional causality is found between health care expenditure and economic growth in Bangladesh.

3 Data and Methodology

In this study, the data for the variables of gross domestic product (GDP), education expenditure (EDU), health care expenditure (HEA), labour force participation rate (LBR) and gross fixed capital formation (GFC) will be used. The data for the respective variables was obtained from the world development indicators (World Bank, 2014) and Economic Planning Unit (EPU, 2013) over the period of 1980 until 2012. Firstly, unit root tests are carried out to determine the stationary of the data. Next, lag order selection based on the unrestricted Vector Autoregressive (VAR) model is performed. The integration test and lag selection test is conducted since it is pre-requisite in Granger Causal test. Finally, the Pair Wise Granger Causality test is conducted to determine the granger causal relationship between the variables.

Theoretical Model

The model of this study will be based on the following production function:

$$Y_t = (A_t, L_t, K_t) Y_t = (A_t, L_t, K_t) \quad (1)$$

Whereby; $Y_t Y_t$ = total output, $A_t A_t$ = total factor productivity, $L_t L_t$ = labour and $K_t K_t$ = capital stock

The Log-Linear regression model developed based on the production function is as follow:

$$\ln GDP = \beta_0 + \beta_1 \ln EDU + \beta_2 \ln HEA + \beta_3 \ln LBR + \beta_4 \ln GFC + \varepsilon_t$$

$$\ln GDP = \beta_0 + \beta_1 \ln EDU + \beta_2 \ln HEA + \beta_3 \ln LBR + \beta_4 \ln GFC + \varepsilon_t \quad (2)$$

Whereby; *GDP* = Real Gross Domestic Product, *EDU* = Public Expenditure on Education, *HEA* = Public Expenditure on Healthcare, *LBR* = Labor Force Participation Rate, *GFC* = Gross Fixed Capital Formation and ε_t = Error Correction Term.

4 Empirical Result

The result of the unit root tests, Augmented Dickey Fuller (ADF) and Phillips Perron (PP) as shown in Table 1 and Table 2 revealed that the data is stationary at first difference.

Table 1 Augmented Dickey Fuller (ADF) test result

| Augmented Dickey Fuller (ADF) Test | | | | |
|------------------------------------|-------------|---------------------|------------------|---------------------|
| Variable | Level | | First Difference | |
| | Intercept | Trend and Intercept | Intercept | Trend and Intercept |
| LNGDP | -1.013113 | -1.172681 | -4.559265* | -4.564542* |
| LNEDU | -0.775484 | -3.328250*** | -4.248613* | -4.169137** |
| LNHEA | -0.884554 | -3.718921** | -4.272216* | -4.188076** |
| LNLBR | -3.345650** | -4.952245* | -8.280137* | -8.187709* |
| LNGFC | -0.988856 | -1.682581 | -3.973163* | -3.877977** |

*Significant at 1% significance level, **Significant at 5% significance level, *** Significant at 10% significance level

Table 2 Philip-Perron (PP) test result

| Phillips Perron (PP) Test | | | | |
|---------------------------|------------|---------------------|------------------|---------------------|
| Variable | Level | | First Difference | |
| | Intercept | Trend and Intercept | Intercept | Trend and Intercept |
| LNGDP | -0.971279 | -1.364033 | -4.567684* | -4.573509* |
| LNEDU | -1.246583 | -2.205881 | -4.185404* | -4.047444** |
| LNHEA | -1.331825 | -2.518709 | -3.949278* | -3.858175** |
| LNLBR | -4.569539* | -4.952245* | -8.497616* | -8.187709* |
| LNGFC | -0.988856 | -1.915017 | -3.911085* | -3.809640** |

*Significant at 1% significance level, **Significant at 5% significance level, *** Significant at 10% significance level

Meanwhile, the result of the lag order selection based on the unrestricted Vector Autoregressive (VAR) model suggested lag order 2. The following Table 3 showed the VAR lag order selection criterion with Akaike's Information Criterion being the lowest value. Hence, the lag order 2 will be used as suggested in the following Pair-Wise Granger Causality test. The following Table 3 showed the VAR lag order selection criteria. Table 4 illustrated the Pair-Wise Granger Causality test result.

Table 3 VAR Lag Order Selection Criteria

| VAR Lag Order Selection Criteria | | | | | | |
|----------------------------------|----------|-----------|-----------|------------|------------|------------|
| Lag | LogL | LR | FPE | AIC | SC | HQ |
| 0 | 167.3422 | NA | 1.95e-11 | -10.47369 | -10.24240 | -10.39830 |
| 1 | 312.1644 | 233.5842* | 8.76e-15* | -18.20416 | -16.81643* | -17.75179* |
| 2 | 337.5192 | 32.71583 | 9.81e-15 | -18.22704* | -15.68287 | -17.39771 |

* indicates lag order selected by the criterion

LR: sequential modified LR test statistic (each test at 5% level)

FPE: Final prediction error

AIC: Akaike information criterion

SC: Schwarz information criterion

HQ: Hannan-Quinn information criterion

Table 4 Pair-Wise Granger Causality Test Result

| Granger Causal Relationship between Education Expenditure and Economic Growth | | |
|---|-------------|---------|
| Null Hypothesis | F-statistic | Prob. F |
| LNEDU does not Granger Cause LNGDP | 0.14488 | 0.8658 |
| LNGDP does not Granger Cause LNEDU | 5.73475 | 0.0086 |
| Granger Causal Relationship between Health Care Expenditure and Economic Growth | | |
| Null Hypothesis | F-statistic | Prob. F |
| LNHEA does not Granger Cause LNGDP | 0.32296 | 0.7269 |
| LNGDP does not Granger Cause LNHEA | 6.93717 | 0.0039 |

The above result showed that the p-value of the F-statistic (0.8658) is greater than 5 per cent significance level. Therefore, the null hypothesis of LNEDU does not Granger Cause LNGDP is not rejected. However, the p-value for the null hypothesis of LNGDP does not Granger Cause LNEDU is 0.0086 which is less 0.05. As a result, the null hypothesis is rejected at 5 per cent significance level. Thus, it can be concluded that there is unidirectional causality that runs from GDP to education expenditure.

The p-value for the null hypothesis of LNHEA does not Granger Cause LNGDP is 0.7269 which is greater than 0.05. This means the null hypothesis is not rejected at 5 per cent significance level. Meanwhile, the p-value for the null hypothesis LNGDP does not Granger Cause LNHEA is 0.0039 is less than 0.05. Hence, the null hypothesis is rejected at 5 per cent significance level. As such, it can be summarized that there is unidirectional causality that runs from GDP to health care expenditure. According to Chor (2010), there should be at least one causation direction between the variables to prove the existence of a long run relationship.

The following Figure 1 will illustrate the granger causality relationship as depicted by the Pair-Wise Granger Causality test result.

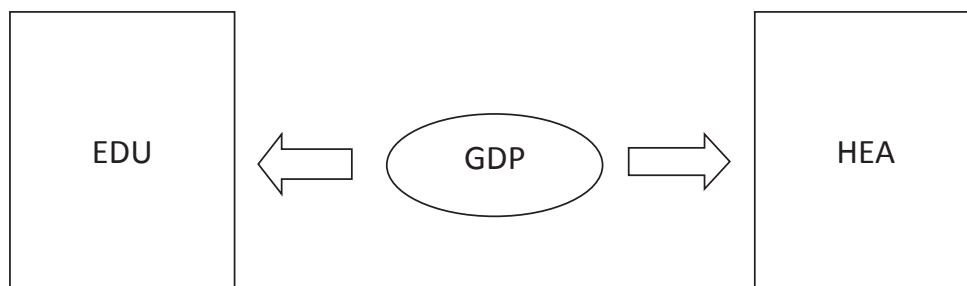


Figure 1 Granger Causal Relationship

5 Conclusion

The Pair-Wise Granger Causality test indicated a unidirectional causality relationship that runs from GDP to the education expenditure. Similarly, a one-way causal relationship is found from the GDP to the health care expenditure. The implication of this finding is that GDP affect both the education expenditure and health care expenditure. This means the performance of GDP is essential in determining the education expenditure and health care expenditure. The existence of unidirectional causal relationship between the variables further proved the presence of long run relationship. However, a reverse causal relationship is not found from education expenditure to GDP and from health care expenditure to GDP. This may suggest that education expenditure and health care expenditure does not appear to have significant effects on the country's economic growth. Such insignificant result may suggest that public health care expenditures and education expenditures may be slow in producing the expected improvement to the economic growth. Such result may be consistent with Baldacci et al. (2003) which suggested that there are significant lags between implementation of social policies in the education and health care sectors and improvements in these sectors. As such, it is essential for the Government to revise the efficiency and transparency of the budgetary allocation for the education and health care sectors so as to ensure that these allocations are fully utilized for the economy growth. Besides that, policy makers may need to implement policy that can enhance the facilities of the education and health care sectors. In addition, the private sectors can also be encouraged to contribute in the education and health care sectors so that the Government's financial burden can be alleviated. Moreover, policy should be introduced to retain the educated and healthy workforce so that they can contribute to the country's economic growth.

References

- Asghar, N., Hussain, Z., & Rehman, H.U. (2012). The impact of government spending on poverty reduction: Evidence from Pakistan 1972 – 2008. *African Journal of Business Management*. 6 (3): 845 – 853.
- Baldacci, E., Guin-Siu, M.T., & Mello, L.D. (2003). More on the effectiveness of public spending on health care and education: A covariance structure model. *Journal of International Development*. 15: 709 – 725.
- Bukenya, J. (2009). Do fluctuations in health expenditure affect economic growth? *The Open Economics Journal*. 2: 31 – 38.
- Chandra, A. (2011). Nexus between government expenditure on education and economic growth: empirical evidences from India. *Revista Romaneasca pentru Educatie Multidimensionala*. (6): 73 – 85.
- Chor, F. T. (2010). The Determinants of Health Expenditure in Malaysia: A time series analysis. *MRPA Paper No. 24356*. Economic Programme, School of Sciences. Universiti Sains Malaysia.
- Clemente, J., Marcuello, C., Montanes, A. & Pueyo, F. (2004). On the international stability of health care expenditure functions: Are government and private functions similar? *Journal of Health Economics*. 23 (3): 589 – 613.
- Dastidar, S.G., Mohan, S. & Chatterji, M. (2013). The relationship between public education expenditure and economic growth: The case of India. *Scottish Institute for Research in Economics Discussion Paper*.
- Djafar, F. (2009). Economic growth, public expenditure and human development in Asia. *Prosiding PERKEM IV*. 1: 77 – 88.
- Economic Planning Unit. (2013). Retrieved from <http://www.epu.gov.my/public-sector>.
- Faraq, M., Nandakumar, A.K., Wallack, S., Hodgkin, D., Gaumer, G. & Erbil, C. (2012). The income elasticity of health care spending in developing and developed countries. *International Journal of Health Care Finance and Economics*. 12 (2): 145 – 162.
- Gounden, A.M.N. (1967). Investment in education in India. *The Journal of Human Resources*. 2 (3): 347 – 358.
- Mohd Yahya Mohd Hussin, Fidlizan Muhammad, Mohd Fauzi Abu @ Hussin & Azila Abdul Razak. (2012). Education expenditure and economic growth: A causal analysis for Malaysia. *Journal of Economics and Sustainable Development*. 3(7): 71 – 81.
- Morgado, S. M. A. (2014). Does health promote economic Growth? Portuguese case study: From dictatorship to full democracy. *The European Journal of Health Economics*. 15 (6): 591 – 598.
- Muhammad, S.H. & Rukhsana, K. (2012). The triangular causality among education, health and economic growth: A time series analysis of Pakistan. *World Applied Sciences Journal*. 18 (2): 196 – 207.
- Nasiru, I. & Usman, H. M. (2012). Health expenditure and economic growth nexus: An ARDL approach for the case of Nigeria. *Journal of Research in National Development*. 10 (3): 95 – 100.
- Noraina Mazuan Sapuan & Nur Azura Sanusi. (2013). Cointegration analysis of social services expenditure and human capital development in Malaysia: A bound testing approach. *Journal of Economic Cooperation and Development*. 34 (1): 1 – 18.
- Omojimiti, B. U. (2010). Education and economic growth in Nigeria: A Granger Causality Analysis. *African Research Review*, 4 (3a): 90 – 108.

- Rahmah, I. & Selvaratnam, D.P. (1999). Health, education and economic growth in Malaysia. *IUM Journal of Economics & Management*. 7 (2): 1 – 15.
- Rahman, M. M. (2011). Causal relationship among education expenditure, health expenditure and GDP: A case study for Bangladesh. *International Journal of Economics and Finance*. 3 (3): 149 – 159.
- tilak, J. B. G. (1989). The recession and Public Investment in Education in Latin America. *Journal of Interamerican Studies and World Affairs*. 31(1/2): 125 – 146.
- Uche, E., Ihugba, O.A. & dNwosu, C. (2013). Causal relationship between Nigeria government budget allocation to the education sector and economic growth. *Discourse Journal of Education Research*. 1 (8): 54 – 64.
- World Bank. (2014). Retrieved from <http://data.worldbank.org/country/malaysia>.
- Yousif, K. A. (2008). Education expenditure and economic growth: Some empirical evidence from the GCC countries. *The Journal of Developing Areas*. 42 (1): 69 – 80.

Appendix A

Pairwise Granger Causality Tests

Date: 05/09/15 Time: 14:25

Sample: 1980 2012

Lags: 2

| Null Hypothesis: | Obs | F-Statistic | Prob. |
|--|-----|--------------------|------------------|
| LNEDU does not Granger Cause LNGDP LNGDP does not Granger Cause LNEDU | 31 | 0.14488 5.73475 | 0.8658 0.0086 |
| LNHEA does not Granger Cause LNGDP LNGDP does not Granger Cause LNHEA | 31 | 0.32296 6.93717 | 0.7269 0.0039 |
| LNLBR does not Granger Cause LNGDP LNGDP does not Granger Cause LNLBR | 31 | 0.03480 2.71676 | 0.9658 0.0848 |
| LNGFC does not Granger Cause LNGDP LNGDP does not Granger Cause LNGFC | 31 | 0.35203 2.72941 | 0.7066 0.0839 |
| LNHEA does not Granger Cause LNEDU LNEDU does not Granger Cause LNHEA | 31 | 1.83573 3.11470 | 0.1796 0.0613 |
| LNLBR does not Granger Cause LNEDU LNEDU does not Granger Cause LNLBR | 31 | 0.25635 1.63116 | 0.7758 0.2151 |
| LNGFC does not Granger Cause LNEDU LNEDU does not Granger Cause LNGFC | 31 | 1.60263 0.36959 | 0.2206 0.6946 |
| LNLBR does not Granger Cause LNHEA LNHEA does not Granger Cause LNLBR | 31 | 2.49749 1.31160 | 0.1018 0.2866 |
| LNGFC does not Granger Cause LNHEA LNHEA does not Granger Cause LNGFC | 31 | 1.64989 1.17530 | 0.2116 0.3246 |
| LNGFC does not Granger Cause LNLBR LNLBR does not Granger Cause LNGFC | 31 | 1.08751 0.53547 | 0.3519 0.5917 |

