

Study of Macro Variables in Excogitating Stability of Indonesian Economic Growth as OECD's Development Center: An Error Correction Model Approach

Zulgani¹, Faradina Zevaya², Amril³

^{1,2,3} University of Jambi, Muaro Jambi, Indonesia

Corresponding author. Email: gzulgani@gmail.com

ABSTRACT

OECD (*Organization for Economic Cooperation and Development*) stands for promoting the economic welfare of its members. It also coordinates its effort to help developing countries outside its membership. Indonesia is selected to become DC (*Development Center*). The goal of DC-OECD as a liaison for developing countries and emerging countries to help decision-making find policy solutions to stimulate economic growth and improve living conditions. Indonesian economic growth is likely to be increased, but the discrepancy of infrastructure is still high. Furthermore, this research aims to analyze macro variables effect to economic growth. Method used quantitative analysis by using Error Correction Model approach. The result shows in long term, BI Rate has significant and negative effect to economic growth, Taxation has negative and significant effect to economic growth, in the meantime Government Expenditure has positive and significant effect to economic growth. In short term, BI rate has positive and not significantly to economic growth, Taxation has positive and not significantly to economic growth, and government expenditure has positive and not significantly effect to economic growth.

Keywords: OECD DC, developing country, error correction model, economic growth, Indonesia

1. INTRODUCTION

OECD (*Organization for Economic Cooperation and Development*) is international cooperation organization encompass economic and development. OECD established on 31 September 1961 to find solutions to stimulate economic growth and reaching out society's well-being of each country (Wino, 2019). For about 40 years, OECD has taken into account and become huge world data statistical source. OECD does not collect the data only, it also supervises trend and world economic development's forecasting and another aspect, comprised of social, environment, trade, education, agriculture, technology, taxation, *so on*. Not only with members, since 2007 OECD has been having relationship with Indonesia. This

relationship known as *Development Center* (DC). DC-OECD as a liaison for developing countries and emerging countries to help decision-making find policy solutions to stimulate economic growth and improve living conditions.

Indonesian economic growth is likely to be increased followed by the decline of discrepancy. According to OECD survey (2018) robust economic expansion and good government policy, the level of poverty and discrepancy increasingly decreased, by contrary accessibility of public services more widespread. Income per capita has grown, but the discrepancy of infrastructure was still high. Indonesian economic growth remains stable approximately 5 percent per 2013, which

encouraged by consumption and infrastructure spending.



Figure 1. Consumption and Infrastructure Spending

Based on the figure above, economic growth projection will be good. The enhancement of income and public trust or consumer will be sustaining incremental of household's consumptions. On the other hand, there are another macro variable which analyzed to offset growth and stability, such as interest rate. In 2016-2017, interest rate declined in sustaining economic growth. But nowadays, that interest rate increasing to slow capital outflow down.

Debt is still become another funding source to infrastructure spending, medical, and social aid. Even 2017 ago, the growth of civil-servant expenditure had been restricted moreover district transfer started to improve. However, subsidy was re-increasing. Enhancement of income is still become fiscal threat. In which taxation income is relatively lower than another developing country (Figure 2). There has been increasing number of assessable, but the awareness to pay on-time is still low.

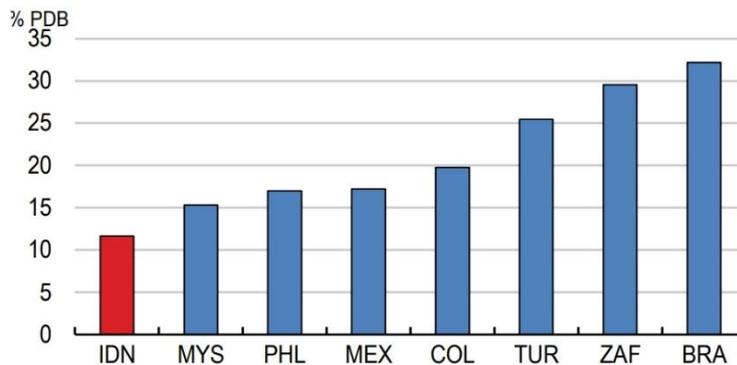


Figure 2. Taxation Income Is Relatively Lower Than Another Developing Country

Source: OECD, Revenue Statistics Database.

In excogitating stability of Indonesian economic growth, there some macro variables observed, such as interest rate, taxation, and government expenditure. As stated Kasmir in Wensy (2018), interest rate is a recompense to customer which conventional-based after buying or using their products. Shift of interest rate, will be affecting aggregate demand (Aryaningsih, 2008). Then, taxation income as cited in Juwita in Suyanto (2016), taxation income is government income from tax sector whereby the purposes comprises domestic and abroad in financing

government expenditure. In government expenditure, development theory and government expenditure initiated by Rostow and Musgrave, there is correlation amongst of government expenditure and economic development phase. The phase divided into 3 (three) steps, they are preliminary phase, middle phase, and advanced phase.

Previously research, carried out by Dody and Bagus (2016) 'An Alternative: Better Life Index as a Measure of Multidimensional Development in Indonesia' based on OECD statement in 2011 on

development measurement known as *Better Life Index* (BLI). BLI consist of 11 development dimensions comprise house, income, employment, citizenship, education, environment, government, medical, life worthiness, safety, and time balance. This study aims to analyze correlation between BLI and human development index, region development index, and economic growth. There are 3 (three) methods in compiling BLI, there are normalization, valuation, and aggregation. In the result, Indonesian BLI value incorporated into lower-middle classification. Jakarta, Kalimantan Timur, Sulawesi Utara, Riau, and Sumatera Selatan possess highest BLI value. There is positive significant effect with human development index and region development index by statistical bureau. On the contrary, BLI possess negative effect to economic growth.

2. METHODS

The indispensable data of this research are 1) Indonesian gross domestic product quarterly 2007-2018, 2) Interest rate quarterly 2007-2018, 3) taxation income quarterly 2007-2018, 5) government expenditure quarterly 2007-2018. Those data and another additional data originated from Ministry of Finance, Central Bank of Indonesia, Statistical bureau. The method used Quantitative analysis by using *Error Correction Model* (ECM). ECM is adjustment model in

p

$$\Delta Y_t = \alpha_0 + \alpha_2 + Y_{yt-1} + \sum_i \beta \Delta y_{t-1+j} + \epsilon_t$$

Whereby: *p* = selected interval; α_0, α_2, y = estimated value; ϵ_t = error term

The criteria for decision making in these hypothesis are:

H0: $y = 0$, which means the data is not stationary (contains the root unit)

H1: $y < 0$, which means stationary data (does not contain a root unit)

Unit Root Test in First Difference

This test is a continuation of the unit root test as a consequence of not fulfilling the assumption of stationarity at zero degree. This test is very important to do for each variable in order to know

modification imbalance of short term towards long term (Bambang and Junaidi, 2012).

Stage of Data Analysis

Data stationarity is an important requirement in the econometrics model for time series data. Stationary data is data that has mean, variance and auto variance (in lag variations), in other words the data is more stable. Widarjono (2013) states the data stationarity test can be done through coleogram by looking at the coefficients of ACF and PACF. If the data used in the model is not stationary, then the data is reconsidered in terms of its validity and stability, because the regression results from non-stationary data will cause spurious regression. Spurious regression is a regression that has a high R2, but there is no meaningful relationship between the two (Gujarati, 2012).

Data stationarity test data is done through a unit root test (unit root test). This unit root test, developed by David Dickey and Wayne Fuller, is known as the Augmented Dickey-Fuller (ADF) Test. The procedure for determining the stationarity of data can be done by comparing the statistical value of DF with the value of the statistical t distribution. DF value of statistics greater than the value of t statistics shows the data is stationary and vice versa. Basically, to carry out ADF-test as like:

the stationarity of research data. And to find out how many times the data must be done in a certain degree difference in order to produce a stationary variable. All existing variables will be differed to a certain degree until all variables are stationary to the same degree.

Cointegration Test

The concept of cointegration associated with two or more non-stationary time series variables which will be co-integrated if the combination is also linear over time, although it can occur that each variable is non-stationary. The time series variable is co-integrated, so there is a stable relationship in the long run (Gujarati, 2012).

Cointegration test is a test of whether there is a long-term relationship between the independent variable and the dependent variable. This test is a continuation of the stationary test. The main purpose of this cointegration test is to find out whether stationary cointegration residuals or not. If the variables are co-integrated, there is a stable relationship in the long run. By contrary, if there is no cointegration between variables, the implication is that there is no relationship in the long run. The term cointegration is also known as the error, because the deviation of the long-run equilibrium is corrected gradually through a series of partial short-term adjustments. It is assumed that y is the dependent variable and the independent variables x_1, x_2, x_3 with the equation:

Where:

$$GDP = \beta_0 + \beta_1 BIRATE + \beta_2 TAX + \beta_3 GE + u$$

Whereby: GDP = Gross Domestic Product (Economic Growth); BIRATE = BI Rate; TAX = Taxation; GE = Government Expenditure; u is a linear combination of GDP, BIRATE, TAX and GE

Hypothesis Testing

Partial Test (t-test)

$t_{\text{-test}}$ aims to see the influence of each independent variable to dependent variable (Gujarati, 2012). In another theoretical $t_{\text{-test}}$ utilized to recognize the quality of regression significance of each independent variable (X), whether there is influence or not to dependent variable (Y), $t_{\text{-test}}$ is as follows:

$$t_{\text{test}} = \frac{\beta_i}{Se(\beta_i)}$$

To be noted:

$t_{\text{-test}}$ = Partial testing

Se = Error standard

β_i = Coefficient of Regression

The test criteria are as follow:

- If $t_{\text{test}} > t_{\text{tabel}}$, so H_0 declined, it means partially there is influence of each independent variable to dependent variable
- If $t_{\text{test}} < t_{\text{tabel}}$, so H_0 accepted, it means partially there is no influence of each independent variable to dependent variable

Simultaneous Test

F-test aims to determine the significance togetherness of all independent variable influence to dependent variable (Gujarati, 2004). The statistical hypothesis as follows:

- $H_0 = b_1 b_2 b_3 b_4 = 0$, there is no influence between independent variable to dependent variable
- $H_a = b_1 b_2 b_3 b_4 \neq 0$, there is an influence between independent variable to dependent variable

Coefficient of Determination (R^2)

To know how much independent variable's influence or strength to dependent variable as whole, so used analysis of variance by calculating the coefficient of determination. Coefficient of determination (Gujarati, 2004) shows the ability of independent variables to explain variations in the dependent variable.

$$R^2 = 1 - \frac{\mu^2}{Y^2}$$

Notable:

R^2 is Coefficient of Determination

μ^2 is Error Standard

Y^2 = Dependent Variable

Classical Assumption Models

Multicollinearity is a linear relationship (perfect or imperfect) between some or all of the independent variables in the regression model (Gujarati, 2012). Another notion declares that Multicollinearity is the situation of the correlation or relationship between independent variables. Multicollinearity is essentially a regression sample phenomenon. The independent variable has a high correlation among the independent variables although regression coefficient values can be obtained, but most likely any independent variables are not statistically significant. Additionally, high multicollinearity symptoms can cause signs of regression coefficient containing signs contrary to theoretically predicted ones. If multicollinearity is perfect in the sense of the regression coefficients of the X variables are indeterminate or inconstant and their standard errors are infinite. If multicollinearity is less than perfect, the regression coefficients although

determinate possess large standard errors (in relation to the coefficients themselves) which means the coefficients can not be estimated with great precision or accuracy.

Autocorrelation test performed by using the Series Correlation LM Test Breusch-Godfrey method by looking at the comparison of Prob. F or Prob. Chi-Square with alpha set at 5%. If the Chi-Square probability $> \alpha$ is 5%, it is free from the autocorrelation problem. Meanwhile, if the Chi-Square probability $< \alpha$ 5%, it can be said that the model in the study has an autocorrelation problem.

Normality test is carried out to analyze whether the data in the study are normally distributed or not. This test can be carried out by looking at the value of Jaeque-Bera (JB) and probability. Data can be stated normal distribution is when the probability is more than α 5%. Vice versa, when the probability value $< \alpha$ 5%, then the data is not normally distributed.

Heteroscedasticity test is performed for the purpose of analyzing whether the interference variable has a non-constant variant. This test is

carried out using the white heteroscedasticity method. Where can be seen through the Chi-Square probability. If Prob. Chi-Square $> \alpha$ 5%, then free of heteroscedasticity. Whereas when Prob. Chi-Square $< \alpha$ 5% then there is no heteroscedasticity problem.

3. RESULTS AND DISCUSSION

Stationarity Test

In utilizing ECM analysis tool, there are several steps that must be done, first by conducting a unit root test or stationarity test. In this study it was determined that alpha (α) used was 5%. If the probability value is at level $> 5\%$, it can be concluded that the data is not stationary so the requirements to obtain the first ECM equation are met. By the contrary, if the probability is $> 5\%$, the stationary data means that the formulation of the ECM cannot be continued. The condition is that each variable must not be significant at the level of level but must be significant at the level of 1st difference or 2nd difference and the data of each variable must be stationary at the same level. Kindly find the results of the stationarity test below:

Table 1. Stationarity test at level

Variable	Method	t-stat	p-value	Interpretation
GDP	ADF	1,798001	0,9812	Not stationary
BIRATE	ADF	-0,949249	0,3005	Not stationary
TAX	ADF	-0,802089	0,3630	Not stationary
GE	ADF	0,332759	0,7773	Not stationary

Source: Processed Data, 2020

Table 2. Stationarity Test Result at 1st difference level

Variable	Method	t-stat	p-value	Interpretation
GDP	ADF	-6,313892	0,0000	Stationary
BIRATE	ADF	-4,479890	0,0000	Stationary
TAX	ADF	-22,47499	0,0000	Stationary
GE	ADF	-16,07908	0,0000	Stationary

Source: Processed Data, 2020

Stationarity test in this study used the ADF (Augmented Dickey Fuller) procedure. Based on the results of the stationarity test conducted, using the Augmented Dicky Fuller (ADF) method it is found that GDP when compared to alpha 5% (0.05) is not stationary at the level, but stationary at the level of 1st difference, so the variables in this

study pass the stationarity test and qualify to be able to use the ECM model in this study.

Cointegration Test

After all variables have passed the stationarity test, the next step is the cointegration test, this test is conducted to determine the behavior of research

data in the long term whether or not to co-integrate. And to find out the integration of long-term balance between variables. This cointegration

test also determines whether research can use the ECM model as an analysis tool.

Table 3. GDP Cointegration Test (*Unrestricted Cointegration Rank Test (Trace)*)

Hypotezed	Eigenvalue	Trace Statistic	5% Critical Value	Probability
None*	0,716681	80,14273	47,85613	0,0000
At most 1	0,275840	22,12843	29,79707	0,2914
At most 2	0,145491	7,282272	15,49471	0,5450
At most 3	0,001082	0,049788	3,841465	0,8234

Trace test indicates 1 cointegrating eqn (s) at the 0.05 level

Source: Processed Data, 2020

Johansen's cointegration test results based on the Trace value indicate that there is one cointegration on the variable. In addition, the results of this cointegration test can also be obtained from forming residuals obtained through

regression of the independent variables to the dependent variable with the Ordinary Least Square (OLS) method whereby the residual must be stationary at the level of level in order to obtain co-integrated results.

Table 4. ECT test at level (GDP)

Augmented Dickey-Fuller test statistic		t-stat	Probability
		-3,565787	0,0007
Test critical values:	1% level	-2,617364	
	5% level	-1,948313	
	10% level	-1,612229	

Source: Processed Data, 2020

Based on the result above, ECT is found at the level, where the probability of ECT is significant at 0.0007, smaller than alpha (0.05). It shows the existence of cointegration in research.

Estimation Result in Short Term

Kindly find the effect of BI Rate, Taxation, and Government Expenditure to economic growth (GDP) below (Processed Data, 2020):

Table 5. Regression Result in Short Term of GDP

Variable	Coefficient	t-Stat	Prob.
C	62,50222	2,335902	0,0243
D(BIRATE)	37,07236	0,616637	0,5408
D(TAX)	0,363673	0,271419	0,7874
D(GOEX)	0,000243	0,190105	0,8501
ECT(-1)	-0,162260	-2,022508	0,0495
Adj R ²	0,030175		
F-stat	1,357810		
Prob(Fstat)	0,264823		

Based on the result above, the short-term model is:

$$GDP_t = 62,50 + 37,07dBIRATE_t + 0,36dTAX_t - 0,00dGE_t - 0,16ECT_t$$

Based on the estimation results, it is obtained that in the short term the BI Rate, TAX (Taxation) and GE (government expenditure) affect positively but not significantly to economic growth (GDP). According to the results of the processed data, a coefficient (C) of 62.50222 is obtained, it means when BI Rate, taxation and government expenditure are assumed to be constant, GDP will increase of 62.5 billion rupiah. Based on the regression results also found the magnitude of the coefficient of ECT that is equal to -0.162260. This figure means that if there is a past imbalance of 100%, then GDP will adjust to decrease by 16%. Then for each variable regression coefficient.

BI Rate which has a regression coefficient value of 37.07236, it means that when taxation and government expenditure are assumed to be constant, if the BI Rate increases by 1%, it will also have an impact on increasing GDP by 37.07236 billion rupiah. The taxation regression coefficient which has a value of 0.363673 means that, if the BI Rate transaction and government expenditure are assumed to be fixed / unchanged, each tax increase of 1% will also have an impact on an increase in GDP of 0.363673 billion rupiah. The regression coefficient of government expenditure which has a value of -0,000243 means that if the BI Rate and taxes are assumed to be constant and unchanged, if there is an increase in government expenditure by 1 billion rupiahs, it will have an impact on increasing GDP by 0,000243 billion rupiahs.

The results of the short-term analysis show that the interest rate shows is positive and significant does not affect GDP. This means that an increase in interest rates in the short term cannot increase Indonesia's GDP. Research conducted by Yusuf, et al (2019) found that in Nigeria interest rate did not

significantly influence economic growth in the short term using the ECM method. The absence of a link between interest rates and economic growth implies that the velocity of money in the country is so low that an increase in interest rates is not able to increase the amount of community savings in financial institutions, in so doing in the short term interest rates did not significantly affect GDP. The short-term analysis results show that the increase in taxation rates in the short term has no effect on GDP. This is different from the study conducted by Ahmad, et al (2018) who studied research on the impact of direct taxes on economic growth in Pakistan. The results found that the indirect tax variable did not have a significant effect in the long term had no significant effect on economic growth, so that the determination of government policy in the short term would not affect the increase in GDP. It means that the lack of taxation collected system. The results showed that the government expenditure had no significant effect on GDP. It means that an increase in government expenditure in the short term has no effect on increasing GDP. It is caused by government expenditure in the short term such as construction of facilities and infrastructure is a long-term investment, so that in the short term government expenditure does not affect the increase in GDP. The same condition also occurs in the country. Research conducted by Sari and Sholeh (2013) who found that in the province of Bengkulu in the short term government spending has not been able to increase economic growth.

Estimation Result in Long Term

Kindly find the effect of BI Rate, Taxation, and Government Expenditure to economic growth (GDP) below (Processed Data, 2020):

Table 6. Regression Result in Long Term of GDP

Variable	Coefficient	t-Stat	Prob.
C	3094,213	7,292272	0,0000
BIRATE	-250,7843	-4,878718	0,0000
TAX	-9,186343	-3,383379	0,0015
GOEX	0,014084	7,592172	0,0000
Adj R ²	0,777115		
F-stat	55,62364		
Prob(F-stat)	0,000000		

Based on the result above, the long-term model is:

$$GDP_t = 3094,213 - 250,78BI\ Rate_t - 9,18TAX_t + 0,01GE_t + \epsilon$$

Based on the estimation results, it is found that in the long term the BI Rate and taxation affect GDP negatively and significantly. Whereas government expenditure positive significantly affecting GDP. According to the results of the processed data, a coefficient (C) of 3,094,213 is obtained, it means when the BI Rate, taxation and government expenditure are assumed to be constant, GDP will increase of 3,094,213 billion rupiah. Then for each variable regression coefficient:

BI Rate which has a regression coefficient value of -250.7843, it means that when taxation and government expenditure are assumed to be constant, the increase in the BI Rate of 1% will have an impact on GDP decline of -250.7843 billion rupiah. The taxation regression coefficient which has a value of -9.186343 means that if BI Rate and government expenditure are assumed to be constant, each taxation increases of 1 billion rupiah will impact on GDP reduction of -9,186343 billion rupiah.

Analysis of estimation result in long term interest rate is negative and significantly affect GDP with the probability of a 0.0000 interest rate being significant at alpha one percent. It means that an increase in interest rates will reduce GDP in the long term, by the contrary decrease in interest rates by the monetary authority will have an impact on increasing economic growth. Based on the results of research conducted by Research carried out by Joseph, et al (2018) who analyzed the impact of interest rates on economic growth in

Nigeria using the multiple regression method. The results found that interest rates significantly influence economic growth. Increased interest rates will reduce the amount of investment; this will certainly have an impact on reducing GDP that can be produced by a country. The regression coefficient of government expenditure which has a value of 0.014084 means that if the BI Rate and taxation are assumed to be constant, if government expenditure increases by 1 billion rupiahs will also have an impact on GDP of 0.014084 billion rupiah. Taxation in the long term has a significant negative effect on GDP with a negative relationship. It means that an increase in tax by the government will reduce the amount of GDP that can be collected in the long term. The results of this study are the same as in Africa. Research conducted by Gashi, (2018) found that there is a negative relationship between taxes and economic growth. One of the policies implemented by the government is to reduce indirect taxes and raise direct taxes to increase economic growth. Government expenditure in the long run has a significant effect on GDP. This means that increasing government policy spending will have an impact on increasing GDP. Research conducted by Hassan and Misra, (2016) who found that there is a positive and significant relationship between government spending and GDP in Jammu and Kashmir countries. This indicates that government spending will improve the construction of facilities and infrastructure, so that it will have an impact on increasing GDP. Government expenditure in the long term has a significant effect on GDP. It means that increasing government policy expenditure will have an impact on increasing GDP. Research carried out

by Hassan and Misra, (2016) who found that there was a positive and significant relationship between government expenditure and GDP in Jammu and Kashmir countries. This indicates that government spending will improve the construction of facilities and infrastructure, so that it will have an impact on increasing GDP.

4. CONCLUSIONS

Based on the results, macro variables in creating stability of economic growth in Indonesia as DC OECD, it can be concluded as follows. In long term, BI Rate has significant and negative effect to economic growth, Taxation has negative and significant effect to economic growth, in the meantime Government Expenditure has positive and significant effect to economic growth. In short term, BI rate has positive and not significantly to economic growth, Taxation has positive and not significantly to economic growth, and government expenditure has positive and not significantly effect to economic growth.

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Research Institution, Universitas Jambi, Indonesia
Faculty of Economics and Business, Universitas
Jambi, Indonesia

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