

## THE INFLUENCE OF CAPITAL EFFICIENCY AND EDUCATION SPENDING ON INDONESIA'S ECONOMIC GROWTH

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**Abstract:** The efficiency of translating capital toward economic growth has been contested in Indonesia, especially when the economic policies could not achieve economic growth targets. In addition, budget allocation for education sector as a human capital investment is substantial and needs to be assessed its the impact on the economic growth. This research examines relationship between capital efficiency measured by the incremental capital output ratio (ICOR) and education spending on economic growth using 2015 to 2019 data for 34 provinces in Indonesia. Analyses were performed using Pearson correlation and panel data regression. The results show that ICOR has a negative correlation with economic growth for majority of provinces. Regression results show that ICOR negatively affects economic growth, while education spending positively affects economic growth, as expected by theory. The results suggest that the government policy to induce economic growth can be achieved by increasing capital efficiency through reducing the value of ICOR and by allocating the education spending.

**Keywords:** *Economic efficiency, Economic growth, Education spending, ICOR*

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### 1. Introduction

Economic growth is one of the important economic indicators for measuring the development of a country's economy. In the process of economic growth, there will be simultaneous effects which affect various economic sectors. A performance increase in an economic sector will alter its attractiveness, encourage technological progress, and expand the market, which in turn will encourage more rapid economic growth (Kuncoro et al., 2010). Meanwhile, economic growth occurs because the factors of production always increase in quantity and quality, population growth that will increase labor force, investment that adds capital goods, and technological developments that increases production efficiency (Sukirno, 2006).

In the macroeconomic context, Keynes's theory states that the demand for investment goods from the business sector (I) is one of the variables that form Gross Domestic Product (GDP) in addition to other variables in the form of demand for consumer goods and services from the household sector (C), government expenditure (G) and foreign sector expenditure for exports and imports (XM), which is mathematically known as the formula  $Y = C + I + G + (XM)$  (Azwar, 2016). The linkage between investment and economic growth can be measured using the Incremental Capital Output Ratio (ICOR). ICOR is a macroeconomic parameter that describes the ratio of capital or capital investment to the results obtained (i.e. output) from using the investment. ICOR can also be interpreted as the impact of increasing capital on the addition of a number of outputs. The smaller the ICOR value, the greater the

productivity and efficiency of the investment invested and a lower ICOR value will result in a higher rate of economic growth (BPS, 2019).

To achieve optimal economic growth, efficiency in the economy is seriously needed. However, Indonesia's ICOR score in 2018 was still quite high compared to other countries in the Southeast Asia region. Indonesia ranked 6 among the Southeast Asia nations, which have ICORs range between 3-4. According to Minister of Finance Sri Mulyani (Kontan, 2019), various fundamental factors could affect ICOR, including Human Resources (HR) who are constrained by educational problems and limited skills. Therefore, to improve the quality of human resources, the government continues to encourage fiscal policy with the aim of prioritizing human resources so that they are able to be globally competitive by allocating education expenditure of 20 percent of the State Budget (APBN).

Historically, Sumitro Djojohadikusumo as Minister of Finance (1952-1953) controversially stated that Indonesia's development funds experienced leakages of up to 30% (Gofar, 1994). In other words, there was substantial waste in development financing. This value is reflected in the ICOR which at that time was 4.9 or 5 while the average ICOR for ASEAN countries was 3.5. Thus, Indonesia's ICOR was 1.5 times greater than the average ASEAN countries. The analysis confirms that the high and low level of ICOR reflects the high and low economic costs of aggregate investment. ICOR is useful as an initial analysis to obtain a quantitative picture and to pave the way for empirical research that must be carried out more concretely and in detail on the problem in question.

The ICOR value is obtained by comparing the amount of additional capital with additional output (or output), so that the equation defines the relationship between the investment that has been invested and the output in the form of annual income generated from that investment. The ICOR value that indicates good investment productivity ranges from 3-4. A higher ICOR value indicates inefficiency in investment management while a lower value means that capital management has been carried out efficiently (Widodo, 1990). The simple ICOR concept designates a deep meaning about what kind of investment is happening. Does ICOR be influenced by the type of investment the government makes? Why does the higher investment do not convert into higher economic growth? Can the lagging problem affect economic growth that cannot be felt directly?

Figure 1 shows relationship between economic growth and ICOR in 2013-2018. In the figure, it is shown that economic growth and ICOR from 2013 to 2018 have an inverse relationship, except in 2015. Prior to 2015, economic growth deteriorated while ICOR generally improved. In 2015 the drop in consumption as the biggest factor contributing to GDP figures made economic growth contracted even though the ICOR value in that year had decreased. In 2015 onward, economic growth improved while ICOR generally improved.

The achievement of economic growth and development is highly dependent on increasing forms of capital, both physical, natural and human capital. Human resources play an important role and are the key to economic growth and increased productivity. The higher quality of human resources will certainly result in higher economic growth and a lower ICOR value (Hendarmin & Kartika, 2019).

ICOR is a function of investment or capital (symbolized as C or K more generally) divided by economic growth (G), where economic growth is a function of capital and non-capital (Leibenstein, 1966; Nell & Thirlwall, 2018). Education spending is one of the non-capital functions as leverage, that is, with the same capital it can increase better growth through the non-capital effect of improving the quality of human resources due to the

allocation of education spending. Therefore, if the greater the allocation of education spending is budgeted, does it will lower ICOR value?

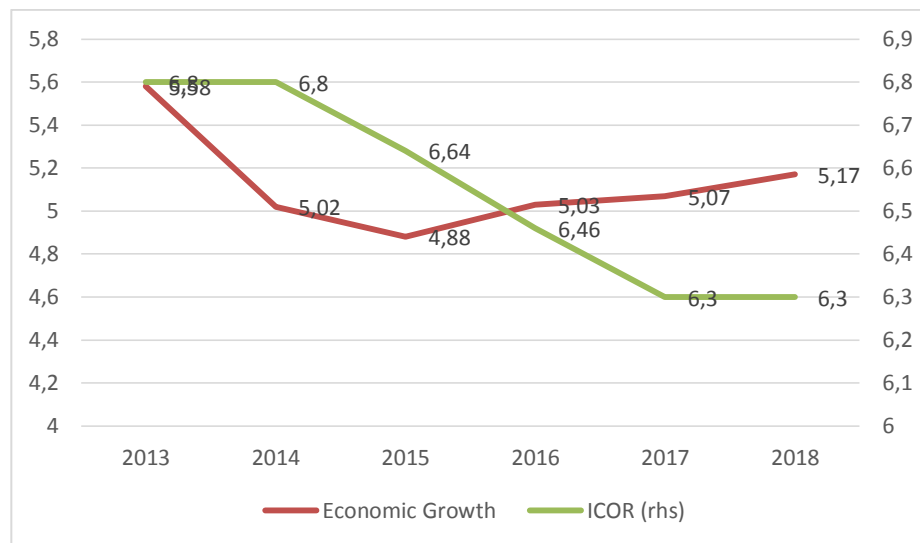


Figure 1. ICOR Value and Indonesia's Economic Growth in 2013-2018  
Source: BKF's database

The education expenditure is disbursed to develop Indonesian people as stated in the *Nawacita*. *Nawacita* are nine development priorities for the next five years, including to improve the quality of life of Indonesian people, carry out a revolution in the character of the nation, reinforce diversity, and strengthen Indonesia's social restoration. The priority of the *Nawacita* program in the education sector is by implementing the “Smart Indonesia” program through the 12 years compulsory and tuition-free education.

In an effort to improve quality, the government uses budget (APBN) as a fiscal policy instrument by regulating the portion of expenditure allocations in the education sector. However, does the amount of education spending that has been distributed to 34 provinces in Indonesia also impact economic growth? Because of the benefits of ICOR knowledge and the large amount of education spending as a tool for consideration of decision making in public economic policy making, this study was conducted to analyze the development of the value of ICOR and education spending on economic growth in Indonesia. This study took a time span from 2015-2019 with a panel data model for 34 provinces in Indonesia.

Economic growth is a long-term per capita output growth process that occurs when there is a tendency to increase in output (Budiono, 2000). The increase in output should come from internal processes within the economy itself rather than from outside; and be self-generating rather than temporary. Self-generating means that the growth process generates strength or momentum for continued growth in the following periods. Other expert (Sukirno, 2006) defines economic growth as the development of changes in the level of economic activity that applies from year to year. To find out how much economic growth has occurred, a comparison of national income from year to year is held, which is known as the rate of economic growth. In economic growth, there are important factors, including capital accumulation, population growth and technological progress (Arsyad, 1988).

According to classical theory of economic growth by Adam Smith (Budiono, 2000) the growth process of output relates to the increase in population or human resources, addition to

the stock of capital goods (capital accumulation) and market expansion as well as the development of domestic and international trade accompanied by specialization and division of labor. In addition to classical economic theory, Ricardo (Budiono, 2000) put forward his thoughts on how to pull the economy forward by relying on technological advances that increase the productivity of labor and capital productivity.

Modern Economic Growth Theory, among others, put forward by Keynes and Neo Keynes. Keynes's thoughts have a background in the depression situation that occurred in 1929 which suggested the idea of effective aggregate demand in the country. This demand is a strategic variable to overcome stagnation in production factors. The "Keynesian Model" aggregate demand is formulated by the change in consumption, investment, and government expenditure. Furthermore, the theory developed by Robert Solow and Trevor Swan states that economic growth depends on the growth of production factors (population, labor, and capital accumulation) and the level of technological progress. This model explains how the factors of production affect the economy's output and growth, which is divided into three stages of analysis, namely (1) the assumption of a fixed labor force and technology, (2) the assumption of only fixed technology and (3) the assumption of a changing labor force and technology (Arif, 1998).

The Cobb-Douglass function can be used to analyze the relationship between the growth rate and ICOR, where an increase in capacity will increase the economic growth side, but not the investment side (Leibenstein, 1966). The function is described by the formula (1) and (2):

$$G = a + bN + bN' + cC + cC' \dots\dots\dots (1),$$

$$\frac{c}{G} = \frac{c}{a+bN+bN'+cC+cC'} \dots\dots\dots$$

(2), where N' and C' are the rate of increase in the utilization of non-capital inputs and capital inputs. Since C is not affected by changes in capacity, it appears that the greater the importance of variation in capacity utilization, the greater the effect of capacity on the inverse relationship between growth rate and ICOR. Meanwhile, the relationship between ICOR and the rate of economic growth is illustrated by an equation where G shows the rate of economic growth, while N and C are the rates of change in capital and non-capital inputs:

$$ICOR = \frac{c}{G} = \frac{c}{a+bN+cC} \dots\dots\dots (3)$$

In order to measure the additional new (investment) capital needed to add one unit of output, ICOR is used as an indicator to calculate investment efficiency against the resulting economic growth in a certain period. One of the investments can be in the form of investment in production factors. According to Solow Swan's theory, one of the factors of production in increasing economic growth is the level of technological progress (Arsyad, 1988). Furthermore, ICOR is important in assessing investment performance in a certain period in a region. ICOR can be used to calculate how much investment is needed to achieve a certain economic growth rate. The relationship between ICOR and economic growth was developed by Harrod and Domar. Harrod-Domar theory relates capital or increase in installed capacity with output in the form of economic growth generated on that capital (Arsyad, 1988). Harrod-Domar argues that investment has a very important role in economic growth. This investment is a key factor in countries that have experienced long-term stable economic growth. The important role of investment from the demand side is as a factor that creates income and from the supply side, investment can increase the production capacity of the economy by

increasing the capital stock (Falianty, 2006). The assumptions used in Harrod-Domar include: (1) the economy is in a condition of full employment or full employment, (2) the economy only consists of the household sector and companies where there are no foreign and government sectors, and (3) the tendency of the community to save or marginal propensity to save remains and starts from zero.

According to the Indonesia's law, the education budget is the budget allocated for education function which is budgeted through state ministries/institutions, through transfers to regions and village funds, and through financing expenditures, including teacher salaries, but excluding official education budgets, to finance education delivery which is the responsibility of the government. As stipulated by the law, government is mandated to allocated minimum 20 percent of state budget to education function.

Adolf Wagner's theory bases his views on a theory called the organic theory of state arguing that government spending is called the "law of ever-increasing activity" which is then reexamined by Peacock and Wiseman. The theory states that government spending and government activities will increase over time. This tendency by Wagner is called the law of always increasing role of government (Clark, 1940; Solikin, 2018). Meanwhile, Rostow and Musgrave in their model connects the development of government spending with the stages of economic development which are separated for each stage, namely at the initial stage, the intermediate stage and the advanced stage. As a result, the education sector has a positive contribution to GDP, where the causal impact of education and health service expenditure on GDP shows an increase in GDP in Bangladesh, Fiji, Kiribati, Maldives, Nepal, Singapore, Sri Lanka, Tonga, and Vanuatu (Maitra & Mukhopadhyay, 2012).

Therefore, this article examines the relationship between capital efficiency (as measured by ICOR) to the economic growth. In addition, this article also investigates role of education spending as a way to increase human capital toward economic growth. This article adds literature on the efficiency of capital in development, as previously inquired by Marissa et al., (2019) in the case of Sumatera provinces.

## **2. Research Method**

The data obtained for this study were secondary data from the Central Statistics Agency, the Fiscal Policy Agency, Ministry of Finance and the Directorate General of Fiscal Balance, Ministry of Finance. The data collected is annual time series data from 2015 to 2019. The variables studied include gross domestic product, growth of gross domestic product, ICOR and education spending. Number of observations were 170, i.e. data from 34 provinces in Indonesia for five years.

The definition of GDP based on current prices is a number that reflects the added value of goods and services which is calculated using the current price which adjusts to the year. For variables in the form of education spending, it is a budget allocation for the education function which is budgeted through state ministries/institutions, education budget allocations through transfers to regions and village funds, and education budget allocations through financing expenditures, including teacher salaries, but not including official education budgets, for finance the provision of education which is the responsibility of the government. Meanwhile, the definition of ICOR according to BPS is a macroeconomic parameter that describes the ratio of capital or capital investment to output or the results obtained using that investment. The formula for calculating ICOR is:

$$\text{ICOR} = \text{PMTB}_{t-1} : \text{PDB}_t \times \% \text{PDB}_t \times 100 \dots\dots\dots$$

(4)



Where:

ICOR = incremental capital output ratio,  
 PMTB = the amount of Gross Capital Fixed Formation at constant prices,  
 PDB = the amount of Gross Domestic Product at constant prices,  
 %PDB = percentage growth of Gross Regional Domestic Product,  
 t = year.

To measure the influence of the strength and direction of the linear relationship of the ICOR variable with economic growth, a correlation measure is used, one of which is the Pearson correlation. The Pearson correlation has the formula:

$$r = \frac{n \sum XY - (\sum X)(\sum Y)}{\sqrt{\{n \sum X^2 - (\sum X)^2\} \{n \sum Y^2 - (\sum Y)^2\}}} \dots\dots\dots$$

(5)

Correlation occurs between two variables if there is a change in one of the variables it will be accompanied by changes in other variables. These changes can occur in the same direction or in the opposite direction. Positive or negative correlation value indicates the direction of the relationship. In this article, it is hypothesized that ICOR has a positive correlation to economic growth.

Furthermore, to determine the effect of ICOR and education spending simultaneously on the economic growth of 34 provinces in Indonesia, panel data regression analysis was used. In this analysis, the estimation of fixed effect model-generalized least square heteros and autoregressive with robust standard error was used. The empirical model used in this research is:

$$G_{it} = a + b_1 ICOR_{it} + b_2 EDU_{it} + u_{it} \dots\dots\dots$$

(6)

where:

$G_{it}$  = economic growth rate,  
 ICOR = incremental capital output ratio,  
 EDU = education spending,  
 i = provinces,  
 t = time,  
 $\alpha$  = constant,  
 $b_1, b_2$  = coefficient,  
 u = error.

In this study, it is expected that ICOR and education spending simultaneously influence economic growth. In addition, ICOR is expected to have a negative effect and education spending has a positive effect on the economic growth.

### 3. Results and Discussion

#### 3.1. Results

Descriptive statistic of variables are presented in Table 1. The ICOR values vary greatly from year to year. In 2015, ICOR rose sharply, decreased in 2016, jumped five times in 2017, reduced in 2018 and stabilized in 2019. In detail at the provincial level, maximum ICOR values were observed in Riau Province in 2015, Kalimantan Timur Province in 2016, Nusa Tenggara Barat Province in 2017, Kalimantan Tengah Province in 2018 and 2019. Meanwhile minimum ICOR values were observed in Aceh Province in 2015, Nusa Tenggara Barat Province in 2018 and Papua Province in 2019. However, the three ICOR values were

negative. In 2017 and 2018, minimum ICOR value with positive signs were observed in Banten Province. Negative ICOR is possible when output of a particular year smaller than previous year. Decreasing output may due to defect or inactive capital goods.

Table 1. Descriptive Statistics

Variable	Mean	Median	Dev. Std	Minimum	Maximum	Observation
ICOR	8.07855373	5.6252977	21.088305	-44.3384	240.4222	170
%GDP	5.45825961	5.436202	3.0752076	-15.2829	21.75873	170
lnGDP	18.790839	18.651219	1.1484786	16.83008	21.33318	170
lnEDU	27.3360409	27.445955	1.2467099	24.28927	30.81162	170

Source: Authors calculation

Correlations between ICOR and economic growth are presented in Table 2. The table shows strong positive correlations ( $0.5 < r < 1$ ) in the provinces of Sumatra Utara, Jambi, Lampung, Gorontalo, Nusa Tenggara Timur and Papua. Meanwhile, weak positive correlations ( $0 < r < 0.5$ ) were observed in the provinces of Aceh, Riau, Jawa Tengah, Jawa Timur and Maluku. Strong negative correlations ( $-0.5 < r < -1$ ) were indicated in the provinces of Sumatra Barat, Sumatra Selatan, Bangka Belitung, Kepulauan Riau, DKI Jakarta, Jawa Barat, DI Yogyakarta, Banten, Bali, Kalimantan Tengah, Kalimantan Selatan, Kalimantan Timur, Sulawesi Utara, Sulawesi Selatan, Sulawesi Barat, Maluku Utara and Papua Barat. The provinces of Bengkulu, Kalimantan Barat, Kalimantan Utara, Sulawesi Tengah, Sulawesi Tenggara and Nusa Tenggara Barat showed weak negative correlations ( $0 < r < -0.5$ ). Majority of provinces (67.65 percent) observed negative correlation between ICOR and economic growth, as expected.

Table 2. ICOR Relationship with Economic Growth

No	Strong Negative Correlation	Correlation coefficient	No	Weak Negative Correlation	Correlation coefficient
1	Sulawesi Utara	-0.992	1	Bengkulu	-0.363
2	DI Yogyakarta	-0.972	2	Kalimantan Barat	-0.216
3	Sumatra Barat	-0.967	3	Kalimantan Utara	-0.232
4	Kepulauan Riau	-0.933	4	Sulawesi Tengah	-0.145
5	Maluku Utara	-0.921	5	Sulawesi Tenggara	-0.118
6	Sulawesi Barat	-0.920	6	Nusa Tenggara Barat	-0.262
7	Bangka Belitung	-0.914			
8	Papua Barat	-0.908			
9	DKI Jakarta	-0.871			
10	Bali	-0.743			
11	Sumatra Selatan	-0.719			
12	Kalimantan Timur	-0.604			
13	Sulawesi Selatan	-0.599			
14	Kalimantan Selatan	-0.590			

15	Kalimantan Tengah	-0.587			
16	Banten	-0.557			
17	Jawa Barat	-0.517			
No	Strong Positive Correlation	Correlation coefficient	No	Weak Positive Correlation	Correlation coefficient
1	Lampung	0.903	1	Jawa Tengah	0.406
2	Sumatra Utara	0.825	2	Maluku	0.403
3	Papua	0.821	3	Riau	0.263
4	Jambi	0.819	4	Aceh	0.249
5	Nusa Tenggara Timur	0.645	5	Jawa Timur	0.197
6	Gorontalo	0.511			

*Source: Processed from BKF database, MoF*

Note: dark green= strong negative corr., light green = weak negative corr., dark red= strong positive corr., light red= weak positive corr.

In this regard, Table 3 presents data in the form of correlation results of long-term investment spending in the form of housing and public facilities function expenditures and shares of total functional expenditure as a whole. The consideration of using housing and public facilities function expenditures is compared to other types of expenditure functions, because this expenditure has the suitable characteristic of being long-term investment spending. Housing and public facilities expenditures require time to add value to the economy because the processing time required to complete the project expenditure is relatively long and the effects that are given cannot be felt immediately in a short time. The long-term investments data are then used to explain positive correlation between ICOR and economic growth. Do the long-term investment expenditures play roles in flipping correlation signs between ICOR and economic growth?

**Table 3. Long Term Investment Expenditure and Share of Total Expenditure**

	Province	Average Long-Term Investment Expenditures (Billion Rp)	Share to Total		Province	Average Long-Term Investment Expenditures (Billion Rp)	Share to Total
1	DKI Jakarta	5,967.57	10.6%	18	Maluku	310.52	13.5%
2	Aceh	997.63	10.0%	19	Nusa Tenggara Barat	306.67	10.5%
3	Riau	860.84	12.3%	20	DI Yogyakarta	281.22	7.4%
4	Papua	706.49	7.6%	21	Sulawesi Tenggara	270.54	10.5%
5	Jawa Timur	682.65	3.2%	22	Jambi	253.99	8.2%
6	Sumatra Utara	656.45	9.3%	23	Jawa Tengah	245.03	1.9%
7	Banten	621.65	8.3%	24	Bengkulu	242.41	11.3%
8	Lampung	599.09	11.6%	25	Sulawesi Tengah	231.55	8.3%
9	Jawa Barat	584.14	3.1%	26	Riau	211.01	6.2%
10	Kalimantan Barat	484.40	11.4%	27	Kalimantan Tengah	206.55	8.6%
11	Sumatra Selatan	461.14	9.1%	28	Sulawesi Utara	182.61	8.7%
12	Kalimantan Selatan	408.93	11.6%	29	Bangka Belitung	159.08	8.5%
13	Papua Barat	381.62	8.9%	30	Nusa Tenggara Timur	156.77	4.8%
14	Sulawesi Selatan	375.51	6.6%	31	Maluku Utara	139.31	7.9%
15	Sumatra Barat	355.63	8.2%	32	Bali	130.12	3.9%
16	Kalimantan Utara	343.88	16.9%	33	Sulawesi Barat	118.18	7.9%



17	Kalimantan Timur	339.58	5.4%	34	Gorontalo	113.84	8.1%
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*Source: Processed from DJPK database, MoF*

Note: dark green= strong negative corr., light green = weak negative corr., dark red= strong positive corr., light red= weak positive corr.

Provinces with the highest strong positive correlation in Table 2 were Lampung (0.903). Sumatra Utara (0.825) and Papua (0.821) respectively ranked 8<sup>th</sup>, 6<sup>th</sup>. and 4<sup>th</sup>. Meanwhile, provinces with highest strong negatives correlation in Table 2 include Sulawesi Utara (-0.992). DI Yogyakarta (-0.972) and Sumatra Barat (-0.967) respectively in the 28<sup>th</sup>. 20<sup>th</sup>, and 15<sup>th</sup> ranks in Table 3. Provinces with the top 10 rank in the average total expenditure for housing and public facilities functions are dominated by provinces with a positive correlation with a total of 6 provinces. The remaining 4 provinces are negatively correlated provinces (i.e. DKI Jakarta, Banten, Jawa Barat and Kalimantan Barat).

To further investigate the pattern of long-term investment spending relationship to provincial economic growth with ICOR having a positive correlation, Table 4 presents data in the form of a correlation between the share of spending on housing and public facilities functions to the total expenditure function as a whole in year t with the economic growth of all provinces in Indonesia in year of t+1. The lag of one year is used to see the effect on economic growth on spending on housing functions and public facilities that has been carried out in the previous year.

Table 4. Correlation of Share of Long-Term Investment Expenditure on Economic Growth

No	Province	Pearson Correlation	No	Province	Pearson Correlation
1	Sumatra Utara	-0.9826	18	Jawa Timur	0.4579
2	Nusa Tenggara Timur	-0.8319	19	Sulawesi Tenggara	0.4768
3	Nusa Tenggara Barat	-0.7645	20	Kalimantan Utara	0.4873
4	Jawa Tengah	-0.6143	21	Maluku	0.6750
5	Kepulauan Riau	-0.3892	22	Kalimantan Timur	0.7228
6	DI Yogyakarta	-0.3739	23	Papua	0.7240
7	Sumatra Selatan	-0.3310	24	Gorontalo	0.7619
8	Riau	-0.2965	25	Sulawesi Selatan	0.8003
9	Lampung	-0.2428	26	Kalimantan Selatan	0.8941
10	Papua Barat	0.0695	27	Bali	0.8974
11	Sulawesi Tengah	0.1977	28	Sulawesi Barat	0.9037
12	Bengkulu	0.2356	29	Bangka Belitung	0.9236
13	Jambi	0.3066	30	Sulawesi Utara	0.9661
14	Kalimantan Tengah	0.3465	31	Sumatra Barat	0.9741
15	Banten	0.3772	32	Jawa Barat	0.9953
16	DI Aceh	0.3799	33	Maluku Utara	0.9986
17	Kalimantan Barat	0.3875	34	DKI Jakarta	1.0000

*Source: Processed from DJPK database, MoF*

Provinces with ICOR that have a strong positive correlation with economic growth are still marked with dark red color. Then, provinces with weak positive correlations are marked with light red color. Furthermore, provinces with strong negative ICOR correlation with economic growth use dark green labels and provinces with weak negative correlations using light green labels. The results show that provinces with a strong positive ICOR correlation (or provinces with red labels) are ranked first and second in Table 4. These provinces are North Sumatra (-0.9826) and Nusa Tenggara Timur (-0.8319), respectively. Meanwhile, the lowest tiers in Table 4 (i.e. rank 25<sup>th</sup> to 34<sup>th</sup>) are occupied by provinces with negative correlations of ICOR to economic growth.

Linear regression was carried out on equation 6 to determine the simultaneous effect of ICOR and education spending on the economic growth of 34 provinces in Indonesia. The regression results are presented in Table 5.

Table 5. Regression Test Results

Variables	FEM with robustness		
Constant	17.20835		
ICOR	-0.0002885	***	H <sub>0</sub> rejected
lnEDU	0.0569844	***	H <sub>0</sub> rejected
R <sup>2</sup> /R <sup>2</sup> adj.	0.2538		
Observations	170		
F-test	36.09		
Prob. >F	0.0000	***	

Note: \* p<0.05, \*\* p<0.01, \*\*\* p<0.001

Source: Authors calculation

Based on Table 5, the probability of the F-statistic for the model is statistically significant at 1 percent. This result means that the independent variables in this study, both ICOR and education spending, are simultaneously capable of having a significant effect on dependent model, namely economic growth. Furthermore, the coefficient value of the ICOR variable is statistically significant at 1 percent. This result indicates that higher ICOR has a negative effect on economic growth, as expected. For the log education spending variable in the model, it is also statistically significant at 1 percent. The result indicates that education spending has a positive effect on economic growth, as expected. In addition, the R<sup>2</sup> value is 0.2538, which means that the variation in economic growth can be explained by the independent variables in this model by 25.38% and the remaining 74.62% of the variation of the dependent variable is determined by other variables not included in the model.

### 3.2. Discussion

Referring to the results of hypothesis testing using correlations, the relationship between ICOR and economic growth in 34 Indonesian provinces can be divided into four categories. This category includes provinces with strong positive correlation, weak positive correlation, strong negative correlation and weak negative correlation. A total of 23 provinces (67.65 percent) showed a negative relationship between the ICOR variable and the economic growth variable, while the remaining 11 provinces (32.35 percent) showed a positive relationship between the two variables.

The negative correlation pattern shown by the 23 provinces is in line with research conducted by Banerji (1969) which states that ICOR and economic growth have a negative

relationship or correlation. High economic growth is associated with low ICOR values and vice versa. However, there is a positive correlation shown in 11 provinces in line with previous research by Situmorang and Sugiyanto (2011), because the types of investment planted in provinces that have a positive correlation are long-term investments. Long-term investment cannot have an immediate effect on economic growth during the five-year period.

Long-term investments made by the government include infrastructure spending, which in this study proxied by spending in housing and other facilities functions. Referring to the data on spending on housing and other facilities functions, provinces that have a positive correlation tend to have a higher average amount of expenditure on housing and other facilities than provinces with a negative correlation coefficient. In addition, to investigate the relationship between the share of long-term investment spending and the resulting economic growth in subsequent years, the correlation between the share of the housing and public facilities spending function on the total spending function as a whole. The results obtained indicate that provinces that have a positive correlation pattern on the relationship between ICOR and their economic growth tend to have the lowest influence on the portion of long-term investment spending on their economic growth, and vice versa. This indicates that provinces that have a positive correlation to the ICOR on economic growth tend to have a portion of long-term investment spending that is less able to add value to economic growth in the short term.

Based on the regression test on the model that combines ICOR and education spending as the independent variable, it shows ICOR significantly and negatively affects economic growth. Meanwhile, the coefficient of log education spending has positive coefficient which means that education spending has a positive effect on economic growth. ICOR has a negative effect on economic growth means that the higher (lower) the ICOR score is, the resulting economic growth will decrease (increase). The regression test results in this study confirm the results of previous research (Ohkawa & Rosovsky, 1960; Taguchi & Lowhachai, 2014). The former authors studied relationship between ICOR and Japanese economic growth from 1890 to 1931; while the later authors examined 21 countries in Asia.

Meanwhile, in developing countries according to Wai (1985) capital is considered an important factor in explaining growth in developing countries for several reasons. First, developing countries have a lower stock of capital than developed countries. Second, developing countries tend not to have a specialized workforce, leaving room in the industry to apply the "roundabout method" in which the first production is in the form of capital goods which are then used to produce consumer goods, thereby increasing productivity. Third, developing countries need more capital to absorb new technologies owned by developed countries. Fourth, developing countries have lower scores of capital per worker than developed countries, so that capital productivity is relatively higher. In several African countries, investment efficiency as proxied by ICOR was determined by several factors, including human capital and corruption (Soumaila, 2017).

Investments made in the economy by both the government and the private sector have an important meaning as a driving force for the economy. Investment made by the government will make a positive contribution to economic growth. On the other hand, it can be seen that education spending has a positive effect on economic growth. The effect of education spending shows that higher education spending results in increased economic growth, and vice versa. Education directly may affect productivity of workers and indirectly impact productivity of other physical capitals (Breton, 2013).

The results of the research on education expenditure conducted confirms previous research conducted by Maitra and Mukhopadhyay (2012) regarding the positive influence of education spending on economic growth. Where education spending in the countries of Bangladesh, Fiji, Kiribati, Maldives, Nepal, Singapore, Sri Lanka, Tonga, and Vanuatu during the 30 years of observation caused GDP to increase. In the theory of Keynes, there is a postulate that public spending has a positive contribution to income growth in the short run through a multiplier process. Public spending can be used as an instrument of exogenous fiscal policy as a factor affecting economic growth. On the other hand, Wagner's law states that when a country's per capita income increases, the government will increase public spending (Solikin, 2018). Thus, if GDP growth increases, it will cause an increase in public spending (unidirectional causality).

Public spending made by the government is divided into two categories according to their effect on economic growth, namely productive and unproductive spending. Productive spending has a positive effect on economic growth, while unproductive spending has an indirect or no effect on economic growth. Education and health spending are generally considered productive expenditure with a comprehensive role in the economy with the return from spending made in the form of income both as empowerment and income at the individual and social level. The empirical studies conducted show that the higher the education taken by individuals, the higher their income level (Psacharopoulos & Patrinos, 2018). While at the social level, quality human resources renovate the social order by encouraging awareness and creating a peaceful state life, as well as increasing awareness of public health, social and political participants (Currie & Moretti, 2003).

Meanwhile, in the theory of endogenous growth the formation of human resources determines the increase in productivity and accelerates the rate of growth along with technological advances (Apostol et al., 2022). Spending on education is a form of investment that helps increase efficiency, knowledge and inventions that contribute to a country's economic growth. In accordance with this theoretical proposition, policy makers should pay attention to spending in education sector to educate the nation's life and eventually it will affect economic growth for Indonesian people prosperity.

#### **4. Conclusion**

The relationship between ICOR and the economic growth of provinces in Indonesia varies, i.e. show positive and negative correlation, which illustrates the differences in the characteristics of the investment period invested in each of these provinces. The positive correlation pattern shows that the effects of investment made in producing output in the form of economic growth have not been felt. Therefore, it is necessary to examine more deeply the types of investment made in the province concerned are short-term or long-term investments. Apart from this, there is also the possibility of inefficiency in investment management so that it does not have an added effect on economic growth. Some provinces exhibit that ICOR values have negative effect on economic growth. In accordance with its function, ICOR describes the amount of capital/capital investment made to the increase in the amount of output in the economic system which can be observed in economic growth figures. The lower the ICOR value, the higher the economic growth achieved because the efficient level of capital management carried out is getting better.

In addition, education spending has a positive effect on economic growth. However, these effects take time to materialize. Education spending has an important role to play in improving the quality of human resources as a key factor in driving the wheels of the

economy. Educated human resources who have expertise or qualified skills will increase economic growth.

There are several limitations in this study. First, in terms of period of analysis, the span of time taken in this study is quite short, namely five years for all provinces in Indonesia. Second, education expenditure data used in the model was the total education expenditure budget which consists of personnel expenditure, goods and services expenditure, capital expenditure and other expenditures. Future research could incorporate variables which directly reflect productivity or innovation of labor forces.

Based on the results, several suggestions can be offered. From the negative effect of ICOR on economic growth, it shows the importance of investment efficiency in the economy. Therefore, government needs to pay attention to policies that support efficiency in investment management, such as simplifying business licensing procedures and support in business operations, as well as providing fiscal incentives with certain criteria. In addition, from the positive effect of education learning on economic growth, the policy maker should pay consideration on composition of priority spending policies in the short and long term. Efforts should be made to improve the quality of education spending which has a positive effect on economic growth. The management of education spending funds should be improved to increase its effectiveness and efficiency by considering the characteristics of each province.

## **References**

- Apostol, M. A., Enriquez, H. A. M., Sumaway, O. L., & Navarrete, A. F. C. (2022). Innovation factors and its effect on the GDP per capita of selected ASEAN countries: An application of Paul Romer's Endogenous Growth Theory. *International Journal of Social and Management Studies (IJOSMAS)*, 3(2), 119–135.
- Arif, S. (1998). *Teori dan Kebijakan Pembangunan*. Jakarta: CIDES.
- Arsyad, L. (1988). *Ekonomi Pembangunan*. Yogyakarta: STIE YKPN.
- Azwar, A. (2016). Peran alokatif pemerintah melalui pengadaan barang/jasa dan pengaruhnya terhadap perekonomian Indonesia. *Kajian Ekonomi Keuangan*, 20(2), 149–167.
- Banerji, R. (1969). An experiment with Incremental Capital-Output Ratio. *Weltwirtschaftliches Archiv*, 102, 274–277.
- BPS. (2019). *Indikator Ekonomi*. Jakarta: BPS.
- Breton, T. R. (2013). The role of education in economic growth: Theory, history and current returns. *Educational Research*, 55(2), 121–138. <https://doi.org/10.1080/00131881.2013.801241>
- Budiono, T. (2000). *Teori Pertumbuhan Ekonomi*. Yogyakarta: Bagian Penerbitan Manajemen Informatika UGM.
- Clark, E. A. (1940). Adolf Wagner: From national economist to national socialist. *Political Science Quarterly*, 55(3), 278–411.
- Currie, J., & Moretti, E. (2003). Mother's education and the intergenerational transmission of human capital: Evidence from college openings. *The Quarterly Journal of Economics*, 118(4), 1495–1532.
- Falianty, T. A. (2006). *Feasibility of Forming Currency Union in ASEAN-5 Countries*. Depok: University of Indonesia.
- Gofar, A. (1994). ICOR. *Majalah Anggaran*.
- Hendarmin, H., & Kartika, M. (2019). The relationship between human capital and the regional economy productivity. *Jejak: Journal of Economics and Policy*, 12(1),



- 138–152. <https://doi.org/10.15294/jejak.v12i1.18396>
- Kontan. (2019). *ICOR Indonesia Masih Tinggi. Menkeu: Kualitas Pendidikan dan Birokrasi Jadi Penyebab*. <https://nasional.kontan.co.id/news/icor-indonesia-masih-tinggi-menkeu-kualitas- pendidikan-dan-birokrasi-jadi-penyebab>
- Kuncoro, M., Hayati, Y. S., Rahmat, R., & Hardani, W. (2010). *Masalah, Kebijakan, dan Politik Ekonomika Pembangunan*. Erlangga.
- Leibenstein, H. (1966). Incremental capital-output ratios and growth rates in the short run. *The Review of Economics and Statistics*, 48(1), 20–27. <https://doi.org/10.2307/1924854>
- Maitra, B., & Mukhopadhyay, C. K. (2012). Public spending on education, health care and economic growth in selected countries of Asia and the Pacific. *Asia-Pacific Development Journal*, 19(2), 19–48. <https://doi.org/10.18356/e7c7bcb7-en>
- Marissa, F., Yulianita, A., & Fitriyah, A. (2019). The effect of investment efficiency toward economic growth in South Sumatera and Jambi Province. *Jurnal Ekonomi Pembangunan*, 17(2), 71–80. <https://doi.org/10.29259/jep.v17i2.9399>
- Nell, K. S., & Thirlwall, A. P. (2018). Explaining differences in the productivity of investment across countries in the context of ‘new growth theory.’ *International Review of Applied Economics*, 32(2), 163–194. <https://doi.org/10.1080/02692171.2017.1333089>
- Ohkawa, K., & Rosovsky, H. (1960). The role of agriculture in modern Japanese economic development. *Economic Development and Cultural Change*, 9(1, Part 2), 43–67.
- Psacharopoulos, G., & Patrinos, H. A. (2018). Returns to investment in education: A decennial review of the global literature. *Education Economics*, 26(5), 445–458. <https://doi.org/10.1080/09645292.2018.1484426>
- Situmorang, A. T., & Sugiyanto, F. (2011). *Pengaruh Efisiensi Perekonomian Terhadap Pertumbuhan Ekonomi 32 Provinsi di Indonesia*. Semarang: FE Universitas Diponegoro.
- Solikin, A. (2018). Pengeluaran pemerintah dan perkembangan perekonomian (Hukum Wagner) di negara sedang berkembang: Tinjauan sistematis. *Info Artha*, 2(1), 53–64.
- Soumaila, I. (2017). The determinants of investment efficiency in West African Economic and Monetary Union (WAEMU). *The Journal of Developing Areas*, 51(1), 49–61. <https://doi.org/10.1353/jda.2017.0003>
- Sukirno, S. (2006). *Ekonomi Pembangunan: Proses, Masalah, dan Dasar Kebijakan*. Kencana (Prenada Media).
- Taguchi, H., & Lowhachai, S. (2014). A revisit to the incremental capital-output ratio: The case of Asian economies and Thailand. *International Journal of Economic Policy in Emerging Economies*, 7(1), 35–54. <https://doi.org/10.1504/IJEPEE.2014.059891>
- Wai, U. T. (1985). Study of ICOR in developing countries. *Savings & Development*, 9(3), 225–263.
- Widodo, H. S. T. (1990). *Indikator Ekonomi: Dasar Perhitungan Perekonomian Indonesia*. Yogyakarta: Kanisius.