THE IMPACT OF ECONOMIC GROWTH, INVESTMENT, INFLATION, AND GINI RATIO TOWARDS THE POVERTY RATE IN INDONESIA

1981-2013

A RESEARCH JOURNAL

Presented as a Partial Fulfillment of the Requirements to Obtain the Bachelor Degree in Economics Department

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ABSTRACT

This study is aimed to analyze the factors which influence the poverty line in Indonesia in the period 1981-2013. The factors are GDP (Growth Domestic Product), Inflation, FDI (Foreign Direct Investment), and Gini ratio.

The research made use of secondary data from BPS, BAPPENAS, and the World Bank. The data analysis used the time series data which focused on Error Correction Model.

The researchers findings are: (1) GDP has a positive relationship with the poverty, but there is no significant influence on the poverty reduction, (2) Inflation has a positive relationship and there is a significant influence towards the poverty reduction. When the inflation increases by 1% so that the poverty will also increase 0.0186%, (3) FDI has a negative relationship with the poverty and has a significance level at 10% critical value so that when FDI or investment increases by 10% then the poverty level will reduce 0.0852% and (4) Gini ratio has a positive relationship with the poverty level and has no significant level towards the poverty reduction.

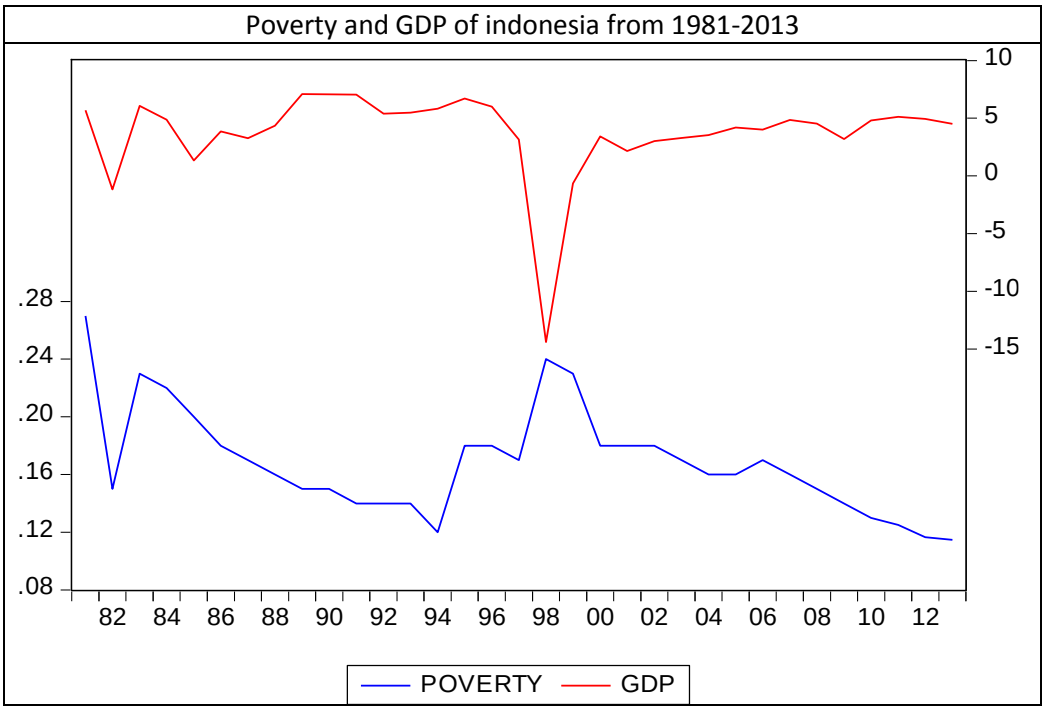
Keywords: Gross Domestic Product, Investment, Inflation, Gini ratio and Poverty.

INTRODUCTION

Indonesia is a developing country having a good rate of economic growth, but having a higher poverty rate at the same time. The World Bank reported that some countries have a high growth, but the population is still poor including Indonesia. In the classical economic growth theories showed that the economic growth is national output growth which is a function of factor function and production function. This means that a good production distributes to the GDP (gross domestic product). Then, when the GDP or the economic growth is higher, it means that the wage of labor increases and it should decrease the poverty indirectly. However, the other theory of growth and poverty stated that when trying to lower the poverty it will slow the rate of growth (Todaro and Smith, 2012).This is in line with the argument that countries with lower inequality would experience slow growth.

This theory tends to deny the classical economic growth. That is why the researcher is interested to analyze the impact of economic growth towards poverty. Poverty is a condition where a person lives below the poverty line. The person cannot fulfill the basic needs in life such as food, shelter, and health. In the country, the voices of poor people is unnecessary at all, for example in politics, the poor people did not have enough strength and do not have any authority to do that. If in the country economic shock occurs, those who will be the victims are poor people. It happens like the world intimidates the poor people. In fact the poor people pay higher than the rich people, but the rich people get higher than the poor people. One word to say is *"inequality"*. Poverty in Indonesia and also in the world happens hereditary. When a parent from the poor family has a son or daughter, they also will live in poverty, just like their parents.

Table 1.1
Poverty and GDP



Source: world bank, BAPPENAS, BPS (processed)

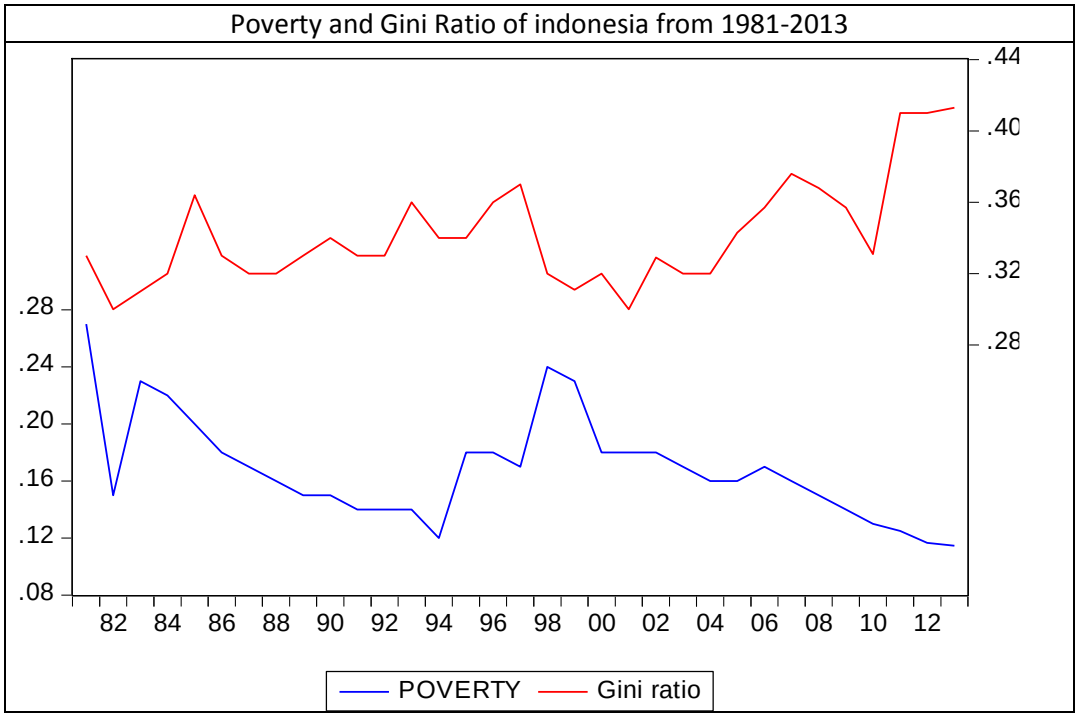
The researcher analyzed the data from that table that there is no significant correlation between the higher economic growth and the lower the poverty rate. Firstly, it can be seen in 1982 that the growth is 1,10% and the poverty rate is 0,15% , while in 1989the poverty is in the same rate, but the economic growth is the highest which is 9,08%. This is evidence that the economic growth does not have a significant correlation to the changes of poverty. The theory of Todaro and smith (2012) mentioned that *'when trying to lower the poverty it will slow the rate of growth* 'this has been proven in 1982. In contrast, in 1989 the condition was different. The higher economic growth but the poverty rate as the same time was getting lower. In 1989, it was proven that the classical theory about gross domestic product will reduce the poverty because increasing the GDP means that the wage will increase and the income per capita will automatically increase as well. From the graph, it can also be seen that the lowest growth in 1999 is about 0,79%, but the poverty shows 0,23% which is higher than the growth of 1,10%.

It can be seen in the graph that in 1998, the growth is very low or the number of growth is -14,39 which is extremely decreasing. What happens in Indonesia in 1998? Economic crisis happened at that time. All nations will remember that the tragedy was the worst economic disaster in Indonesia. The economic crisis in 1997-1998 reminded us as the black Tuesday. Besides, the beginning of the world's economic recession on October 29th, 1929 was also known as malaise. At that time, the government decision was not stable, the maturity of the foreign debt was on its due date, and of course international trade was less effective. The foreign debt in March 1998 reached 138 billion US dollars, and about 72.5 billion US dollars was private debt which is two-thirds of the short term, which was about 20 billion US dollars maturing in1998. And sadly the foreign

exchange reserved about 14.44 billion US dollars because Indonesia at that time had no more trust to bring Rupiah currency to decline drastically from 4.850/US dollar in 1997 to a level around 17.000 dollar, on January 22nd, 1998, or depreciated by more than 80 percent.

Graph 1.2

Gini Ratio and Poverty



Source: world bank, BAPPENAS, BPS (processed)

Based on the data above, the analysis on how poverty influence the welfare in this case the highest the Gini ratio, the lowest the welfare can be conducted. The data showed that the distribution of income whether it is good or not by looking at how much the inequality influenced by changes in poverty rate. . It can be seen that in 1982 when the poverty rate was 0,15%, the Gini ratio or inequality was 0,3%. If compared in 2001, it showed the same inequality, but having a higher poverty rate, which was about 0,18% while the other data from 2002 showed the same level of poverty rate which was 0,18% with the inequality about 0,357.Then, in 2006 the lower poverty rate was about 0,16% and the inequality was 0,357%. According to the data, in some data the inequality were not correlated with the poverty rate, meaning that the changes of the poverty rate were not followed by the changes in Gini ratio.

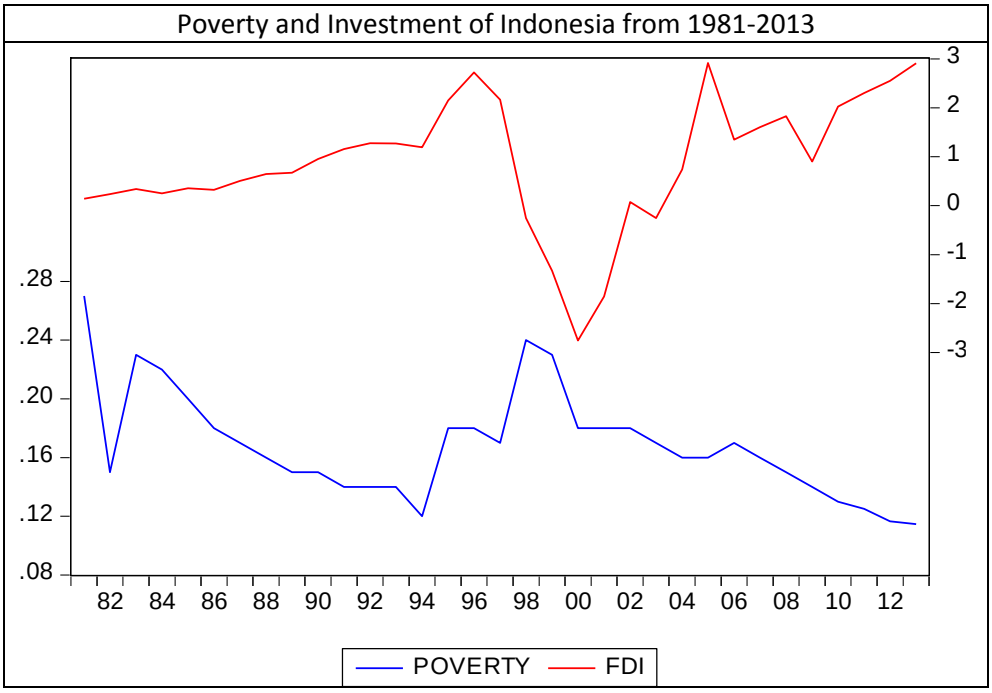
Based on the data of the poverty rate in 2011-2013, the rate was 12.50%, 12%, and 11% so that it showed a dramatically decrease. Compared to the percentage of poverty with the Gini ratio in the last 3 years (2011-2013), the numbers were 0.41%, 0.41%, 0.413. From these data, the researcher can conclude that as the poverty rate decreased, the Gini ratio also increased. It means that the decrease of the poverty rate caused the distribution of income getting worse, as can be seen in the increasing Gini ratio. The head of BPS – Mr. Suryamin was declared that it was the highest number

that Indonesia ever had after its independence. Normally the number of Gini ratio starts from 0 to 1. Actually Indonesian Gini ratio number is around 0.33-0.38, but in the last three years the number of Gini ratio was in the 'caution zone'. It will be dangerous if the number of Gini ratio is more than 0.6. Then, the solution to fix the number of the Gini ratio is the quality of the economic growth.

At the same time, the Deputy of Balance and Statistical Analysis of BPS – Mr. Kecuk Suharyanto gave an additional explanation about what really happened in the last three years. From the income side, Indonesian people's income is categorized into three classes. The top high class is 20%, middle class is 40% and the bottom class is 40%. In 2005, the bottom class received benefits from the economic growth of 21% which means that they just received a half of it. However, in 2013 it has decreased by 16.9%. Meanwhile, in 2015 the high class got 40% and increased by 49% from the GDP in 2013. This means that the benefits received by the high class were higher than the middle and bottom class. It is the reason why the Gini ratio became larger, meaning that the rich will be richer and the poor will get poorer. Suharyanto also said that even though the economic growth is high, but the quality is bad because it was not supported by tradable sectors. It can also be seen a bad economic growth quality: open unemployment declined slowly, poverty rate was stagnant, inequality was large, and inflation was getting worse.

Graph 1.3

Poverty and Investment



Source: world bank, BAPPENAS, BPS (processed)

Foreign and poverty reduction (Klein, 2011) "FDI is a key ingredient of the successful economic growth and development in developing countries.

Foreign direct investment is especially well suited to affect this transfer and translate it into a broad-based growth, not least by upgrading human capital. Growth is the single most important factor in poverty reduction." We can restated what Klein said that FDI is has a tight relation with the growth and as what the researcher has explained before that growth has a relation also to the poverty reduction. There are also an empirical study from Pakistan stated that the role of investment in poverty reduction in short-run is not significant (Chani et al, 2011). In 1981 investment was 0,14% and poverty was 0,27% if compared with in 1990 the investment was 0,96%, the poverty reduced to 0,15% and then in 1996 the FDI increased to 2,76% and the poverty increased to 0,18%. Based on the data, the researcher can analyze that there is no significant relation between foreign direct investment and poverty decrease. As can be seen in the graph that the foreign direct investment is fluctuated. It keep decreasing from 1981 until 1997, but because the economic crisis at that time so that the number of foreign direct investment was -0.25 in 1998 and continued to a minus in 1999, 2000, and 2001. However, in the latest four years which were in 2010, 2011, 2012, and 2013, foreign direct investment kept increasing. The data from 2015 from Indonesian investment website publicated that foreign direct investment has grown by 29.2% in 2015.

Graph 1.4
Poverty and Inflation

Source: world bank, BAPPENAS, BPS (processed)

The result from an empirical study journal from Pakistan stated that inflation has a positive impact on poverty (Chani et al, 2011). It can be analyzed that when inflation increases then the price of goods will increase and at that time the wage does not increase because this will increase the inflation rate. For example, the fact today that before the inflation of the price of basic needs such as rice which is per kilo about $1 dollar, but when the inflation increases the price will be $2 dollar per kilo. This causes the people's ability to buy the basic needs decreases and then

they will be measured as a poor people when they cannot buy the basic needs. In addition, based on the data analysis above in 1981, the inflation rate was 10,44 % and the poverty was 0,27% compared with in 1982 which the inflation rate was 6,06% and the poverty was 0,15%.In this case, the poverty has reduced as the decrease of the inflation rate. However, in 1999-2000 the inflation rate increased and reduced the poverty rate. From the data, it can be seen that the inflation rate fluctuated, but the graph showed that in 1998 the inflation rate was so high because of the economic crisis. At that time, the inflation rate was around 200% which was the most severe along the new order. It can be identified by the decrease of Rupiah currency against the Dollar currency and also the very drastic decrease of Indonesian nation's percapita income. So far, all these things drive a number of factories and industries that will collapse by creditors following some businessmen debt maturing in1998 will be generating thousands of new unemployment with a series of social problems.

RESEARCH METHOD

3.1 Type of Study

This study focused on the effect of economic growth, inflation, investment, and Gini ratio towards the poverty rate in Indonesia from 1981 to 2013. The type of data used in this research is a secondary data which is a time series data. This data collected from other thesis, World Bank, *Badan Pusat Statistik* Indonesia and the theories obtained by the researcher during her study.

3.2 Data Collection Methods

This study used the secondary data: time series data which consisted of 34 years data (Economic growth, investment, inflation, and Gini Ratio and poverty). The data were taken from *Badan Pusat Statistik* (BPS) or Central Bureau of Statistics of Indonesia, *Badan Perencanaan Pembangunan Nasional* (Bappenas) and the World Bank. The data included poverty rate (percentage of poor population), economic growth, investment, inflation, and Gini ratio.

3.3 Research Variables

3.3.1 Poverty Level

This study used the percentage of the poor population in Indonesia from 1981 to 2013. The data from 1981 to 2010 taken from *Bappenas* in millions , and then it was processed in the percentage by divided the number of population in poverty with the number of total population times 100%.Whilethe researcher obtained the rest of data from 2011 to 2013, from BPS.

3.3.2 Economic Growth

It used the percentage growth of Gross Domestic Product (GDP) of Indonesia from 1981 to 2013. The GDP used in this research was GDP per capita income, which data obtained from the World Bank.

3.3.3 Investment

This study used the foreign direct investment data of Indonesia from 1981 to 2013. FDI data used in this research was from the World Bank. The researcher used the foreign direct investment data because FDI is one of indicators to increase the national income.

3.3.4 Inflation

Inflation rate used in this research is inflation of GDP deflator, meaning that the measurement came from the economic metric accounts by converting outputs measured at current prices into GDP. The data used was the percentage of inflation in Indonesia from 1981 to 2013.

3.3.5 Gini Ratio

Gini Index is a measurement of income distribution in Indonesian country. Gini ratio data used in this research was the percentage of Indonesia Gini ratio from 1981 to 2013.

3.4 Analysis Technique

To prove the empirical hypotheses, the researcher will test the data by using the causality analysis with Error Correction Model (ECM). ECM is an analysis method to know the causality between two variables with Eviews computer program assistance. Causality tests used to know the relationship between the dependent variable and independent variable, and vice versa.

The researcher used ECM because it has some advantages such as: (1) ECM can make a specification model of the general equation; (2) ECM can explain the long-run and short-run information from the data. It can also know whether the empirical model is consistent or not with the economic theory, (3) ECM is a dynamic model to find a solution for a time series data which is not stationary and (4) It can be used to find the solution multicollinearity and spurious regression (Insukindro, 1993).

To use the error correction model, the first thing to do was having a stationary data. Then, to know whether the data was stationary or not, the researcher needs to use a unit root testing. After the researcher found the result, if one of the variables was not stationary at level, then the next step to use was the degree of integration test. After getting the results that all the variable were stationary at first differences, the researcher conducted the co-integration test stationary. Then the last step when the results found all variables were cointegrated was to know whether the economic growth has a long run or short run effect towards the poverty rate of Indonesia.

3.4.1 Stationary Test

Every data that the researcher collected was the result of stochastic modelling which means that the data is the aggregate of random variables in a time series. A data from the random result was stationary if the mean and the variance were constant all the time and the covariance between two time series data just depending on lags between two certain periods (Widarjono, 2005).

One of the important things to apply the time series model is when the data assumption result is normal and stable or stationary from all variables. Econometric model estimation for a time series data will not have a conclusion if the time series data still have a unit root or not stationary. Nonstationary data will create a spurious regression condition that can be remarked that the data has a higher coefficient determination R^2 and statistically significant.

In this research, there is a probability that the data is not stationary. Therefore, the researcher conducted a stationary testing like a unit root testing. If the result showed that the data has a unit root or not stationary, so that it would be taken to the next step, which was the degree of integration test. From the test, it could be seen the degree of the data stationarity.

3.4.2 Unit Root Test

The unit root test can be called as a stationary test because the main focus of the test is to know and analyze whether a certain coefficient of autoregressive models have the same value or not. To know the result, the researcher used a test known as an augmented dickey fuller or ADF. The formulation of ADF test is divided by three:

(1)a model with intercept and trend

$$\Delta Y_t = \alpha_0 + \alpha_1 T + yY_{t-1} + \sum_{i=2}^{p} \beta_i \Delta Y_{t-1+1} + e_t \quad ....(3.1)$$

(2) a model with intercept and trend

$$\Delta Y_t = \alpha_0 + yY_{t-1} + \sum_{i=2}^{p} \Delta Y_{t-1+1} + e_t \text{ ....(3.2)}$$

(3) a model without intercept and trend

$$\Delta Y_t = yY_{t-1+1} + \sum_{i=2}^{p} \Delta Y_{t-1+1} + e_t \text{ .....(3.3)}$$

Where:

$\Delta Y_t = Y_t - Y_{t-1}$

Y_t= the observed value at time t

P = maximum lag used

Procedures to consider whether the data was stationary or not stationary were to compare the value between the values of statistics ADF and the T critical value developed by MacKinnon. If ADF absolute statistic value is higher than the critical value so that the data is stationary. And vice versa, if the absolute statistics is less than the critical, value the data is not stationary. The value of ADF showed by the t value coefficient statistic yY_{t-1}at the equation (3.3) until (3.5). The causal in the ADF is to determined the length of sloth. The length of sloth can be decided based on criteria AIC (Akaike Info Criterion) or SIC Schwartz Info Criterion) and can use *crule of thumb* = $N^{1/3}$ formula as well, where N is a number of observation.

1. model with intercept and trend $\Delta Y_t = \alpha_0 + \alpha_1 T + yY_{t-1} + e_1$.....(3.4)
2. model with intercept

$$\Delta Y_t = \alpha_0 + yY_{t-1} + e_1 \text{..... (3.5)}$$

3. model without intercept and trend

$$\Delta Y_t = yY_{t-1} + \sum_{i=2}^{p} Y_{t-1+1} + e_t \text{.....(3.6)}$$

T distribution statistic does not follow a normal distribution statistics n but follow a statistical distribution of PP (Philip Peron) while the critical values used critical values proposed by MacKinnon. Like the previous ADF test, the procedure for determining whether the data is stationary or not by comparing the statistical value of pp with the critical value which is statistic distribution MacKinnon. The value of pp showed by the value of t statistics coefficient yY_{t-1} in the equation (3.5) until (3.6). If the value of absolute statistic pp is larger than it critical value so the data is stationary and if the value of absolute statistic pp smaller than it critical value so the data is not stationary. Different with ADF test, to consider the lenght of the lag, pp test using truncation lag from newey-west. The number of q show the periods of autocorrelation problem.

3.4.3 The Degree of Integration Test

If the data processed in a unit root test were not stationary at any level so that the next step was changing the non stationary data to stationary data. The transformation method to do was by conducting the degree of integration test to know the stationarity level of the integration data. The degree of integration test has the same way as the unit root test, but the level was changed to the first differences.

The decision of the degree of the data whether it was stationary or not can be seen from the absolute statistic values. If the statistic value was higher than the critical value, the data would be stationary. However, if the absolute statistics was smaller than the critical value, the data would not be stationary. The formulation of the degree of integration test from ADF is:

$$Q_{LB=}T(T+2)\sum_{j=1}^{k} \frac{rj^2}{T-j} \text{ ..... (3.7)}$$

$$\Delta 2Y_t = \alpha_0 + yY_{t-1} + \sum_{i=2}^{p} \beta_1 \Delta 2Y_{t-1} + e_t \text{ ..(3.8)}$$

$$\Delta 2Y_t = y\Delta Y_{t-1} + \sum_{i=2}^{p} \beta_1 \Delta 2Y_{t-1+1} + e_t \text{ ....(3.9)}$$

Where:

$\Delta 2Y_t = \Delta Y_t - \Delta Y_{t-1}$

If the first difference of the data was stationary, the researcher used the first difference. However, if the degree of the first difference showed non stationary then the researcher chose the second difference. The worse thing was when the data was not stationary at the second difference degree so that it cannot be used in the time series data. Because one of the requirements to use ECM is all the time series data were stationary, then after getting the results, the researcher continued to the co integration test.

3.4.4 Co-Integration Test

Econometrics theory used is based on stationary data. If the data that used is not stationary, granger and new bold (1987) was said that the regression result will spurious. So, to avoid such a problem, dynamic model by Engle & Granger (1987) recommended causality test that known as Error Correction Model which is related to co integration test.

To use co integration test, the researcher can make sure that all the variables have the same degree of integration. And the continuation of unit root test and degree of integration test is the co integration test. The data co integrated if d,h or write as (d,h) (Sriyana, 2013);

1. Every co integrated component at degree d or I (d).
2. There are vector α which is not equal to 0 (α≠0) so that Zt =α1 X~1 (d,b) where b:0 and α is a co integration vector.

The important thing from the illustration and definition above is assumed that if two or more than two variables have a different degree of integration so that the variables cannot be able to be co integrated (Insukindro, 1993).

This test was applied when stationary data through the unit root test and the degree of integration test has been done. The co-integration test is used to know the probability of equilibrium or the the long run stabilization occuring between the observed variables. After all the requirements of co-integration have been done then the researcher knew the degree of the data which is stationary or not. To used the co-integration test, all the data must be at the same degree.

The formulation of contegration test of johansen is:

$$pov_t = \beta_0 + \beta_1 GDP_t + \beta_2 FDI_t + \beta_3 Inf_t + \beta_4 Gini_t + e_t \text{ .....(3.10)}$$

Where:

Pov = dependent variable

GDP, FDI, Inf, Gini = independent variable

E= residual value

Equation (3.10) can be rewrite as :

$$e_t = pov_t - \beta_0 - \beta_1 GDP_t - \beta_2 FDI_t - \beta_3 Inf_t - \beta_4 Gini_t$$

...(3.11)

Equation disorders e_t in the equation (3.10) and (3.11) is a linear combination if equation disorders do not have unit root or stationer or I(0) so that, both has a long run relationship. Engle & Granger (1987) process the cointegration test based on the residual value from equation (3.10) with using ADF test method. The formulation of cointegration test of ADF is:

$$\Delta e_t = \beta_1 e_{t-1} + \sum_{i=2}^{p} \alpha_i \Delta e_{t-1+1} \text{ ..... (3.12)}$$

Engle & Granger (1987) proposed that from the seven of co integration tests to test the Null hypothesis of co integration, the best test used for the time series data is the test found by Johansen or familiar with Johansen co integration test. The test used by Johansen can be used to decide co integration of variables.

To measure whether the data are co integrated or not depends on the like hood ratio or trace statistics and the critical value. If trace statistics is higher than the critical value then the data are stated to be co integrated, and vice versa, when the trace statistics are smaller than the critical value then the data are not co integrated. In a simple way, the estimate equation regression can be used to know whether the variables are co integrated or not. The variables have a correlation if having the probability which is smaller than 0.05 or

having the probability which is smaller than the critical value at 5% level.

The main purpose of the co integration test is to know whether the residual regression of the co integration is stationary or not. The co integration test is very important for knowing or developing a dynamic model, especially for Error Correction Model which includes the key variables in the co integration relationship.

3.4.5 Error Correction Model

When the data are co integrated, there is a long run relationship, or the long run equilibrium occurs between variables. However, there are probabilities that the long run disequilibrium happens. In the economics, disequilibrium frequently happens, meaning that sometimes what in economics are expected to happen does not always come to realize. The fact means that there are so many differences about the economic theory and the reality. The differences of what is in economics to happen and what actually happens need an adjustment to correct the disequilibrium, called an Error Correction Model.

If in the short run there is disequilibrium in a period so that Error Correction Model will correct it in the next period (Engle & Granger, 1987).The mechanism of the correction model is to make the behavior of the short run and long run equal. This mechanism also can be a way to solve a chaotic regression using variable differences remaining in the model, without eliminating the long run information caused by the use of the only data differences. Therefore, it can be concluded that ECM is consistent with a concept of co integration or is known as a granger representation theorem (Sriyana, 2003). ECM can be formulated as:

$$\Delta pov_t = \alpha_0 + \alpha_1 \Delta GDP_t + \alpha_2 \Delta FDI_t + \alpha_3 \Delta Inf_t + \alpha_4 \Delta Gini + X_2 EC_2 + e_t$$

..... (3.13)

Where:

$$EC_t = pov_t - \beta_0 - \beta_1 GDP_t - \beta_2 FDI_t - \beta_3 Inf_t - \beta_4 Gini_t$$

In this case, coefficient $\alpha_1$is a short run coeffient while β_1 is a long run coefficient. Correction coefficient disequilibrium α_2 in the absolute value explain how fast the time needed for getting the equilibrium.

In this research, the causality test meant to know whether the variables of Gross Domestic Product (GDP), Inflation, Foreign Direct Investment (FDI), and Gini ratio affect to the percentage of poverty rate in Indonesian country.

So the test will used to see the causality with ECM in short run in this research can formulate as:

$$\Delta pov_t = \alpha_0 + \alpha_1 \Delta GDP_t + \alpha_2 \Delta FDI_t + \alpha_3 \Delta \inf_t + \alpha_4 \Delta Gini_t + \alpha_5 EC_{t-1} + e_t$$

..... (3.14)

Where:

Pov = poverty

GDP = gross domestic product

FDI = Foreign direct investment

Inf = Inflation

Gini = Gini ratio

E = residual value

$$ECT = (pov_t - \beta_0 - \beta_1 GDP_t - \beta_2 FDI_t - \beta_3 \inf_t - \beta_4 Gini_{t-1})$$ ....(3.15)

3.4.6 Diagnostic test

The diagnostic tests have to be conducted on the Error-correction mechanism in order to determine whether any of these assumptions have not been violated (Ssekuma, 2011). There are three testing, which are:

3.4.6.1 Normality test

A normality test is a statistical process used to determine if a sample or any group of data fits a normal standard of distribution. The normal distribution is the probability distribution that plots all of its values in a symmetrical fashion and most of the results are situated around the probability's mean. Values are equally likely to plot either above or below the mean. Grouping takes place at values that are close to the mean and then tails off symmetrically from the mean.

In this research Jacque-Bera test was used to determine whether the ECM was normally distributed or not. As discussed by Jarque and Bera (1980) in Ssekuma (2011) This test measured the difference in kurtosis and Skewness of variables compared to those in the normal

distribution. In the Jacque-Bera test, the Null and alternative hypothesis are formulated as follows:

H_0: The variable is normally distributed.

H_1: The variable is not normally distributed.

The test statistic is

$$JB = \frac{N-k}{6}\left[S^2 + \frac{(K-3)^2}{4}\right]$$

Where N is the number of observations, k is the number of estimated parameters, S is the Skewness variable, and K is the kurtosis variable, the null hypothesis is rejected if the p-value ≤ level of significance, or if the JB > X^2

3.4.6.2 Heteroscedasticity Test

Heteroscedasticity results from a sequence of random variables. It implies that during the regression analysis there is non-consistent variance. As discussed by Engle (1982) in Ssekuma (2011), heteroscedasticity is tested by using the langrange multiplier, also known as Engle's Arch LM test. The test procedure is as follows:

H_0: there is no heteroscedasticity

H_1: there is heteroscedasticity

The test statistics is

$$LM_E = nR^2$$

Where *n* is the number of observations, and $R^2$is the coefficient of determination of the augmented residual regression. The null hypothesis is rejected if the *p*-value ≤ level of significance and it can be concluded that there is heteroscedasticity.

3.4.6.3 Serial Correlation Test

Aserial correlation is a cross-correlation of a signal (white noise) with itself. It may be caused by:

- Nonstationarity of dependent and explanatory variables
- Data manipulation (averaging, interplotation and extrapolation)
- Incorrect functional form

Ljung and Box (1978) suggested the use of Ljung-Box test to test the assumption that the residuals contain no autocorrelation up to any order *k*. The test procedure is as follows:

H_0: there is no autocorrelation up to order k.

H_1: autocorrelation exists up to order k.

The test statistics is

$$Q_{LB=}T(T+2)\sum_{j=1}^{k}\frac{rj^2}{T-j}$$

Where T is the number of observations, *k* is the highest order of autocorrelation for which to test and $rj^2$is the jth autocorrelation. The null hypothesis is rejected if the p-value ≤ level of significance and it can be concluded that autocorrelation exists up to order *k*. The major drawback of this test is deciding which lag order (*k*) to use. Ljung and Box (1987) suggested the maximum number of lags to use should be $T^{1/3}$ where T is the number of observations.

RESULT AND DATA ANALYSIS

4.1 Unit Root Test

Each variable will be tested by Info Criterion (AIC) or Schwartz Info Criterion (SIC) criteria or we can use rule of thumb formula N1/3, where N is number of observation.

So the maximum lag from 321/3 is 4. using the unit root test in this research using Augmented Dickey-Fuller (ADF). Maximum lag can be decided by Akaike

Table 4.1
Unit root testing using ADF at none

Variable	absolute statistic value	Critical value α = 5%
GDP	2.7160	0.0082
Inflation	1.8082	0.0676
FDI	0.6919	0.4080
Gini Ratio	1.0879	0.9240
Poverty	1.4875	0.1258

Processed using E-views (appendix)

The table 4.1 shows the ADF testing using none (without intercept and constant). Each variable shows the value of absolute statistics and the critical value at 5% level in the MacKinnon table. All the variables are not stationary, except GDP variable, but it can be assumed that GDP variable is not stationary like the other variable. It can be seen from the table that the absolute statistics of GDP is 2.7160 and the critical value is 0.082. It means H_0 is rejected, where the hypothesis has a unit root or the data is stationary. Inflation absolute statistics is 1.8082 and the critical value is 0.0676 meaning that H_0 is accepted, where the hypothesis Has a unit root or the data is not stationary. It also happens to the rest of FDI data, Gini ratio, and poverty. It can be seen on the table that the absolute statistics value is smaller than the critical value at 5% level. Thus, the data variables of FDI, Gini ratio, and poverty are not stationary.

4.2 Integration Degree Test

Because all the data were not stationary so that the next step was the integration degree test to make all the data are stationary at the same level. In this case, the researcher tested each variable at 1st difference degree level.

Table 4.2
Unit root testing using ADF at none (1st difference level)

Variable	Absolute statistic value	The critical value at α = 5%
GDP	6.0050	0.0000
Inflation	9.5146	0.0000
FDI	4.1634	0.0002
Gini Ratio	6.8821	0.0000
Poverty	2.9095	0.0051

Processed using E-views (appendix)

The table 4.2 shows the results of unit root testing using ADF at 1st difference level. It can be seen that the entire variable is stationary at the 1st degree. GDP absolute statistics value which is 6.0050 is higher than the critical value of 0.0000. This means that H_0 is rejected. It can be said that the hypothesis has a unit root test that there is no unit root in the data so that the data are stationary. Inflation absolute statistic value of 9.5146 is larger than 0.0000, showing the data are stationary. The same as GDP and Inflation, the rest data of FDI, Gini ratio, and

Poverty were also proven stationary because the absolute statistic values are higher than the critical value at 5% level at the 1st difference degree.

4.3 Co integration Test

Because all the data have been stationary at the 1st difference degree, the co integration test was conducted. Co integration test is aimed to know whether the independent variable and dependent variable have a long run relationship. One of the conditions that should be passed before doing the co integration test is when the data are integrated at the same degree. As what the researcher has done before, all the data were integrated at the same degree

so that it can be continued to the co integration test. Before doing the co integration test for the entire variables, the researcher conducted a test to the residual whether it is stationary or not. It can be assumed in this research that the residual is Res. It can be seen in the table below.

Table 4.3
Unit root test of residual

Null hypothesis: RES has unit root
Exogenous: None
Lag length: 0 (Automatic – based on AIC, maxlag=4)

	T – Statistic	prob*
Augmented Dickey-Fuller test statistic	-5.808292	0.0000
Test Critical values: 1% level	-2.639210	
2% level	-1.951687	
10% level	-1.610579	

Processed using E-views (appendix)

As it can be seen from the table above that the absolute statistic value is 5.8082 and the critical value at 5% level is 0.0000.It shows that the absolute statistic value is higher than the critical value. Thus, H_0 is rejected because there was no unit root or the residual of the data is stationary. Because the residual is stationary so that it can be continued to do the co integration test to know the long run relationship between the independent variables and the dependent variable. It can be seen from the results below.

Table 4.4
Long-run relationship between variables

Variable	probability	coefficient	t-statistic	conclusion
C	0.0066	0.264874	2.937403	Significant
GDP	0.9231	-0.000254	-0.097344	Not significant
INFLATION	0.3220	0.000782	1.008154	Not significant
FDI	0.2057	-0.008097	-1.295612	Not significant
GINI RATIO	0.2843	-0.285883	-1.091525	Not significant

Processed using E-views (appendix)

From the table above, it can be seen that all the variables' result is higher than 0.05 meaning that there is no correlation between GDP, inflation, FDI, Gini ratio towards the poverty in the long-run relationship. The hypothesis of GDP has a negative relationship with the poverty rate, meaning that when GDP increases, the poverty must decrease, but the result showed that there is no significant correlation between GDP and poverty. This result just followed the theory mentioned before, when trying to lower the poverty, it will slow the rate. The explanation means if the poverty decreases, it means that the rich people increase and it can be seen that rich people's life style tends to use import goods and services. That is why the growth indirectly will decrease. The hypothesis of the inflation rate positively Affects the poverty, meaning that when the Inflation increases it will increase the poverty as well. However, the test showed that there is no correlation between inflation and poverty. The hypothesis of FDI is that FDI has a negative impact towards the poverty which means that when FDI increases, the poverty rate must decrease. In this test result there is no significant correlation between FDI and poverty. The reason why there is no correlation between FDI and poverty because FDI is also a part of economic growth so that there must be a relationship between both variables. The hypothesis of Gini ratio negatively affects the poverty rate means that when the poverty rate is reduced, Gini ratio must decrease as well. However, the result showed that there is no significant correlation between Gini ratio and poverty rate. The data also showed that the decrease in the poverty rate will keep the Gini ratio increasing as well.

4.4 Error Correction Model test

Table 4.5
Short run relationship between variables

variables	Probability	Coefficient	t-statistic	conclusion
C	0.3777	-0.003765	-0.897475	Not significant
D(GDP)	0.3324	0.001536	0.987657	Not significant
D(INFLATION)	0.0186	0.0011045	2.510279	significant
D(FDI)	0.0852	-0.009134	-1.789689	significant
D(GINI RATIO)	0.6993	0.073128	0.390530	Not significant
RES (-1)	0.0003	-0.706126	-4.179956	significant

Processed using E-views (appendix)

In this test, the researcher checked the probability of F-statistic whether it is smaller or larger than 0.05. If the probability of F-Statistics was smaller than 0.05, the next step would be to check the significance of each variable. Because the table above showed that the probability F-statistic is 0.0002 which is smaller than

0.05 so that it can be continued to check the probability. As it can be seen from the data above that the value of GDP probability is 0.3324, meaning that it is higher than 0.05.Thus, there is no correlation between GDP and poverty in the short run relationship. The value of FDI and Gini ratio is higher than 0.05 so that there is no correlation between these three variables. However, the inflation probability value is 0.0186 which means that the value is smaller than 0.05. Therefore, it can be concluded that there is a positive correlation between inflation and poverty in the short run.

From the above it can be seen that only inflation that has 0.0186 probability, means that, as increase the inflation 1% it will increase poverty 0.0186. and also there are also significant correlation between FDI and poverty reduction, so the probability show 0.0852. it does mean that as increase FDI 10% it will reduce the poverty 0.0852. and the Residual value is 0.0003. It does mean that ECM model can be accepted because it is smaller than 5%.

4.5 A Normality Test

Table 4.6

Series: Residuals sample 1982-2013 observations 32	
Mean	-7.59e- 19
Median	-0.004324
Maximum	--0.041573
Minimum	-0.050138
Std. Dev.	0.021502
Skewness	0.132149
Kurtosis	2.722430
Jarque-Bera	0.195865
Probability	0.906710

Processed using E-views (appendix)

A complement of standard descriptive statistics is displayed along with the histogram. All of the statistics are calculated by using the observations in the current sample.

- Mean is the average value of the series, obtained by adding up the series and divided by the number of observations.
- Median is the middle value of the series when the values are ordered from the smallest to the largest. The median is a robust measure of the center of the distribution that is less sensitive to outliers than the mean.
- Max and min are the maximum and the minimum values of the series in the current sample.
- Standard deviation is a measure of dispersion or spread in the series.

- Skewness is a measure of asymmetry of the distribution of the series around its mean. The Skewness of a symmetric distribution, such as the normal distribution, is zero. Positive Skewness means that the distribution has a long right tail and negative Skewness implies that the distribution has a long left tail. Based on the above that the Skewness result is 0.13. It means that the result is positive so that it has a long right tale.
- Kurtosis measures the flatness of the distribution of the series. The kurtosis of the normal distribution is 3. If the kurtosis exceeds 3, the distribution is peaked relative to the normal; if the Kurtoss is less than 3, the distribution is flat relative to the normal. As we see from above data that the result of kurtosis is 2.722. It less than 3 so the distribution is flat relative to normal.
- Jarque-Bera is a test statistic for testing whether the series is normally distributed. The statistical test measures the difference of the Skewness and Kurtosis of the series with those from normal distribution. Under the Null hypothesis of a normal distribution, the Jarque-Bera statistics is distributed as X^2 with 2 degrees of freedom. The reported probablity is the probablity that a Jarque-Bera statistics exceeds (in absolute value) the observed value under the Null hypothesis—a small probability value leads to the rejection of the Null hypothesis of normal distribution at the 5% level but not at 1% significance level. In the table above it showed that the probability is 0.9006 which is larger than 5%. Thus, it can accept the Null hypothesis of the normal distribution.

From the above explanation and analysis, it can be concluded that in a normality test, ECM has normally distributed.

4.6 Heteroscedasticity

Table 4.7

Heteroscedasticity test	
Prob. F	0.0005
Prob. Chi-Square	0.0697

Processed using E-views (appendix)

- Considering the *P*-value for the F-statistics
- The Null hypothesis for the white test is homoscedasticity
- If fail to reject the Null hypothesis , the it has homoscedasticity
- If reject the Null hypothesis then it has heteroscedasticity

- Significance level of 5% is commonly used for this test
- Reject H_0 if *p*-value ≤ α and do not reject H_0 if *p*-value

Because the probability is 0.0005 < 0.05 so H_0 is rejected meaning that it has heteroscedasticity in Error Correction Model.

4.7 A serial correlation

Table 4.8

Breusch-Godfrey Serial Correlation LM Test:	
Prob. F	0.3441
Prob. Chi	0.2241

Processed using E-views (appendix)

The probability above showed that it is larger than the α significance level 0.3441 > α (at 5% level) and 0.2241 > α (at 5% level). Therefore, the Null hypothesis cannot be rejected. This means there is no serial correlation. The lag used in that serial correlation LM test is 4 as what Ljung and Box suggested that lag equal $T^{1/3}$ in which T is the number of observations.

Economic Interpretation

From the ECM equation $Poverty_t = \alpha_0 + \alpha_1 GDP_t + \alpha_2 Inflation_t + \alpha_3 FDI + \alpha_4 Gini\ ratio + e_t$ it can be formulated as:

$Poverty_t = 0.2648 - 0.0002GDP_t + 0.0007Inflation - 0.0080FDI_t - 0.2858\ Gini\ ratio_t$

From the result of the formulation above, it can be derived the explanation as follows:

1. Changes in GDP 1% will change the poverty -0.0002. It shows that there is no significant change or significant correlation between changes in GDP and the poverty.
2. Changes in inflation 1% will change the poverty 0.0007. It shows that there is no correlation between inflation and poverty.
3. Changes in FDI 1% will change the poverty -0.0080. It can be seen that there is no correlation between FDI and the poverty in the long run.
4. Changes in Gini ratio 1% will change the poverty -0.2858. It means that there is no correlation between Gini ratio and the poverty in the long run.

From the data above, it can be concluded that there is no significant correlation between GDP, inflation, FDI, and Gini ratio towards the poverty in the long run. The results of the short run are explained below, whether in the short run there are significant correlations between the variable and independent variable or not.

From this ECM equation $\Delta Poverty_t = \alpha_0 + \alpha_1 \Delta GDP_t + \alpha_2 \Delta Inflation_t + \alpha_3 \Delta FDI_t + \alpha_4 \Delta Gini\ ratio_t + RES_{t-1}$ it can be formulates as follows:

$\Delta Poverty_t = -0.0037 + 0.0015\Delta GDP_t + 0.0010\Delta Inflation_t - 0.0091\Delta FDI_t + 0.0731\Delta Gini\ ratio_t - 0.7061RES_{t-1}$

From the results of the formulation above it can derived as follows:

1. Changes in GDP 1% will change the poverty 0.0015
2. Changes in inflation 1% can change the poverty 0.0010. As analyzed before that there is a correlation between inflation towards poverty because the probability of inflation is smaller than α = 5% in the short run.
3. Changes in FDI 1% will change the poverty -0.0091
4. Changes in Gini ratio 1% will change the poverty 0.0731

From the data above, it can be concluded that there is no significant correlation between GDP, FDI, and Gini ratio towards the poverty in the short run. But instead it has a significant correlation between inflation towards the poverty.

Conclusion

1. GDP in Indonesia from 1981 to 2013 has a negative impact towards the poverty, but has no significant correlation. A good growth must be followed by reducing poverty otherwise the quality of the growth will be not good, meaning that the increase in growth does not increase the welfare of all people and does not distribute well. The growth just gave benefits to some people. It has also proven by the theory that said, when trying to lower the poverty it will slow down the rate of growth. The reason why the lower poverty is not always followed by increasing the growth because of the rich people tend to consume import goods and services while the poor people just can afford domestic goods and services. Therefore, the high consumption of import goods and services automatically tends to lower the growth.
2. Inflation in Indonesia from 1981 to 2013 has a positive impact towards the poverty rate and has a significance correlation. As can be seen from the result that inflation Has the probability of 0.0186, meaning that as the inflation increases by 1% it will be also followed by the increase of the poverty by 0.0186.
3. FDI in Indonesia from 1981 to 2013 has a positive impact towards the poverty rate and has a significance correlation. As can be seen from the result that FDI has the probability of 0.0852, meaning that as FDI increases by 10% it will be followed by the decrease of the poverty of 0.0852.
4. Gini ratio in Indonesia from 1981 to 2013 has a negative impact towards the poverty rate and does not have any significance correlation towards the poverty rate. It means that when the poverty reduces it is not followed by the decrease of the Gini ratio. On the other hand, Gini ratio increases as the decrease in the poverty rate. It is because the quality of growth is not good and also the inequality is getting larger. The increase of growth does not distribute to all people, but only to some of them. That is why Gini ratio is getting larger.

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