ANALYSIS OF RELATIONSHIP BETWEEN EDUCATION COSTS AND ECONOMIC GROWTH USING THE GRANGER CAUSALITY APPROACH

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ABSTRACT

This research is intended to analyze the relationship between education spending and economic growth. This is done to identify whether the two affect each other or only one direction. To find it out, the Granger causality test is used. Data analyzed are annual time series data from 2000-2018. After analyzing and processing the data, the results show that the two research variables have a causal relationship, it means that both education expenditure and economic growth variables influence each other. Government expenditure in the field of education will affect economic growth. On the other hand, economic growth will also affect education spending. To get a better understanding of the relationship, it is analyzed how the mechanism of transmitting variables influences other variables. The analytical tool used is Vector Autoregressive (VAR). From the results of the VAR regression, the results show that economic growth variables affect education spending in the first lag, meaning that when economic growth rises, the government can increase its expenditure the following year. While new education spending will affect economic growth in the third lag, meaning new education spending will affect growth in the next 3 years.

Keywords: education expenditure, economic growth, Granger Causality Test, VAR

Contribution / Originality

This study is one of the few studies investigating the causality relationship between economic growth and education expenditure, both of which influence each other. This study contributes to the first logical analysis that education as an investment in human capital applies long-term rising labor productivity and technology as a proxy for the results of education investment will increase economic growth in real terms.

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Introduction

The private sector is very difficult to be expected to contribute more in driving the economy to conditions that are not supportive. The planned increase in the basic electricity tariff (TDL) in 2019, and this increase in provincial/district/city minimum wages will aggravate the business world. The company's operational costs will increase, meanwhile the purchasing power of the people will continue to decline. In the midst of such business or private sectors, it is necessary to improve the role of the gross domestic product to improve and increase gross domestic product. In accordance with Keynes's opinion, to overcome this situation it is necessary to intervene by influencing government aggregate demand. Government policy can be done in two ways, namely to influence aggregate demand and aggregate supply. Policies that affect aggregate supply are carried out more to influence the condition of the real sector through regulations. It's just that this policy will be effective in a rather long period of time and will be better if done with monetary policy and the real sector. Meanwhile policies that affect aggregate demand are carried out through government expenditure (State Revenue and Expenditure Budget/APBN). This policy is effective in the not-too-distant future because the government itself is both the policy giver and the perpetrator. In another perspective this policy is known as fiscal policy.

Since January 2001 the Indonesian people have gone through a new round of governance, in which regional autonomy has been carried out throughout cities and regencies, totaling 336. This has led to increased responsibility for governance (provision of public goods and economic development) at the regional level. It is very large, especially in the field of education which is an essential element in regional development and has become one of the main parts of the population's needs. However, the ability of regions to maintain and improve the delivery of education can be said to be very limited, bearing in mind the role of Local Revenue (PAD) is still low in the reception of city/district regional budget and the readiness of human resources (HR) and the ability of management of the education sector at the regional level is still limited.

Generally, it is believed that fiscal decentralization will improve people's welfare. This opinion is based on the view that states the needs of local communities for education and public goods in general will be better met than if directly regulated by the central government. However, this tendency is not apparent because to date most of the local governments (LGs and DPRDs) of cities and districts in Indonesia have responded to fiscal decentralization by boosting the increase in PAD through taxes and retribution without offsetting the increase of the effectiveness of APBD expenditure. Such policy measures can adversely affect the delivery of education at the regional level and the welfare of the community.

Considering the above interests, it should be questioned to what extent the implementation of fiscal decentralization can have bad implications for the activities of providing education in cities and districts in Indonesia. Fiscal policy through government expenditure in the state budget is expected to stimulate gross domestic product. Government spending can stimulate the economy through the increased consumption and investment. Consumption and investment are components of the Gross

Domestic Product (GDP). As we know in the concept of macroeconomics and economic development that GDP (Y) consists of household consumption (C), investment (I), government expenditure (G) and net exports (XM) or (Y = C + I + G + (XM)). Government routine expenditure is used for unproductive expenditure and leads to consumption while development expenditure is more investment-oriented.

Education expenditure is the dependent variable, meaning that gross domestic product influences education expenditure. The theory of the development of government expenditure that has been described above shows that gross domestic product (GDP) will influence the amount of education expenditure. Education expenditure is an independent variable, which means that education expenditure affects gross domestic product (GDP). John Due in Setiabudi. 2017), argues that the government can influence the level of real GDP by changing the supply of various factors that can be used in production through government expenditure programs such as education.

While Atep Adya Barata (in Dwimawanti, 2019), stated that the activities carried out by the government that encourage the amount of state expenditure have an influence on the economy of the community. Landau (1986) (in Laan. 2016), proves that government spending in the military and education sectors is negatively correlated to economic growth, while education itself is strongly correlated and government investment is positively but not significant. Steven A.Y. Lin (in Deviani, 2016), Lin (1994) says that government spending will increase economic growth (GDP) at a slower rate. Lin also stated that Wagner's Law only applies to developed countries.

Government expenditure in the relatively large field of education is absolutely necessary especially to catch up the backwardness of Indonesia's education with other countries. In addition, increasing education will have a positive impact on reducing poverty, increasing the welfare of the population and other positive impacts. According to Sylwester (in Handoyo, 2019),, a country that devotes a lot of attention to public education (seen from the percentage of GNP on education) has a low level of income inequality. The results of this study reinforce previous studies conducted by Easterly and Rebello in Rahmayani, dkk, 2018), and Sylwester (1999) who say that education spending is not only related to economic growth but also reduces income inequality.

Research on the sources of economic growth of a country by including human capital variables has been carried out, including Mankiw, Romer and Weil (in Aminudin Anwar (2018), using cross section data from various countries obtained from UNESCO Yearbook. Ranis, Stewart and Ramirez (in Mongan, 2019), studied the relationship between economic growth and human development in the form of a two-chain relationship. Bayhaqi (2000) used three model formulations that showed Indonesia's total growth factor (TFP) growth during 1969-1998. Wang and Yao (2002) stidied the sources of Chinese economic growth by dividing the periods, namely before the reform (before 1978) and after the reform (after 1978). The data used were the 1952-1999 time series. Donald and Roberts (2002) in addition to including education variables also include health variables in estimating a country's economic growth by taking a sample of 77 countries consisting of 22 OECD countries and 55 LDCs countries. Lin (in Amalia, 2015),) studied the impact of education on Taiwan's economic growth during the period

1965-2000. Research on the impact of education spending on human capital was carried out by Gupta in Suprayitno,. 2017), using simultaneous equations, examining the reciprocal relationship (causality) between education expenditure and human capital. Al-Samarrai and Zaman (in Hafidh 2019),conducted the research about the impact of eliminating education costs on student participation rates, especially primary and secondary education.

Studies that show a negative relationship between government spending and growth includes research of Barro and Salla-i-Martin (in Deviani, 2016), which divides government spending into productive and unproductive expenditure. Productive expenditure if the expenditure has a direct effect on economic growth. Most studies on the relationship between government spending and economic growth assume all government spending is productive. Research of Landau (in Saepudin 2013), examined 27 developing countries to conclude that large government spending especially, consumption spending, would actually reduce per capita income growth. The same result was found by Landau (1986) for 65 developing countries.

Devarajan and Vinaya (in Amalia, dkk. 2015), found a negative and insignificant relationship between productive expenditure and growth. Meanwhile Lin (in Amalia, dkk. 2015),) states that non-productive expenditure has a negative and not significant relationship to growth in industrialized countries but it is positive and significant in developing countries. This happens because government services that are non-productive in developing countries are mostly used for consumption. Josaphat P Kweka and Oliver Morrisey (in Elia Fitri. 2016), studied the relationship between the two countries in Tanzania in the period 1965-1996. The results obtained that government spending had a negative impact on growth. The negative impact was due to inefficient government spending in Tanzania. Other studies showed that government consumption expenditure had a negative impact on growth (Grier and Tullock (in Amalia, dkk. 2015).

Studies of developed countries also conclude the same results as those of Hannson and Henrekson. In the majority of studies, total government expenditure had a negative effect on growth. Henrekson said that at low levels of government spending in poor countries, especially for productive spending and also low taxes, usually inefficient in collecting taxes and government spending. (Hannson and Henrekson in Solikin (2018)).

Studies that show a positive relationship between government spending and growth include Ram dan Grossman (dalam Andi Hakib, 2019), who found a positive relationship between government spending and economic growth. Diamond (1989) stated that social spending had a significant positive relationship and investment spending that had a negative effect on economic growth. The impact was strongly influenced by the efficient use of funds.

RESEARCH METHODS

The research approach used is a quantitative approach that is strengthened by using a qualitative approach in analysis. The data used in this study are secondary data from the Central Statistics Agency (CSA). In this study the data which analyzed

quantitatively are Government Expenditure Data for Education (GEDE) and Gross Domestic Product (GDP) data.

Granger Causality Test is performed to determine whether an endogenous variable can be treated as an exogenous variable. Granger causality is carried out to determine the influence between variables. If there are two variables X and Y, then does X cause Y or Y causes X or does both apply or is there no relationship between them. Variable X causes variable Y to mean how many Y values in the current period that can be explained by the Y value in the previous period and the X value in the previous period. Granger's causality only tests the relationships between variables and does not estimate the model. For bivariate regression, models are:

$Yt = 0 + \alpha 1Yt\text{-}1 + ... + \alpha\, nYt\text{-}n + \beta 1Xt\text{-}1 + ... + \beta\, nXt\text{-}n + \varepsilon 1$

$Xt = 0 + \alpha 1Xt\text{-}1 + ... + \alpha\, nXt\text{-}n + \beta 1Yt\text{-}1 + ... + \beta\, nYt\text{-}n + \varepsilon 1$

F-statistics are Wald statistics with the hypotheses of each equation:

$\beta 1 = \beta 2 = = \beta n = 0$

The null hypothesis is

H0 = X does Granger cause Y for regression 1 and Y not Granger causes X for regression 2.

1. If $\beta 1 = \beta 2 = = \beta n \neq 0$ for equation 1 and $\beta 1 = \beta 2 = = \beta n = 0$ for equation 2, means X Granger causes Y and not vice versa.
2. If $\beta 1 = \beta 2 = = \beta n = 0$ for equation 1 and $\beta 1 = \beta 2 = = \beta n \neq 0$ for equation 2, then Y Granger causes X and not vice versa.
3. If $\beta 1 = \beta 2 = = \beta n \neq 0$ for equation 1 and $\beta 1 = \beta 2 = = \beta n \neq 0$ for equation 2, it means X Granger causes Y and Y causes X.
4. If $\beta 1 = \beta 2 = = \beta n = 0$ for equation 1 and $\beta 1 = \beta 2 = = \beta n = 0$ for equation 2, it means that X and Y have no relationship.

RESEARCH RESULTS AND DISCUSSION

1. Unit Root Tests (Unit Root Test) and Degree of Integration

This unit root test is often also called the stationary stochastic process, because in principle the test is intended to observe whether certain coefficients of the estimated autogresiveness model have a value of one or not. In time series analysis, information about the stationarity of a data series is very important because the inclusion of non-stationary variables in the estimation coefficient of the regression coefficient will result in the resulting standard error being biased. The existence of this bias will cause conventional criteria that are commonly used to justify causality between two variables become invalid. That is, estimation of regression using a variable that has a unit root (non-stationary data) can produce incorrect conclusions (forecasting) because the estimation regression coefficient is inefficient.

In this study, stationarity test was performed using the Augmented Dickey-Fuller Test (ADF) method. This stationarity test is based on the null hypothesis that the stochastic variable has a unit root. By using the ADF test model, the null hypothesis and other basic decision-making used in this test are based on the MacKinnon critical value instead of the t-test. Next the t ratio is compared with the statistical critical value in the

ADF t table to find out the presence or absence of unit roots. If the hypothesis is accepted it means that the variable is not stationary, it is necessary to test the degree of integration. The degree of integration test is intended to look at the degree or order of differentiation as to how the observed data will be stationary.

Table 1. GDP Variable Unit Root Test

ADF Test Statistic	-4. 109575	1 % Critical	-4.2324
		5 % Critical	-3.5386
		10 % Critical Value	-3.2009
*MacKinnon critical values for rejection of hypothesis of a unit root.			

Pada uji stasioneritas variabel GDP sudah lolos dengan nilai kritis 5%, yaitu nilai ADF - 4,109575 dengan nilai kritis -3,5386 pada taraf signifikansi 95%.

Table 2. GEDE **Variable Unit Root Test**

ADF Test Statistic	-0.512827	1% Critical Value*	-4.2324
		5% Critical Value	-3.5386
		10% Critical Value	-3.2009
*MacKinnon critical values for rejection of hypothesis of a unit root.			

Whereas in the stationarity test the variable education expenditure (EDEXP) has not passed with a critical value of either 10%, 5% or 1%, namely the ADF value of -0.512827 with a critical value of -4.2324, -3.5386 or -3.5386 . If one variable does not pass the unit root test at the level/level stage, further testing is needed, namely the degree of integration test.

Table 3. Integration Degree Test of EDEXP

ADF Test Statistic	-3.039683	1% Critical Value*	-4.2412
		5% Critical Value	-3.5426
		10% Critical Value	-3.2032
*MacKinnon critical values for rejection of hypothesis of a unit root.			

\	*MacKinnon critical values for rejection of hypothesis of a unit

In Table 3 above, the EDEXP variable has not yet passed the unit root test at the first degree of integration, even with a critical value of -3.2032 at a 90% significance level because the statistical ADF value is only -3.039683. Because the EDEXP variable is not stationary at the first degree of integration, further tests are needed, namely the second degree of integration test.

Table 4: Integration Degree Test of EDEXP

ADF Test	**-**	**1% Critical Value***	**-4.2505**
		5% Critical Value	-3.5468
		10% Critical Value	-3.2056
*MacKinnon critical values for rejection of hypothesis of a unit root.			

In the second degree integration test is shown in Table 4. The EDEXP variable has passed the test at a critical value of 1%, -42505 with a statistical ADF value of -5.004179. If both variables are stationary, the next step can be done.

2. Determination of Lag Length

Before conducting the cointegration test it is necessary to determine the length of the lag. Because the cointegration test is very sensitive to the length of the lag, then the determination of the optimal lag becomes one of the important procedures that must be carried out in the formation of the model (Enders, 2004). In general, there are several parameters that can be used to determine the optimal lag length, including AIC (Akaike Information Criterion), SIC (Schwarz Information Criterion) and LR (Likelihood Ratio).

Table 5. Determination of Lag Length

Nilai AIC	Lag ke-1	Lag ke-2	Lag ke-3	Lag ke-4
AIC	-2,369763	-2,167784	-2,263391	-1,983301
SC	-2,113830	-1,736840	-1,653854	-1,191541

From table 5 above it shows that the lag or lags to 4 have the smallest value of both AIC and SC namely -1.983301 and -1.19154.

3. Cointegration Test (Johansen's Cointegration Test)

Cointegration is a combination of linear relationships of non-stationary variables and all of these variables must be integrated in the same order or degree. Integrated variables will show that these variables have the same stochastic trend and subsequently have the same direction of movement in the long run. In this study, cointegration testing uses the Johansen's Multivariate Cointegration Test. It starts with defining a vector of n potential endogenous variables Zt. Zt is assumed to be an unrestricted VAR system and has up to k lags:

$$Zt = A1\ Zt\text{-}1 + ...+ Ak\ Zt\text{-}k + \Phi\ Dt + \mu + \varepsilon t$$

Ai is n x n matrix coefficients, p is a constant, Dt is a seasonal dummy variable which is orthogonal to the constants p and ct is assumed to be independent and identically distributed based on the Gaussian process. Equation (3.8) can be formulated back into the form of vector error correction (VECM) by subtracting Zt-1 from both sides of the equation:

$$\Delta\ Zt = \Gamma 1\ \Delta\ Zt\text{-}1 + ... + \Gamma k\text{-}1\ \Delta\ Zt\text{-}k+1 + \Pi\ Zt\text{-}k + \Phi\ Dt + \mu + \varepsilon t$$

Where $\Gamma i = -(I - A1 - ..... - Ai),\ (i = 1, ... , k\text{-}1)$, dan $\Pi = -(I - A1 - ... - Ak)$.

Based on the length of the lag above, we conducted a cointegration test to find out whether there will be a balance in the long run, that is there is a similarity in the movement and stability of the relationships between the variables in this study or not. In

this study, the cointegration test was carried out using the Johansen's Cointegration Test as shown in Table 6.

Based on Table 6 it can be seen that the LR value is smaller than the critical value with a significance level of 1% and 5%. This means that the null hypothesis which states that no cointegration is accepted and the alternative hypothesis which states that there is cointegration can be rejected. Based on the econometric analysis above, it can be seen that between the two variables in this study, there was no co-integration at the significance level of 1% and 5%. Thus, the results of the cointegration test indicate that between GDP and education expenditure do not have a stability/balance relationship and the similarity of movement in the long run. In other words, in each short-term period, all variables tend not to adjust to each other, to achieve long-term equilibrium.

Table 6. Cointegration Test

Date : 10/11/11 Time: 10:19
Sample : 2000 - 2018
Included observations: 18
Test assumption: Linear deterministic trend in the data Series: LGDP GEDE
Lags interval : 1 to 1

Eigenvalue	Likelihood Ratio	5 Percent Critical Value	1 Percent Critical Value	Hypothesized No. of CE(s)
0. 159486	7.891333	15.41	20.04	None
0.033356	1.289138	3.76	6.65	At most 1

*(**) denotes rejection of the hypothesis at 5% (1%) significance level
L.R. rejects any cointegration at 5% significance level

Unnormalized Cointegrating Coefficients:

LGDP	GEDE
-0.957436	0.853049
0. 150662	0.078338

Normalized Cointegrating Coefficients: 1 Cointegrating Equation (s)

LGDP	GEDE	C
1.000000	-0.890972	-5.496424
	(0.08268)	
Log likelihood	50.54332	

4. Granger Causality Test

In this causality test is carried out using a multivariate VAR model that is carried out simultaneously. Each equation in VAR is tested in the Wald Chi-Squares distribution or commonly denoted $\chi 2$ - Wald. Each variable is exchanged from an endogenous variable to an exogenous variable to be tested for causality. The statistical calculation results $\chi 2$ - Wald show the joint significance of the endogenous variable in the VAR equation. Table 7 below is the result of univariate VAR causality testing.

Tabel 7. Granger Causality Test

Pairwise Granger Causality Tests
Date: 10/11/11 Time: 10:25
Sample: 2000- 2018
Lags: 3

Null Hypothesis:	Obs	F-Statistic	Probability
GEDE does not Granger Cause LGDP	37	3.44598	0.02896
LGDP does not Granger Cause GEDE		3.17218	0.03846

Based on the test of causality relationships with the Granger Causality method, it was found that there is a two-way relationship (causality) between education expenditure (EDEXP) and economic growth (GDP). This indicates that the movement of GDP pushed up the education budget in Indonesia, in addition to the education budget will also increase GDP.

5. Empirical Model in VAR

The VAR model developed by Sims (1980, in Fikriah et al 2017) assumes that all variables in the simultaneous equation are endogenous variables. This assumption is applied because often the determination of exogenous variables in simultaneous equations is subjective. In VAR, all independent variables in the equation will also appear as independent variables in the same equation. The VAR approach is modeling every endogenous variable in the system as a function of the lag of all endogenous variables in the system. Based on the standard form in the VAR model, the general form for multivariate cases (Enders, 2004,in Fikriah et al 2017)) is as follows:

$Yt = Ao + A1Yt\ -1 + A2Yt\ -2 + ... + ApYt\text{-}p + \varepsilon t$

Yt: vector (nx1) which contains n of each variable in VAR Ao: vector (nx1) intercept
Ai: matrix coefficient (nxn)
εt: vector (nx1) of error term
Based on the general form above, the research model using the standard VAR model is as follows:

$$\begin{bmatrix} LGDPt \\ GEDEt \end{bmatrix} = \begin{bmatrix} \alpha 10 \\ \alpha 20 \end{bmatrix} + \begin{bmatrix} a21(^{L})_{a22(}L) \\ a11\,(L)\ a12(L) \end{bmatrix} \begin{bmatrix} L\,GDPt \\ GEDEPt \end{bmatrix} + + \begin{bmatrix} \varepsilon 1 \\ t \end{bmatrix}$$

LGDP = Natural Gross Domestic Product logarithm and GEDE = Natural Logarithm of Education Expenditures. The VAR form above is a regular VAR form that is free of restriction to be used if the data are stationary at the level level. Variations in the form of VAR usually occur due to differences in the degree of integration of variable data, which is known as VAR in level and VAR in difference. VAR level is used when the research data has a stationary form in the level. If the data are not stationary at the level

but do not have (theoretically do not require the existence of) cointegration relationships, then the VAR estimation is done in the form of difference.

Tabel 8. VAR Estimation Result

	LGDP	GEDE
LGDP(-1)	1.140023	0.711616
	(5.95327)	(1.90418)
LGDP(-2)	0.142457	-0.278393
	(0.51955)	(-0.52026)
LGDP(-3)	-0.472850	-0.121535
	(-1.70936)	(-0.22513)
LGDP(-4)	0.027530	0.010621
	(0.12267)	(0.02425)
GEDE(-1)	0.018348	0.577039
	(0.18592)	(2.996 14)
GEDE(-2)	-0.078240	-0.042113
	(-0.69236)	(-0.19096)
GEDE(-3)	0.300309	0.181434
	(2.59736)	(0.80409)
GEDE(-4)	-0.072748	0.022286
	(-0.63363)	(0.09947)
C	0.790889	-1.865311
	(1.14482)	(-1.38354)
R-squared	0.988421	0.963957
Adj. R-squared	0.984991	0.953277
Sum sq. resids	0.243338	0.926766
S.E. equation	0.094934	0. 185269
F-statistic	288.1098	90.26219
Log likelihood	38.86103	14.79054
Akaike AIC	-1.658946	-0.321697
Schwarz SC	-1.263067	0.074183
Mean	11.74013	7.005869
S.D. dependent	0.774893	0.857113
Determinant Residual Covariance		0.000174
Log Likelihood		53.69941
Akaike Information Criteria		-1.983301
Schwarz Criteria		-1.191541

Partial test of each independent variable using t-test is intended to determine the relationship between variables in the research model. From the relationship between these variables, the transmission mechanism can be analyzed, so that it can be seen whether the mechanism is in line with the hypothesis taken earlier and consistent with the theory. In partial testing using the t test used a degree of trust (df) 90% for two sides. This test aims to determine the significance of the relationship of each independent

variable to the dependent variable. The research model obtained 5 relationships between variables that passed the t test as summarized in table 9 below:

Tabel 9. Relation between Variable

With its own lag variable		With other lag variable	
LGDP(-1)	→LGDP	LGDP(-1)	→GEDE
LGDP(-3)	→LGDP	GEDE(-3)	→LGDP
GEDE(-1)	→GEDE		

In Table 9 above, there are two columns, first showing the relationship between the inaction variable and the dependent variable itself, while the second column showing the relationship between the inaction variable and other dependent variables. In this analysis, the concern is the relationship between inaction variables and other dependent variables, so the role of the second column above is more important. When looking at relationships in one variable, the LGDP variable influences LGDP in the 3rd and 1st month. It can be explained that the GDP variable takes time to affect the GDP of the following year. Whereas the EDEXP variable can directly affect the expenditure of education the following year directly.

Variable → ***LGDP (-↑→ LGDP(-1) ↑→ LGDP ↑***

From the above scheme it can be explained that the increase in GDP in lag 3 will increase GDP in lag 1, meaning that it takes 2 years to determine the impact of rising economic growth on economic growth at a later stage.

Variable Education expenditure → ***GEDE(-1) ↑GEDE ↑***

While the variable education expenditure can affect the increase in the education budget in the following year. This means that if this year the government increases its education expenditure in the State Budget, the following year the government can directly increase the education budget again without waiting, the same as the previous year.

GDP transmission to LGDP Education expenditure (-1) GEDE

It can be explained that when government revenue rises as reflected by rising GDP, then for the next fiscal year the government can directly allocate an increase in the education budget in the next year's RAPBN depending on budget politics. This means that education budget expenditure is highly dependent on government finances. If economic growth is good, national income is surplus. The government will get income from taxes, for example, so that it has more free budget allocations in determining the desired budget items. In recent years the government has continued to increase the education budget to reach 20% of the National Budget in line with economic growth.

Transmission of Education expenditure towards → ***GEDE(-3) ↑→ LGDP↑***

It is in accordance with the theory which states that education can not affect the economy in the short term. At least in this study reinforces the theory. New education influences economic growth after the 3rd year. If the government increases the education budget, only the next 3 years will increase GDP.

Education has a representative carrying capacity for economic growth. Tyler reveals that education can increase one's work productivity, which will then increase his income. This increase in income also affects the national income of the country concerned, which in turn will increase the income and living standards of low-income people. Meanwhile, Jones sees education as a tool to prepare the educated and trained workforce that is very much needed in a country's economic growth. Jones sees that education has an ability to prepare students to become potential workers, and to be better equipped to train in their work which will spur labor productivity levels, which will directly increase national income. According to his opinion, the correlation between education and income seems more significant in developing countries.

Educational intervention on the economy is an effort to prepare economic actors in carrying out the functions of production, distribution and consumption. Intervention on the production function is in the form of providing labor for various levels, namely top, midle, and low management; or in extreme labor the blue collar and the white collar. In addition to the workforce, education also intervenes in production to provide strong entrepreneurs who are able to take risks in innovation in production technology. Another form of intervention is creating new technology and preparing people who use it.

Production expansion programs through intensification and rationalization are a concrete manifestation of the role of educational institutions for this production function. Intervention on the distribution function is through the development of research and product development in accordance with the needs and desires of the community or consumers. Intervention on the consumption function is carried out through increased work productivity which will encourage increased income. This increase in income will lead to an increase in the consumption function, which is indicated by an increase in the amount of savings that comes from income set aside. This savings will be a capital investment which will certainly accelerate the pace of economic growth of a country.

D. Conclusions

1. From the results of the Granger causality test it can be concluded that the causality relationship between economic growth (GDP) and education expenditure (EDEXP) both influence each other. GDP affects EDEXP and EDEXP also affects GDP. This is indicated by the statistical F value for the variable which states that GDP does not cause Granger to affect EDEXP of 3,44598 greater than the probability value of 0.02896. So the hypothesis that GDP does not affect EDEXP is rejected. GDP will affect EDEXP. While the statistical F value for the variable that states EDEXP does not cause Granger to affect GDP by 3.17218 is greater than the probability value

0.03846. So the hypothesis that EDEXP does not affect GDP is also rejected. EDEXP will affect GDP.

2. If the causality relationship is known, then the next is to find out the transmission mechanism using the Vector Autoregressive (VAR) analysis. In the VAR analysis it is shown that although the two variables have a causal relationship, but with different influences, GDP can directly affect the increase in the education budget the following year while new education spending will affect economic growth in the next 3 years.

Based on the above research findings, several suggestions can be made as follows:

1. The government should continue to increase its education expenditure because of both variables. The EDEXP variable can be influenced by the government. Both in the short and long term education is the most important factor for the progress of the nation. In the short term the government budget in the education sector will cause a large multiplier effect which in turn will also affect economic growth.
2. The influence of education as an investment in human capital does apply in the long run, rising labor productivity and technology as a proxy for the results of education investment that will increase economic growth in real terms. So both short-term and long-term influences influence economic growth and GDP.

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