

Analysing the effects of selected economic indicators on education and on the causality between education and economic growth of the Philippines

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ABSTRACT:

The study estimates the impact of inflation, unemployment and population on the education in the Philippines. This study determines the causality between the education expenditure and GDP. This study used the structural stability test to examine the stability of the coefficients of the model between different time periods despite the economic environment in previous years. Findings show that education expenditure granger causes economic growth as what introduced by the endogenous growth theory which emphasized the importance of education on economic growth, in estimating education on the economic growth of the Philippines as

education conduit for accumulation of human capital that will have an effect to economic growth. This shows the value of the educated labor force in the Philippine economy, even though the study encountered difficulty in gathering data, specifically for education expenditure as a consequence of limited data published by the government. Findings also show that population and unemployment are statistically significant on education expenditure while inflation is statistically insignificant. This suggests that high demand in education due to an increase in population and unemployment will increase the education expenditure.

Keywords: education expenditure, economic growth, population, unemployment, causality

Introduction

Education plays an important role in the economy, particularly in the development process, as education fortifies the competitiveness of available labor in the market¹. Investing in human capital (education) is considered as a primary

foundation in achieving a particularly level of economic development², particularly for emerging and developing economies. Education provides opportunities for employment and therefore, generates revenue for the country as this boosts aggregate spending. As the endogenous growth theory aptly states, economic growth caused by

¹ Afzal, M., Rehman, H.U., Farooq, M.S. & Sarwar, K. (2011). Education and economic growth in Pakistan: A cointegration and causality analysis. *International Journal of Educational Research*, 50, 321-335.

² Hassan, S. & Ahmed H. (2008). Education's contribution to the economic growth of Sub-Sahara Africa. *Southwestern Economic Review*, 1(32), 175-190.

accumulating human capital from education, and from having technical innovation can be highly substantial and sustainable for economic productivity³; and that faster growth of human capital leads to faster economic growth in the general level⁴. Education positively contributes to higher social returns and is associated with positive externalities, as well as with the benefits reflected in higher productivity⁵. Additionally, Wu, Tang, and Lin⁶ reiterated that education expenditure contributes to productivity growth. The role of education in a nation's path to development cannot be taken for granted as labour productivity depends on education and that in due course, the individual's educational opportunities and attainment affects household income and economic growth⁷.

Education expenditure, as contained in World Bank Report in 2013 showed that for the years 2006 to 2012, the Philippines with a share of per capita GDP per student of 9.1 percent was in the 9th spot out of the 10 countries with the lowest share of per capita GDP per student in secondary level. While other ASEAN countries such Cambodia, Brunei Darussalam, and Indonesia had 6.8, 7.8, 8.8 percent respectively were ranked 3rd, 5th, and 7th. This report shows that even if the education expenditure is high, if the population or the number of students is also high, then the GDP per capita per student will tend to be lower. The proportion of the

education expenditure is insufficient to the total number of students.

Education expenditure in the Philippines is essentially accounted for by both the government and the private sector. As stated in the first argument, if demand for education increases as population increases, then financing for education eventually increases. Financing for education and increases in education expenditure can both lead to global economic advantages⁸. However, Hwang⁹, having used real GDP per capita and population density as influencing factors on education expenditure, revealed that increasing education expenditure is due to high costs, and that education expenditure can be influenced by inflation.

Adhering to the common economic adage that both human capital investments and public spending have effects on a country's output, policymakers believe that investing more in human capital, e.g. increasing education expenditure, promotes growth¹⁰. This diverges from what the World Bank Report of 2011 revealed that Philippine education expenditure has been declining, measured as a percentage of GDP and as the share of government expenditures, when compared to how much other countries in the region have been spending (e.g. Indonesia and Vietnam). The report showed a decline in the national budget allocated for the Department of Education (DepEd) from 18 to 14 percent.

The World Bank Report in 2009 stated that Philippine spending on education was only \$110 per student for one school year, compared to Thailand

³ Jalil, A. & Idrees, M. (2013). Modeling the impact of education on the economic growth: Evidence from aggregated and disaggregated time series data of Pakistan. *Economic Modelling*, 31, 383-388.

⁴ Grimm, M. (2005). Educational policies and poverty reduction in Cote d'Ivoire. *Journal of Policy Modeling*, 27, 231-247.

⁵ Vu, T.B., Hammes, D.L. & Im, E.I. (2012). Vocational or university education? A new look at their effects on economic growth. *Economics Letters*, 117, 426-428.

⁶ Wu, S.Y., Tang, J.H. & Lin, E.S. (2010). The impact of government expenditure on economic growth: How sensitive to the level of development? *Journal of Policy Modeling*, 32, 804-817.

⁷ Afzal, M., Farooq, M.S., Ahmad H.K., Begum, I. & Quddus, M.A. (2010). Relationship between school education growth in Pakistan ARDL bounds testing approach to cointegration. *Pakistan Economic and Social Review*, 48(1), 39-60.

⁸ Tarabini, A. (2010). Education and poverty in the global development agenda: Emergence, evolution and consolidation. *International Journal of Educational Development*, 30, 204-212.

⁹ Hwang, J. (2005). Asset distribution and tertiary education expenditure in developing countries. *Economics of Education Review*, 24, 171-178.

¹⁰ Pina, A.M. & St. Aubyn, M. (2005). Comparing macroeconomic returns on human and public capital: An empirical analysis of the Portuguese case (1960-2001). *Journal of Policy Modeling*, 27, 585-598.

and Singapore which has \$853 and \$1800 respectively.

But, as we have seen the benefit of getting better quality education, what will be the implications of this to inflation, as demand for education increases, while the cost of education continues to rise as well. This paper examines the causality between education and GDP. Further, it also includes in the analysis the influence of price changes, unemployment, and population to education.

Literature Review

Jalil and Idrees¹¹ explained that expanded the neoclassical growth model of Mankiw regarding human capital accumulation from education as an input in achieving economic growth. While endogenous growth theories regard human capital accumulated from education as affecting the outcome of economic growth, by resulting to an efficient labor force, Tang and Yin¹² emphasized on the importance of education expenditure. An educated labor force is able to adapt to changes in technology, is able to communicate better and makes for better absorption of imported technology which is vital for developing economies¹³.

This was for the reason that increasing education expenditure and investing more in human capital were the preconditions to improve productivity that will lead to positive economic performance¹⁴. In this scenario, since workers are

more likely to find jobs when educated¹⁵, unemployed workers have been trying to obtain education in order to become more competitive and acquire higher-paying jobs as education positively affect workers' wages¹⁶. Biagi and Lucifora¹⁷ suggested that an increase in educational attainment was associated to a decline in the unemployment rate as individuals acquire jobs. In the study of Adsera and Boix¹⁸ the negative relationship of education and unemployment was also brought to light. Kaas and Zink¹⁹ argued that unemployment may affect skill accumulation as human capital becomes idle during the unemployment period or waiting period. Additionally, Grimm²⁰ stated that because of unemployment, the motivation to acquire human capital is strong, likewise, as industries demand for more educated workers, this encourages the population to acquire or to invest in education²¹.

Sano and Tomoda²² showed that it was important to look into the design of the educational

¹¹ Jalil, A. & Idrees, M. (2013). Modeling the impact of education on the economic growth: Evidence from aggregated and disaggregated time series data of Pakistan. *Economic Modelling*, 31, 383-388.

¹² Tang, H.W.V. & Yin, M.S. (2012). Forecasting performance of grey prediction for education expenditure and school enrolment. *Economics of Education Review*, 31, 452-462.

¹³ Hassan, S. & Ahmed H. (2008). Education's contribution to the economic growth of Sub-Sahara Africa. *Southwestern Economic Review*, 1(32), 175-190.

¹⁴ Gounder, R. & Xing, Z. (2012). Impact of education and health on poverty reduction: Monetary and non-monetary evidence from Fiji. *Economic Modelling*, 29, 787-794.

Asteriou, D. & Agiomirgianakis, G.M. (2001). Human capital and economic growth Time series evidence from Greece. *Journal of Policy Modeling*, 23, 481-489.

¹⁵ Abbott, A. & Jones, P. (2012). Government spending: Is development assistance harmonised with other budgets? *Journal of Policy Modeling*, 34, 921-931.

¹⁶ Kaas, L. & Zink, S. (2011). Human capital investment with competitive labor search. *European Economic Review*, 55, 520-534.

Tilak, J.B.G. (2007). Post-elementary education, poverty and development in India. *International Journal of Educational Development*, 27, 435-445.

¹⁷ Biagi, F. & Lucifora, C. (2008). Demographic and education effects on unemployment in Europe. *Labour Economics*, 15, 1076-1101.

¹⁸ Adsera, A. & Boix, C. (2000). Must we choose? European unemployment, American inequality, and the impact of education and labor market institutions. *European Journal of Political Economy*, 16, 611-638.

¹⁹ Kaas, L. & Zink, S. (2011). Human capital investment with competitive labor search. *European Economic Review*, 55, 520-534.

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²¹ Biagi, F. & Lucifora, C. (2008). Demographic and education effects on unemployment in Europe. *Labour Economics*, 15, 1076-1101.

Aakvik, A., Salvanes, K.G., & Vaage, K. (2010). Measuring heterogeneity in the returns to education using an education reform. *European Economic Review*, 54, 483-500.

²² Sano, K. & Tomoda, Y. (2010). Optimal public education policy in a two sector model. *Economic Modelling*, 27, 991-995.

system for the formation of human resource as they emphasized that the funding in education may lead to homogeneity of the labor force. Moreover, a competitive educational system improved the skill set of the workers, as Adsera and Boix²³ emphasized on technological change and those new technologies required high skilled workers. The same study also stated that even as the labor force advanced in competitiveness, the persons with the higher skill set were more likely to be employed than those with a lower skill set. Likewise, Jalil and Idrees²⁴ stated that investing in higher education was a major source of economic growth as per the endogenous growth framework.

Tilak²⁵ averred that, as the contribution of education in increasing economic productivity relative to individuals productivity took effect, economic growth in India was estimated at its highest at 14% GDP growth rate. Chi²⁶ stated that human capital accumulation from education played a significant role in China's economic development, and that growth was driven by human capital accumulation in Japan²⁷. A large human capital stock contributed much faster and was able to reveal a positive relationship between education and growth²⁸. Hanushek²⁹ emphasized the importance of

education to economic growth, and Bassanini and Scarpetta³⁰ highlighted the importance of human capital in the growth of OECD countries. Additionally, highly educated areas in the US contributed positively to economic growth of the country for the past decades³¹.

Recent studies have showed the positive contribution of education, as human capital acquires its improvements from education to economic growth. However, economic growth can also influence education. As the economy expands, government is able to increase its revenue collection and this should consequently lead to increased education spending. Previous studies suggest a two-way relationship between education and growth rate. According to Vu, Hammes, and Im³², Gylfason and Zoega³³, and Hassan and Ahmed³⁴, education enhances economic growth and vice versa. Contrary to Grimm³⁵, and after testing for the heterogeneity of selected Organisation for Economic Co-operation and Development (OECD) countries Wu, Tang and Lin³⁶ used Granger causality between expenditure and economic growth, the general idea that human capital accumulation contributes positively to economic growth has been rejected, and there have been claims that it should have been the other way

²³ Adsera, A. & Boix, C. (2000). Must we choose? European unemployment, American inequality, and the impact of education and labor market institutions. *European Journal of Political Economy*, 16, 611-638.

²⁴ Jalil, A. & Idrees, M. (2013). Modeling the impact of education on the economic growth: Evidence from aggregated and disaggregated time series data of Pakistan. *Economic Modelling*, 31, 383-388.

²⁵ Tilak, J.B.G. (2007). Post-elementary education, poverty and development in India. *International Journal of Educational Development*, 27, 435-445.

²⁶ Chi, W. (2008). The role of human capital in China's economic development: Review and new evidence. *China Economic Review*, 19, 421-436.

²⁷ Self, S. & Grabowski, R. (2003). Education and long-run development in Japan. *Journal of Asian Economics*, 14, 565-580.

²⁸ Chen, B. & Feng, Y. (2000). Determinants of economic growth in China: Private enterprise, education, and openness. *China Economic Review*, 11, 1-15.

²⁹ Hanushek, E.A. (2013). Economic growth in developing countries: The role of human capital. *Economics of Education Review*. <http://dx.doi.org/10.1016/j.econedurev.2013.04.005>.

³⁰ Bassanini, A. & Scarpetta, S. (2002). Does human capital matter for growth in OECD countries? A pooled mean-group approach. *Economics Letters*, 74, 399-405.

³¹ Doms, M., Lewis, E. & Robb, A. (2010). Local labor force education, new business characteristics, and firm performance. *Journal of Urban Economics*, 67, 61-77.

³² Vu, T.B., Hammes, D.L. & Im, E.I. (2012). Vocational or university education? A new look at their effects on economic growth. *Economics Letters*, 117, 426-428.

³³ Gylfason, T & Zoega, G. (2003). Education, Social Equality and Economic Growth: A View of the Landscape. *CESifo Economic Studies*, 49(4), 557-579.

³⁴ Hassan, S. & Ahmed H. (2008). Education's contribution to the economic growth of Sub-Sahara Africa. *Southwestern Economic Review*, 1(32), 175-190.

³⁵ Grimm, M. (2005). Educational policies and poverty reduction in Cote d'Ivoire. *Journal of Policy Modeling*, 27, 231-247.

³⁶ Wu, S.Y., Tang, J.H. & Lin, E.S. (2010). The impact of government expenditure on economic growth: How sensitive to the level of development? *Journal of Policy Modeling*, 32, 804-817.

around: that economic growth accelerates human capital investment.

Using a Johansen cointegration test, Asteriou and Agiomirgianakis³⁷ examined the long-run relationship and causality between education expenditure and GDP in Greece where there existed a cointegrating relationship between education expenditure and GDP per capita. And after testing the stationarity of the variables, the causality was from education expenditure to economic growth. Similarly, Abu-Bader and Abu-Qarn³⁸ found that causality from expenditure to growth was consistent with the Keynesian view and that causality from growth to expenditure, as well as the bi-directional, was consistent with Wagner's Law. Tilak³⁹ stated that education and development were more in association with each other, rather than having a causal relationship.

Self and Grabowski⁴⁰ explored the causality between education and growth in Japan, and argued the possibility that economic development lead to higher levels of education. While Afzal, Rehman, Farooq and Sarwar⁴¹ stated that there was bi-causality between education and economic growth, particularly RGDP, in Pakistan. There were contrary to Pina and St. Aubyn⁴² who concluded

that causality from education to growth did not exist.

The above literatures point to differing views regarding the relationship between expenditure in education and economic growth of a country. There are claims that education expenditure directly affects economic performance and vice-versa; while others claim that education expenditure does not lead to productivity and economic growth. Due to this, there is a need to duplicate the study in the Philippines to determine which view is applicable to the local setting.

Method

Using a descriptive method of research, the study examined the selected indicators of education and its relationship to GDP (as this study also includes the causality between education and GDP). Time series (from 1980 to 2012) data on GDP, inflation rate, population, and unemployment rate were taken from the National Statistics Coordination Board (NSCB), the Bangko Sentral ng Pilipinas (BSP), and from Philippine Statistical Yearbooks (PSY). This examines the relationship of inflation rate, population and unemployment rate on education expenditure that will validate the findings of the previous literatures, whether education expenditure is affected by the price changes, population and unemployment rate. The available data related to education expenditure was only from 1991 to 1998. Because of this limitation, the study considered only this period to be consistent with the education expenditure data.

To estimate the relationship of inflation, population and unemployment rate, a model was specified where Educ was education expenditure, INF was inflation rate, Pop was population, and Unemp was unemployment rate.

$$Educ_t = \beta_0 + \beta_1 INF_t + \beta_2 Pop_t + \beta_3 Unemp_t + e_t \quad (\text{eq. 1})$$

To determine the causality between education and GDP, if education caused the GDP or GDP caused education, or if there was bi-directional

³⁷ Asteriou, D. & Agiomirgianakis, G.M. (2001). Human capital and economic growth Time series evidence from Greece. *Journal of Policy Modeling*, 23, 481-489.

³⁸ Abu-Bader, S. & Abu-Qarn, A.S. (2003). Government expenditures, military spending and economic growth: causality evidence from Egypt, Israel, and Syria. *Journal of Policy Modeling*, 25, 567-583.

³⁹ Tilak, J.B.G. (2007). Post-elementary education, poverty and development in India. *International Journal of Educational Development*, 27, 435-445.

⁴⁰ Self, S. & Grabowski, R. (2003). Education and long-run development in Japan. *Journal of Asian Economics*, 14, 565-580.

⁴¹ Afzal, M., Rehman, H.U., Farooq, M.S. & Sarwar, K. (2011). Education and economic growth in Pakistan: A cointegration and causality analysis. *International Journal of Educational Research*, 50, 321-35.

⁴² Pina, A.M. & St. Aubyn, M. (2005). Comparing macroeconomic returns on human and public capital: An empirical analysis of the Portuguese case (1960-2001). *Journal of Policy Modeling*, 27, 585-598.

causality, a model was specified as equations 2 and 3 where Educ was education expenditure and GDP was gross domestic product.

$$Educ_t = \sum_{i=1}^m \alpha_i Educ_{t-i} + \sum_{k=1}^m \beta_k GDP_{t-k} + e_{t-k} \quad (\text{eq. 2})$$

$$GDP_t = \sum_{i=1}^m \gamma_i GDP_{t-i} + \sum_{k=1}^m \delta_k educ_{t-k} + v_{t-k} \quad (\text{eq. 3})$$

This study used the following statistical techniques and procedures: To gain insights on the behavior of the performance of education for the period 1980 to 2012, this study used the linear trend model. This provided insights concerning the trend in Philippine education. The equation of the model where educ was education expenditure and time was the trend.

$$educ_t = \beta_0 + \beta_k time_{t-k} + \mu_{t-k} \quad (\text{eq. 4})$$

A Structural stability test refers to the stability of the coefficients of a regression model between different time periods which can be investigated using the Chow Breakpoint Test. This can provide insights concerning the stability or consistency despite the economic environment in previous years. A structural change could mean a change in the intercept, a change in the slope coefficients, or a change in both the intercept and the slope coefficients. In general, these changes may involve several time periods.

The formula for the structural stability of the regression parameter involving time series data using the Chow Breakpoint test is as follows, where k is the number of regressors including intercept, n is the number of observations, RSS_R is the regression sum of squares restricted, and RSS_{UR} is the regression sum of squares unrestricted.

$$F = \frac{(RSS_R - RSS_{UR})/k}{RSS_{UR}/(n_1 + n_2 - 2k)} \quad (\text{eq. 5})$$

A Specification error test is associated with the specification of the model regarding the inclusion of an irrelevant variable, the exclusion of relevant variable, or the functional form of the model. A

Specification error creates biased or inconsistent regression estimators, and the inconsistency can still be there even when the sample observation increases. To determine the specification of the model, this study used the equation:

$$\hat{Y}_i = \hat{\beta}_1 + \hat{\beta}_2 X_{2i} + \hat{\beta}_3 X_{3i} + \gamma \hat{X}_i^2 \quad (\text{eq. 6})$$

Most of the time series data may have a unit root and this reveals that the mean and variance are not independent of time, and such non-stationary time series data will produce a spurious regression output, e.g., relationships are significant when in fact the results obtained contemporaneous correlation rather than meaningful relationships. The widely used unit root test is the Dickey-Fuller. The optimal lag length for the Augmented Dickey-Fuller (ADF) test, as seen in eq. 8, is determined by minimizing the Akaike Information Criterion (AIC). This study used the stationarity test as a prerequisite for Granger causality and this should be cointegrated.

$$\Delta x_t = \alpha_0 + \alpha_1 t + \beta x_{t-1} + \sum_{j=1}^m \delta_j \Delta x_{t-j} + \varepsilon_t \quad (\text{eq. 7})$$

The series will be integrated of order d , that is, $x_t \sim I(d)$, if it is stationary after differencing it d times. Cointegration indicates the long-run equilibrium relation. A series that is $I(0)$ is stationary.

$$\Delta y_t = y_t - y_{t-1} \quad (\text{eq. 8})$$

The study used White heteroskedasticity test to determine if the variance of the residual is constant, unbiased and no outliers. This determines if there is white noise in the regression.

$$e_i^2 = \beta_0 + \beta_1 educ + v_i \quad (\text{eq. 9})$$

Results and Discussions

Result of the study showed (Table 1) that population and unemployment were significant to education expenditure while inflation was insignificant. The insignificance of inflation was contrary to the findings in the study by Afzal, et al.⁴³ where inflation negatively affected education

⁴³ Afzal, M., Rehman, H.U., Farooq, M.S. & Sarwar, K. (2011). Education and economic growth in Pakistan: A cointegration and

in the long-run only and in the study by Hwang⁴⁴ stating education expenditure can be influenced by inflation due to high costs. Also, education expenditure increased as the population increases and as unemployment increases.

As population increases, more students demand for education since they are willing to learn and prepare for becoming more competitive, as emphasized by Hassan and Ahmed⁴⁵ that investing in human capital is considered as a primary foundation in achieving productivity of labor, since educated labor force adapts to new technology and able to communicate better. Similarly, as unemployment increases, education expenditure increases, as demand for education increases since they are willing to be employed and obtain high-paying jobs⁴⁶. Moreover, increasing population and unemployment have negative effects on growth as these put pressures on our economy to either generate more jobs or, as this research was able to reveal, individuals leave the labor force and decide to demand for (higher) education instead. When jobs are hard to come by, individuals forego their job search, leaving the unemployed headcount in the process, and decide to demand for education with the intention of acquiring better skills and anticipate better and higher-paying jobs in the future. Table 1 show that Philippine government should augment its education budget to increase education expenditure and to ultimately

accommodate the education demanded by the population and the unemployed. This significantly improves the quality of the labor force (human capital) as derived from education. Increasing education expenditure also increase the accessibility of education by the population and the unemployed⁴⁷ and societal benefits from this abound. In this globalized economy, demand for high-paid jobs increases demand for education towards the acquisition of human capital competitiveness and ultimately to acquire better jobs as argued by Tarabini⁴⁸ that financing education increases education expenditure that leads to global economic advantages.

The Breusch-Godfrey Serial Correlation result shows that the probability exceeds the 0.10 alpha which accepts the hypothesis that there is no serial correlation in the regression result, while the probability of the ARCH (Autoregressive conditional heteroskedasticity) test exceeds the 0.10 alpha which accepts the hypothesis of no heteroskedasticity in the regression as supported by the White heteroskedasticity test which means that the regression result achieve homogeneity as revealed by Sano and Tomoda⁴⁹ the importance of the design of the educational system for the formation of human resource that leads to homogeneity of the labor force. The Ramsey RESET (Regression Equation Specification Error Test) shows that the probability exceeds the 0.10 alpha which accepts the hypothesis of no

causality analysis. *International Journal of Educational Research*, 50, 321-335.

⁴⁴ Hwang, J. (2005). Asset distribution and tertiary education expenditure in developing countries. *Economics of Education Review*, 24, 171-178.

⁴⁵ Hassan, S. & Ahmed H. (2008). Education's contribution to the economic growth of Sub-Sahara Africa. *Southwestern Economic Review*, 1(32), 175-190.

⁴⁶ Kaas, L. & Zink, S. (2011). Human capital investment with competitive labor search. *European Economic Review*, 55, 520-534.

Tilak, J.B.G. (2007). Post-elementary education, poverty and development in India. *International Journal of Educational Development*, 27, 435-445.

Abbott, A. & Jones, P. (2012). Government spending: Is development assistance harmonised with other budgets? *Journal of Policy Modeling*, 34, 921-931.

⁴⁷ Biagi, F. & Lucifora, C. (2008). Demographic and education effects on unemployment in Europe. *Labour Economics*, 15, 1076-1101.

Adsera, A. & Boix, C. (2000). Must we choose? European unemployment, American inequality, and the impact of education and labor market institutions. *European Journal of Political Economy*, 16, 611-638.

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⁴⁸ Tarabini, A. (2010). Education and poverty in the global development agenda: Emergence, evolution and consolidation. *International Journal of Educational Development*, 30, 204-212.

⁴⁹ Sano, K. & Tomoda, Y. (2010). Optimal public education policy in a two sector model. *Economic Modelling*, 27, 991-995.

specification error in the regression model, indicating that the regression model is properly specified. The regression results also show that the residual of the regression is said to be normally

distributed since the Jarque-Bera probability exceed the 0.10 alpha and accepting the hypothesis that there is no non-normality in the residual.

Table 1. Regression results, Serial correlation, Heteroskedasticity, Specification error

*** significant at 0.01 critical value, **significant at 0.05 critical value, *significant at 0.10 critical value

Dependent Variable: EDUC_EXP				
Method: Least Squares				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-866929.8	67132.17	-12.91378	0.0002***
INF	796.6035	958.1969	0.831357	0.4525
POP	12967.57	759.7046	17.06923	0.0001***
UNEMP	13547.29	4977.828	2.721526	0.0529*
R-squared	0.989223			
Prob(F-statistic)	0.000217			
Jarque-Bera				
F-statistic	0.581266			
Probability	0.747790			
Breusch-Godfrey Serial Correlation LM Test:				
F-statistic	4.229668			
Probability	0.131923			
ARCH Test:				
F-statistic	0.126304			
Probability	0.736797			
White Heteroskedasticity Test:				
F-statistic	3.855185			
Probability	0.371278			
Ramsey RESET Test:				
F-statistic	0.266751			
Probability	0.641178			
	EDUC_EXP	GDPGR		
Jarque-Bera	0.822964	0.966874		
Probability	0.662667	0.616660		

Table 2 shows the stationarity of the variables. Gross Domestic Product growth rate (GDPGR) is stationary at level since its ADF test stat is significant at 5% critical value. Inflation (INF) is stationary at level since its ADF test stat is significant at 5% critical value. While Population

(POP) and Unemployment (UNEMP) are stationary at 1st difference since ADF test stat is significant at 5% critical value and 1% critical value, respectively. This stationarity output is a prerequisite to Granger causality test as being used by Asteriou and Agiomirgianakis⁵⁰.

⁵⁰ Asteriou, D. & Agiomirgianakis, G.M. (2001). Human capital and economic growth Time series evidence from Greece. *Journal of Policy Modeling*, 23, 481-489.

Table 2. Unit root test for GDPGR, INF2006, Population and Unemployment

	ADF Test Statistic	1% Critical Value	5% Critical Value	10% Critical Value
GDPGR	-3.457901**	-3.6576	-2.9591	-2.6181
INF	-3.637251**	-3.6576	-2.9591	-2.6181
D(POP,2)	-3.481604***	-3.6661	-2.9627	-2.6200
D(UNEMP,2)	-4.032603***	-3.6661	-2.9627	-2.6200

*** significant at 0.01 critical value

** significant at 0.05 critical value

* significant at 0.10 critical value

Table 3. Granger causality between education expenditure and GDPgr

Null Hypothesis:	F-Statistic	Probability
GDPGR does not Granger Cause EDUC_EXP	2.48941	0.18975
EDUC_EXP does not Granger Cause GDPGR	23.5281	0.00834***

***significant at 0.01 alpha

The Granger causality (Table 3) shows the direction from education expenditure to GDP growth rate (GDPGR) since the result shows that the hypothesis GDPGR does not Granger Cause EDUC_EXP is accepted as the probability exceed 0.10 alpha while the hypothesis EDUC_EXP does not Granger Cause GDPGR is rejected as the probability is less than 0.01. The education expenditure Granger cause the GDP growth rate, the same result also stated by Grimm⁵¹ and contrary to the findings of Pina and St. Aubyn⁵² that causality between education and growth does not exist but recognizes that human capital promotes growth. This means that the Philippine education system should invest more on the development and improvement of the education sector to achieve high economic growth. This shows that investing in education is important to the economic growth process of the Philippines. This was also emphasized by Wu, Tang, and Lin⁵³ and Jalil and

Idrees⁵⁴ that education expenditure contributes to productivity growth as stated in the endogenous growth framework. The causality shows that investing more in human capital will improve productivity of labor that leads to high economic performance⁵⁵. However, Abu-Bader and Abu-Qarn⁵⁶, Vu, Hammes, and Im⁵⁷, Gylfason and Zoega⁵⁸, and Hassan and Ahmed⁵⁹, found bi-

⁵⁴ Jalil, A. & Idrees, M. (2013). Modeling the impact of education on the economic growth: Evidence from aggregated and disaggregated time series data of Pakistan. *Economic Modelling*, 31, 383-388.

⁵⁵ Gounder, R. & Xing, Z. (2012). Impact of education and health on poverty reduction: Monetary and non-monetary evidence from Fiji. *Economic Modelling*, 29, 787-794.

⁵⁶ Asteriou, D. & Agiomirgianakis, G.M. (2001). Human capital and economic growth Time series evidence from Greece. *Journal of Policy Modeling*, 23, 481-489.

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directional causality between expenditure and growth, signifies that education enhances economic growth and at the same time economic growth causes education.

The Philippine government should increase its education budget to increase education expenditure particularly in basic education, and boost the Philippine economy. Increasing the budget for basic education should increase not only the salaries of teachers but also the education infrastructure, laboratories, number of available books for the students, and improve the teacher-student ratio per classroom. Increasing human capital accumulated from education can sustain economic productivity which leads to faster economic growth. Increasing the education budget to increase education expenditure is a big help and further examination of the design of the Philippine educational system, with the noble intention of improving human capital, is strategic towards growth. A competitive educational system increases human capital and this contributes to Philippine economic growth, as stated in the endogenous growth framework. Increasing education expenditure can also help in the Philippines competing with other ASEAN (Association of Southeast Asian Nations) member countries regarding human capital competitiveness and who can cope with global competitiveness; with the definitive goal of achieving development and economic growth.

Conclusion

This study examined the relationship of inflation, population and unemployment on education expenditure and the causality between education expenditure and GDP growth rate. Even though the study encountered difficulty in gathering data, specifically for education expenditure as a consequence of limited data published by the government, findings showed that education

expenditure Granger cause economic growth as what was proposed by the endogenous growth theory which emphasized the importance of education in achieving significant economic growth. In estimating the effect of education on the economic growth of the Philippines, as education is a conduit for accumulation of human capital that will have an effect to economic growth, education expenditure also Granger causes economic growth. This shows the value of the educated labor force in the Philippine economy. With the constant increase in unemployment, the government would try to increase the budget of education to curb unemployment in the country.

With the increasing population, more students want to go to school to become competitive in the future; and with the increasing prices, it is better for the Philippine government to continue increasing the budget allocated for education to achieve economic growth as it has become evident that there are significant returns for the economy when investments in human capital are made.

Findings also show that population and unemployment are statistically significant in education expenditure while inflation is statistically insignificant. This suggests that high demand in education due to an increase in population and unemployment increase the education expenditure. This shows that the Philippine educational system should match labor demand in terms of producing a labor force with high human capital.

Future study related to this research may include the number of enrollees at different levels, to examine the contribution of the education sectors at different levels to the Philippine economy, as well be able to determine the impact of the K-12 program on Philippine human capital. It would also be interesting to know the effect of education in poverty alleviation in the Philippines.

Phân tích những tác động của các chỉ số kinh tế được lựa chọn đối với giáo dục và mối quan hệ nhân quả giữa giáo dục và tăng trưởng kinh tế Philippines

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TÓM TẮT:

Nghiên cứu đánh giá tác động của lạm phát, thất nghiệp và dân số đối với giáo dục ở Philippines. Nghiên cứu này chỉ ra mối quan hệ nhân quả giữa chi phí giáo dục và tổng sản phẩm trong nước. Nghiên cứu sử dụng kiểm định tính ổn định của cấu trúc nhằm kiểm chứng sự ổn định của các hệ số mẫu giữa các thời điểm khác nhau mà không tính đến môi trường kinh tế trong những năm trước đó. Phát hiện cho thấy kiểm định nhân quả Granger về chi phí giáo dục tác động đến sự phát triển kinh tế như những gì đã được đề cập trong lý thuyết tăng trưởng nội sinh nhấn mạnh đến tầm quan trọng của giáo dục đối với phát triển

kinh tế, coi giáo dục đối với sự phát triển kinh tế Philippines như sự kết nối nhằm tích lũy vốn con người ảnh hưởng đến sự phát triển kinh tế. Điều này cho thấy giá trị của lực lượng lao động qua đào tạo trong nền kinh tế Philippines, ngay cả khi nghiên cứu gặp phải những trở ngại trong thu thập dữ liệu, đặc biệt là chi phí giáo dục do dữ liệu chính phủ công bố còn hạn chế. Nghiên cứu cũng chỉ ra rằng dân số và thất nghiệp có ý nghĩa thống kê đối với chi phí giáo dục, trong khi lạm phát thì không. Như vậy, nhu cầu giáo dục cao do gia tăng dân số và thất nghiệp sẽ tăng chi phí giáo dục.

Từ khóa: chi phí giáo dục, tăng trưởng kinh tế, dân số, thất nghiệp, mối quan hệ nhân quả

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