

Analysis of Investment Efficiency by using ICOR Approach to Economic Growth in All Provinces of Sumatera Island

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Abstract: This study aims to describe the effect of investment efficiency through ICOR approach to the economic growth of provinces on Sumatera Island between 2007 and 2016. Using the data panel and Fixed Effect Model, this study confirms that ICOR has a negative correlation with the level of economic growth like has been expected in the theoretical model and it also found that the ICOR coefficient is -0.21. The coefficient shows the meaning that the increasing in investment efficiency through the decreasing one percent of ICOR will boost the economic growth of ten provinces in Sumatera by 0.21 percent. Based on the ICOR project of Sumatera Island 12,762 - 0,2144 * ICOR shows that investment use is more efficient in increasing economic growth in 2007-2016. This research also shows that for the Province of North Sumatera, Riau Province, Jambi Province, Bengkulu Province and Lampung Province have grown better than other provinces in Sumatera Island in the same development stage without an increase in the proportion of investment to Gross Domestic Regional Product.

1 INTRODUCTION

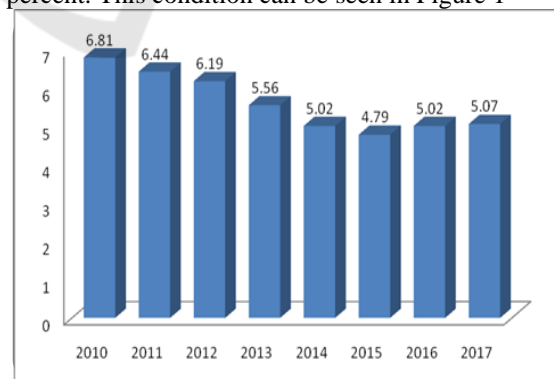
Community welfare in a region can be seen from the high and low economic growth in the region. By increasing the economic growth of a region, it is expected that the income of the people in the region will increase so each region will always make an effort to reach the optimal economic growth to bring its people to a better life.

The factors that determine a country's economic growth are determined by four factors namely: (i) capital accumulation, including all new investments, such as land (land), physical equipment (machinery), and human resources (human resources); (ii) population growth; (iii) technological progress; and (iv) institutional resources (institutional system) (Arsyad, 2010).

The several factors that influence economic growth above, Indonesia is one of the broadest developing countries who have that all factors and Indonesia is rich in natural resources, both marine, forest and mining. and others. The abundance of natural resources is widespread in all provinces in Indonesia.

The Indonesian economy has experienced a fluctuating growth in one windu. Since 2010,

Indonesia's economic growth has decreased from 6.81 percent and continues to decline each year to reach 4.17 percent in 2015. However, in the following years, the economy in Indonesia: a began to make improvements. This was marked by an increase in economic growth in 2015 and 2016 which was 5.02 percent and increased again to 5.07 percent. This condition can be seen in Figure 1



Source: BPS, 2017

Figure 1: Indonesian Economic Growth 2010-2017 (percent)

In terms of production, economic improvement was driven by growth in almost all sectors of the

business sector in the economy. Sector that provides a large portion of Gross Domestic Product, namely the information and communication sector, other services and the transportation and warehousing sector.

In terms of expenditure, economic improvement can be seen from the start of increased investment and exports and imports. If seen from the spatial economic structure, it is still dominated by provincial groups in Java and Sumatra. In 2017, the provincial group in Java made the largest contribution to Gross Domestic Product, which amounted to 58.49 percent, followed by Sumatra Island at 21.66 percent.

Sumatra Island which has quite unique characteristics and has a significant contribution to the Indonesian economy because it is supported by the availability of raw materials, energy sources, labor, national markets and exports and the superior location close to the shipping lanes in the Malacca Strait.

According to the Indonesian Investment Coordinating Board (BKPM) (2015), there are at least some potential investments in Sumatra prepared by the government as a buffer for national economic growth. Therefore, in line with the above conditions, to optimize the use of natural resources on the island of Sumatra, of course, sufficient additional capital (investment) is needed to achieve the targeted economic growth. This investment is based efficiency in the use of investment in the resources that are owned will only produce economic growth that is not optimal. For this reason, in order to achieve certain economic growth targets, it is very necessary to estimate the investment needs properly.

Harrod Domar's model relates the influence of additional capital stock on output known as ICOR Incremental Capital-Output Ratio. ICOR approach is really needed in determining how much investment needs at the level of economic growth that is expected to grow and with ICOR approach, it can see the efficiency of investments which has invested in a certain period. The lower of the ratio means the higher level of investment efficiency. The amount of ICOR generally ranges from 2.0 to 5.0 with a median value for more than 70 developing countries between 3.0 to 3.5 (Arsyad, 2010).

Based on the above introduction, this study aims to determine the effect of efficiency investment by using ICOR indicator to economic growth in provinces on the island of Sumatra. This research is important in the economic development planning process in Sumatera Island, so the author is

interested to discuss and analyzes "Investment Efficiency in Provinces on Sumatra Island".

2 THEORETICAL FRAMEWORK

2.1 Adam Smith's Growth Theory

According to Smith (Arsyad, 2010), the main elements of a country's production system are three, namely:

1. The availability natural resources, which are presented by the availability of land. According to Smith, the available natural resources are the most basic container of a society's production activities. The amount of available natural resources is the "maximum limit" for the growth of an economy.
2. Human resources, represented by the population. Human resources play a passive role in the process of increasing output.
3. Accumulated capital owned. According to Smith, the stock of capital plays the most important role in economic development. Stock capital can be identified as a development fund, the rapid pace of economic development depends on the availability of development funds. In addition, capital stock is an element of production that actively determines the level of output. Its role is very central in the process of output growth. The amount and growth rate of output depends on the growth rate of the capital stock in accordance with the "maximum limit" of natural resources. In other words, output growth will slow down if the "carrying capacity" of natural resources is no longer able to keep pace with the pace of economic activities of the community.

Smith said, capital must be done first than the division of labor. Smith considers capital fertilization as an absolute condition for economic development, thus the problem of broad economic development is the ability of humans to save more and invest more. "The capital of a nation increases in the same way as increasing individual capital by cultivating and continually increasing the savings they set aside from income. Therefore, the fastest way is to invest capital in such a way that it can provide the greatest income to the entire population and also influence savings. Thus the level of investment will be determined by the level of savings and savings fully invested (Jhingan, 2012).

2.2 Harrod-Domar Model

Harrod and Domar provide a key role for investment in the process of economic growth, especially regarding the dual character of investment. First, investment creates income and both investments increase the production capacity of the economy by increasing the capital stock. Therefore, as long as net investment continues, real income and output will always increase. However, to maintain the equilibrium level of income in full employment from year to year, both real income and output must both increase at the same rate when the productive capacity of capital increases. If not, any difference between the two will cause excess capacity or idle capacity. This forces employers to limit their investment expenditures so that it will ultimately adversely affect the economy, namely lowering income and employment in the next period and shifting the economy out of the path of steady growth in balance. So if work is to be maintained in the long run, investment must always be enlarged (Jhingan, 2012).

The center of attention of Harrod revolves around economic growth which can take place continuously in a pattern of stable equilibrium. Harrod's theory has general growth criteria and economic assumptions, namely:

1. The rate of economic growth is defined as $g = \Delta Y / Y$;
2. The desire to save is a proportional part of national income, $s = S / Y$;
3. Additional capital for a given period is the same as the existing investment, $\Delta K = I$
4. All savings are channeled in net investment, $S = I = \Delta K$ so that $s = S / Y = I / Y$
5. $\Delta K / \Delta Y$ is defined as ICOR (Incremental Capital Output Ratio), denoted by k ;
6. Then growth can be formulated as

$$g = \frac{\Delta Y}{Y} = \frac{\Delta Y / I}{Y / I} = \frac{I / Y}{I / \Delta Y} = \frac{S / Y}{\Delta K / \Delta Y} = \frac{s}{y}$$

Which means that economic growth depends on the tendency to save society (s) as well as measures of economic efficiency (k) (Hakim, 2014).

2.3 Neoclassical Growth Theories

According to the Solow-Swan theory, economic growth depends on the availability of factors of production (population, labor, and capital

accumulation) and the level of technological progress.

The Neoclassical model states that the mobility of production factors, both capital and labor, at the outset was not smooth. As a result, at that time capital and skilled labor tended to be concentrated in more developed areas so that development inequality tended to widen (divergence). But if the development process continues, with better infrastructure and communication facilities, the mobility of capital and labor will be smoother. Thus, later after the country concerned has advanced, then development inequality will decrease (convergence). This estimate is known as the Neoclassical Hypothesis (Tambunan, 2009).

2.4 Endogenous Growth (New Growth Model)

Endogenous growth theory is the beginning of a revival of new understanding of the factors that determine long-term economic growth. In this case, endogenous growth theory explains why capital accumulation does not experience diminishing returns, but instead experiences increasing returns with specialization and investment in the field of human resources. The difference with the Solow model is that in Solow growth, savings will encourage growth temporarily, but decreasing return to capital will ultimately drive the economy in steady state where growth depends only on exogenous technological advances. Conversely in endogenous growth models, savings and investment can encourage sustainable growth (Nanga, 2005).

2.5 Investment Theory

Investment is the first step in production activities. With such a position, investment in essence is also the first step in economic development activities. The dynamics of investment affect the high and low level of economic growth, reflecting the widespread lack of development. In an effort to grow the economy, every country is always trying to create a climate that can stimulate investment. The target is not only the public or domestic private sector, but also foreign investors (Dumairy, 1996).

The issue of investment in the era of regional autonomy needs to be assessed in terms of the issue of investment carried out in the regions, how the regulation and control is carried out as well as the issue of budget (budget) issued.

Since the enactment of Law No. 1/1967 jo. No. 11/1970 concerning Foreign Investment (PMA) and

Law No. 6/1968 jo. No. 12/1970 concerning Domestic Investment (PMDN), investment tends to increase from time to time. However, in certain years there was also a decline. The increasing trend not only takes place in investments by the public or the private sector, both PMDN and PMA, but also investment by the government. This means the formation of gross domestic capital increases from year to year (Dumairy, 1996).

To get an overview of the development of investment from time to time, there are three types of methods (based on three clusters of data) that are commonly done. First, by highlighting the contribution of gross domestic capital formation in the context of aggregate demand, namely seeing the contribution and development of variable Investment (I) in the national income identity $Y = C + I + G + (X-M)$. Data Investment (I) is the overall data on gross domestic investment, including both investment by the private sector (PMDN and PMA) and by the government. The second way is to observe PMDN and PMA data. In this way, we only observe investment by the private sector. The third way is to examine the development of investment funds channeled by the banking world (Dumairy, 1996).

2.6 Investment Efficiency

Efficiency is an activity to use resources appropriately, there is no waste of existing resources. Companies usually make efficiency in order to reduce costs and facilitate the process of managing the company to easily achieve company goals. Investment activities carried out by the company must be efficient in order to give benefits to the company. Investment efficiency is the optimal level of investment from the company, where the investment is a type of investment that is profitable for the company (Suryana, 2014).

The indicator commonly used to measure investment efficiency is Incremental Capital Output Ratio or ICOR. According to the Central Bureau of Statistics, (ICOR) is a quantity that shows the amount of additional new capital (investment) needed to increase / increase one unit of output. The ICOR magnitude is obtained by comparing the amount of additional capital with additional output. Because unit capital forms are different and diverse while output units are relatively not different, then to facilitate calculation both are valued in terms of money (nominal).

The ICOR concept was originally developed by Harrod and Domar which later became known as the

Harrod-Domar model. This model basically shows the relationship between output (regional income) of an economy with the amount of capital stock needed. Capital stock is the condition of the stock of capital (capital goods) available at a certain time.

If you want to increase regional income by 1 unit, you need an additional capital stock of ICOR. The capital stock in year t is basically the accumulation of investment (capital goods) from a given year (year $(t-s)$) where $s = 1, 2, 3, \dots$ up to the t -year. Suppose an investment starts in the t -year and continues until the year $(t + 1)$, that is, the condition is assumed to consist of only two years, then the capital stock in the t -year and year $(t + 1)$.

In calculating ICOR, the investment concept used refers to the concept of the national economy. Definition of investment referred to here is fixed capital formation / formation of fixed capital goods consisting of land, buildings / construction, machinery and equipment, vehicles and other capital goods. Meanwhile the calculated value includes: the purchase of raw / used goods, large manufacturing / repairs carried out by other parties, major manufacturing / repairs carried out on its own, sales of used capital goods. Fixed Capital Formation or the formation of fixed capital goods in this case is the formation of gross fixed capital goods (PMTB) (BPS Calatog, 2008).

3 METHODOLOGY

The scope of this study is to analyze the investment efficiency with ICOR approach in all provinces of Sumatera Island and the impact on economic growth. The study will be analyzed by using panel data regression method. The data used is a combination time series and cross section in the form of annual data.

Observation period is adjusted to the availability data from 2007 to 2016. The data will be analyzed in this study include Gross Domestic Regional Product (GDRP) data, Gross Fixed Investment and the rate of economic growth of ten provinces in Sumatera Island; Aceh Province, North Sumatera Province, West Sumatera Province, Riau Island Province, Riau Province, Jambi Province, South Sumatera Province, Bangka Belitung Province, Bengkulu Province, and Lampung Province.

This study analyzed the correlation of investment efficiency by using ICOR approach to the economic growth in all provinces of Sumatera Island. In this case, investment efficiency which measured by using ICOR approach can affect the economic

growth. The lower value of ICOR means that investment used more efficient. The impact of efficiency investment used is the higher economic growth.

This research plan will analyze the problem based on the framework as in the following scheme:

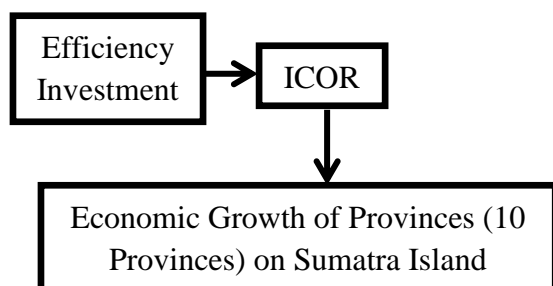


Figure 2: Correlation of Investment Efficiency and Economic Growth

In this study, the equation form is:

$$G_{it} = \beta_0 + \beta_1 ICOR_{it} + e_{it}$$

Where :

α : Constanta

G_{it} : Economic growth in all provinces of Sumatera Island

$ICOR_{it}$: Incremental Capital Output Ratio in all provinces of Sumatera Island

e : Error term

3.1 The Stages of Analysis

The steps of data panel analysis in this study are:

1. Estimating panel data regression using the fixed effect model.
2. Perform the Chow test
 - a) If accepted, then the common effect model (continue step 5).
 - b) If rejected, then the fixed effect model (continue step 4).
3. Perform the Hausman test
 - a) If accepted, then the random effect model (continue step 5).
 - b) If rejected, then the fixed effect model (continue step 4).
4. Test assumptions on the selected model.
5. Conduct test of the significance of parameters which include simultaneous test and partial test with improved regression equation.

6. Dispose of several research variables that are not in accordance with the theory.
7. Interpret the final panel data regression model with the selected model.

3.2 Variable Operational

The limits of the variables contained in this study are:

1. Economic growth
Economic growth is an increase in GRDP minus the previous year's GRDP. Economic growth used in this study is economic growth from 10 provinces in Sumatra, namely Nangroe Aceh Darussalam, North Sumatra, West Sumatra, Riau Islands, Riau, Jambi, South Sumatra, Bangka Belitung, Bengkulu and Lampung in the 2007-2016 research period.
2. Investment Efficiency
Efficiency in this study is measured by the calculation of the Incremental Capital Output Ratio (ICOR) in 10 Provinces of Sumatra ICOR approach shows the amount of additional investment needed to increase one unit of output (Central Statistics Agency, 2009). The lower ICOR indicates an increase in efficiency.
3. Investment
The amount of investment is reflected by the amount of Gross Fixed Capital Formation (PMTB) and Stock Change (Central Statistics Agency, 2009). Investment in this study is PMTB in provinces (10 provinces) on the island of Sumatra in 2007-2016. PMTB is the procurement, manufacture, purchase of new capital goods from within and outside the country, minus the net sales of used capital goods while stock changes are the difference between the ending inventory with the initial inventory at a certain period and which is included in the stock calculation intermediate goods in various economic sectors that have not been used in the production or consumption process.

4 RESULTS AND DISCUSSION

Equation obtained from the data analysis are:

$$G_{it} = \beta_0 + \beta_1 ICOR_{it} + e_{it}$$

Based on the results of all tests that have been carried out, as in the Chow Test and Hausman Test

the results obtained are Fixed Effect Model. From the regression results, obtained by the following equation:

$$G_{it} = 12.76245 - 0.21446ICOR_{it} + e_{it}$$

Based on the regression that has been done, the constant $C = 12,76245$ showed that if the independent variable is 0, then the economic growth in all provinces of Sumatera Island still increase 12,76245 percent. ICOR coefficient indicates the number -0,21446 which means when the other variables equal to zero, an increase of one percent in ICOR figures will have an impact on decreasing economic growth of 0,21446 percent.

The estimation results for the variable economic growth show the value of t-test probability is of $0,0922 < \alpha 10\%$ or 0,10, meaning ICOR partially have significant impact on economic growth.

Determination coefficient R^2 is used to calculate how much variance of the dependent variable can be explained by the independent variables. The R^2 value obtained by 0,270305. That is, the economic growth amounted to 27,03 percent variable community in the province of Sumatera Island (the dependent variable) can be explained by the independent variable in the model. While the remaining 72,97 percent is explained by other variables outside the model are held constant (*ceteris paribus*).

The results of this study indicate that there is a relationship quite significantly between investment efficiency that measured by using ICOR approach to economic growth in all provinces of Sumatera Island. The mutually beneficial relationship between investment efficiency which measured by using ICOR approach and economic growth is caused by the utilization of government budget for investment produce optimal output so productivity is high and hence a high economic growth in the provinces of Sumatera Islands.

Based on Table 1, the individual effect each provinces reflected from last intercept ($C + C_i$) by using Fixed Effect Models. It shows that the value of intercept each province in Sumatera is different. This situation explains that the investment efficiency variable which measured by ICOR approach has a different level of influences to the economic growth of each provinces in Sumatera Island. It shows that for the Province of North Sumatera, Riau Province, Jambi Province, Bengkulu Province and Lampung province have grown better than other provinces in Sumatera Islands in the same development stage

without an increase in the proportion of investment to Gross Domestic Regional Product.

Table 1: Individual Effect of Province in Sumatera Island

Fixed Effects Cross	Coefficient	Individual Effect (C+Ci)
_ACEH--C	-6.497783	6.264667
_SUMUT--C	0.317095	13.079545
_SUMBAR--C	-0.312264	12.450186
_RIAU--C	1.798647	14.561097
_JAMBI--C	2.427833	15.190283
_SUMSEL--C	-0.209247	12.553203
_BENGKULU--C	0.100765	12.863215
_LAMPUNG--C	3.015841	15.778291
_BABEL--C	-0.389937	12.372513
_KEPRI--C	-0.25095	12.5115

Source: Processed Data

5 CONCLUSION AND IMPLICATION

The conclusions from the results of the study include: (1) The relationship between ICOR and the economic growth of Sumatra Island is negative; (2) This research shows that for the Province of North Sumatra, Riau Province, Jambi Province, Bengkulu Province, and Lampung Province have grown better than other provinces in Sumatra Island in the same development stage without an increase in the proportion of investment to gross Domestic Regional Product.

It is expected that the government more concern to the use of appropriate technology in order to give the positive impact to employment and economic growth.

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