Proceeding International Conference on Economic Business Management, and Accounting (ICOEMA)-2024
Program Studi Doktor Ilmu Ekonomi
Universitas 17 Agustus 1945 Surabaya-2024

Analysis of Economic Growth in Indonesia Using the Error Correction Model

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Received: August, 2024; Accepted: August, 2024; Published: November, 2024
Permalink/DOI:

Abstract

This research was conducted to look at the influence of foreign debt, savings, domestic loans and total factors of production on economic growth in Indonesia in the long term and short term using the error correction model (ECM) method. The results of the simultaneous test (F-test) of all independent variables have an influence on the dependent variable in the short term and long term. Foreign debt (X1) partially in the short term has no effect on economic growth in Indonesia and in the long term it does. Savings (X2) partially in the short term have no effect on economic growth in Indonesia and in the long term they do. Domestic loans (X3) partially in the short term and in the long term have no effect on economic growth in Indonesia. Total production factors (X4) partially in the short term and long term have a negative effect on economic growth in Indonesia.

Keywords: *Error Correction Model, Economic Growth In Indonesia*

INTRODUCTION

Economic growth as an important indicator for measuring success in a country's economic development is the government's full attention in advancing the country's economy. Economic growth is a measure of the achievements of economic activities in Indonesia in obtaining additional income for its people from one period to the next. High economic growth in a country can encourage faster development activities in a country. It is hoped that a high rate of economic growth will also be able to encourage and increase welfare and prosperity for its people. The following is data on Indonesia's economic growth.

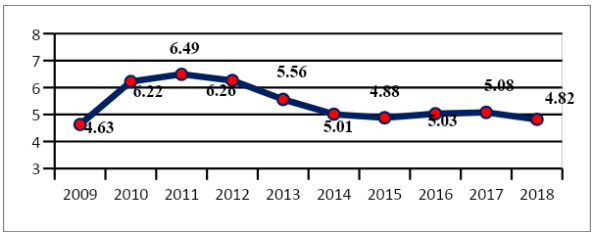

Figure 1. Economic Growth in Indonesia 2009-2018 (%)
Source: BPS, 2024

Indonesia's economic growth experienced fluctuations during the 2009-2018 period. The movement of economic growth in 2009 to 2009 had a positive trend. However, in 2012 it decreased to 6.26% and the decline in growth continued until 2015 amounting to 4.88%, this occurred due to the slowing of the economy in the first quarter of 2015 compared to economic growth in the same period in 2014 which was caused by the production side and consumption side (Bank Indonesia).

From the production side, the cause is construction performance related to delays in the realization of infrastructure spending, meanwhile from the expenditure side the cause of the economic slowdown is that all components of household consumption expenditure slow down, then government consumption expenditure also slows down. If you look at 2009 to 2018, Indonesia's economic growth has had a negative trend.

Economic growth is the development of activities in the economy which causes the production of goods and services in an area to increase over a certain period of time. This production is measured using the concept of added value *originating* from certain regional economic sectors which in total are known as economic growth. Classical/Neo Classical Economic growth theory also states that economic growth, measured by GDP growth, depends on the development of production factors, namely; capital, labor and technology.

Currently, Indonesia, in its development as a developing country, is always trying to be able to develop its nation and state independently without expecting help from other countries. In reality, the Indonesian state has not been able to carry out development independently but is still dependent on other countries, due to capital problems that are insufficient for the state financing budget.

Foreign debt is sufficient to help developing countries in their efforts to cover short-term state revenue and expenditure budget deficits, the effects of routine financing expenditures and relatively large development expenditures. Classical economic theory also indicates that an increase in foreign debt can only finance government spending and increase economic growth in the short term. In the long term, foreign debt does not have a significant impact due to the government budget deficit being financed by foreign debt, this foreign debt can cause various economic problems, most of the state revenue which is expected to improve the economy instead becomes routine expenditure which is partly allocated for principal installments and interest on debt. This is the result of the debtor country being unable to utilize and use foreign debt properly. This is because the allocation of funds that have been provided to pay debt obligations will reduce the allocation of development funds to other sectors that encourage economic growth.

Another effort that can be made to increase economic growth is to accumulate capital. Capital accumulation can be done when part of the income is saved or reinvested. In Indonesia, savings which are a source of funds for investment are considered insufficient, because they are still relatively low. Community savings are part of the income received and are not used for consumption purposes. According to Solow, people's savings will be invested, According to the assumption, some proportion of output is set aside for savings

and investment. It can be said that Indonesia has not been able to provide all development funds, the reason is that domestic savings have not met domestic capital. According to Solow, high savings only increase economic growth temporarily until *steady-state conditions,* if high savings are maintained, it only maintains a large capital stock and high output does not maintain high growth forever (Mankiw, 219: 2007).

In 2010 Indonesia's savings amounted to 728902 billion rupiah, continuing to increase in 2018 amounting to 2363818 billion rupiah. In theory, increased savings only increase GDP temporarily and high savings do not maintain growth, this is interesting to research.

Increased GDP growth can also be influenced by domestic loans (PDN). Domestic loans are not as well known compared to foreign loans, both are regulated in Law number 1 of 2004 concerning State Treasury, where both are sources of state financing. Domestic loans (PDN) are any loans by the government obtained from domestic lenders which must be repaid with certain conditions according to the validity period. Domestic lenders as a source of government financing come from regional governments, state-owned enterprises (BUMN) and regional companies selected and selected by the Minister of Finance (Director General of Debt Management).

Domestic loans are carried out to improve domestic industry and reduce dependence on foreign loans, so far the use of PDN is still limited to empowering domestic industry through the Ministry of Defense and Police of the Republic of Indonesia (BAPPENAS, 2012). The following is a graph of Indonesia's domestic loans. Indonesia's domestic loans continue to experience a significant increase. The highest domestic loans occurred in 2018 with loans amounting to 2651382 million rupiah and the lowest in 2010 amounting to 706678 million rupiah. The highest loan growth occurred in 2017 to 2018 at 72.6% compared to the previous year. This happens because the government wants to reduce foreign loans by increasing domestic loans.

Another factor that can increase economic growth or GDP can also be done by increasing productivity and technology, which can be seen from the role of total production factors. Total production factors are better known as *Total Factor Productivity* (TFP). In the classical economic growth theory developed by Solow (1957), the input factors of labor and capital are the determinants of a country's economic growth. Apart from labor and capital, other factors which are often called total factor productivity also influence economic growth. Several studies also prove that the high level of output produced by a country is influenced by *Total Factor Productivity* (TFP) which is identical to technological progress, elements of productivity and work efficiency. This is in accordance with the classical theory of the Solow model, that economic growth depends on capital accumulation, labor growth and the level of technological progress. In the Solow Residual equation, TFP measurement uses the formula A = ÿY + ÿK + ÿL. Where Ÿy is economic growth, ÿK is capital growth, ÿL is workforce growth.

Total Factor Productivity (TFP) gives a fluctuating and negative trend. The highest TFP growth was in 2010 which reached 56.52%, in 2011 TFP fell to

16.89%, this was due to labor growth which fell by -1.98%. At the end of 2018 TFP growth was 22.42%.

One of the studies by Rosita Mellani Dewi (2014), examined *the Total Factor Productivity* (TFP) *Technology Development Against Indonesia Creative Industrial Sector GDP* using a *Judgment Sampling approach.* The results of this research show that the culinary industry subsector contributed 32.17% to GDP, the fashion subsector contributed 27.97% to GDP, and other subsectors only contributed around 1%. The calculation results The lowest TFP is the research and creative industry research subsector which has the smallest trend, this is due to the lack of government support in providing funding.

Based on the background explanation stated above, by looking at Indonesia's economic growth trend, the author is interested in conducting research using quarterly data for 2010-2018 and will discuss the problem of the relationship between GDP and foreign debt, savings, domestic loans and total factors of production in the short term and long-term.

METHOD

This type of research is quantitative descriptive. Quantitative descriptive is a type of research that aims to systematically, factually and accurately describe the facts and characteristics of an object or population

certain.

Data analysis

The data used in this research is time series data. According to Agus Widarjono (2013:336) the appropriate model for non-stationary time series data is the error correction model. This research uses the analysis method *Error Correction Model* (ECM) Engle Granger to process the data in this research. The reason for using the ECM analysis method is because this method can analyze the short-term and long-term relationship of the influence of the independent variables Foreign Debt (X1), Savings (X2), Domestic Loans (X3) and Total Production Factors (X4) on the dependent variable Economic Growth (Y) is expressed in the form of this research function Y = f (X1, X2, X3, X4). The ECM test steps are data stationarity test, cointegration test, and ECM test.

Error Correction Model (ECM)

The Error Correction Model (ECM) was developed by Domowitz and Elbadawi which is a testing tool used to correct and analyze the short-term and long-term balance of each variable (Nachrowi, 2006:371). Apart from that, ECM can also be used to explain why economists face imbalances in terms of phenomena that economists expect do not match reality.

The following is a long-term estimation model in linear form used in this research as follows:

$$Yt = ÿ0 + ÿ1X1t + ÿ2X2t + ÿ3X3t + ÿ4X4t + et$$

Mean while, the short-term estimation model using the Engle- Granger ECM approach used in this research:

$$ÿYt = ÿ0 + ÿ1ÿX1t + ÿ2ÿX2t + ÿ3ÿX3t + ÿ4ÿX4t + ÿ5ECT + et$$

Conceptual Framework

The conceptual framework is a picture of thought compiled from various theories of the relationship between several variables that are described and then analyzed critically and systematically so as to produce a synthesis of the relationship between the variables studied. In general, the conceptual framework can be depicted in the following picture:

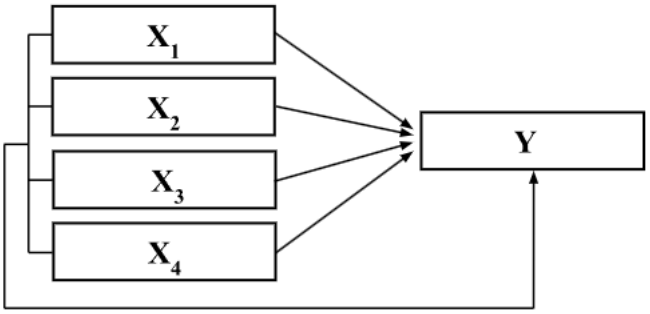

Figure 2. Conceptual Framework

Hypothesis

The hypothesis used in this research is:

H1 : Foreign Debt, Savings, Domestic Loans and Total Production Factors in the short term influence economic growth in Indonesia.

H2 : Foreign Debt, Savings, Domestic Loans and Total Production Factors in the long term influence economic growth in Indonesia.

RESULTS AND DISCUSSION

Stationarity Test

The data stationarity test is carried out to test whether the data is stationary or not. The method that is widely used by econometricians to test stationary data problems is to use the unit root test with the Augmented Dickey Fuller Test (ADF).

Table 1. Unit Root Test Result

Variabel	*Prob Augmented Dickey Fuller Test*		
	Level	**First diference**	**Second diference**
Economic Growth (Y)	0,8474	0,0001	0,0001
Foreign Debt (X1)	0,8360	0,0000	0,0000
Savings (X2)	0,9997	0,9998	0,0001
Domestic Loan (X3)	1,0000	0,9619	0,0500
Total Factor of Production (X4)	0,0000	0,0000	0,0000

Source: Processed data result (2024)

At the Second Difference level, all variables appear to be stationary with probability values for all variables < 0.05. Because all variables are stationary, the research can continue.

Cointegration Test

Table 2. Cointegration Test Result

Unrestricted Cointegration Rank Test (Trace)				
Hypothesized No. Of CE(s)	**Eigenvalue**	**Trace Statistic**	**0.05 Critical Value**	**Prob****
None*	0.856427	113.2484	69.81889	0.0000
At most 1	0.585497	47.25743	47.85613	0.0568
At most 2	0.263868	17.31447	29.79707	0.6168
At most 3	0.158897	6.898692	15.149471	0.5895
At most 4	0.029420	1.015301	3.841466	0.3136

Source: Processed data result (2024)

Based on the table above, it shows the occurrence of cointegration or the existence of a long-term relationship as seen from the trace statistical value 113.2484 > critical value 69.81889 with a probability of 0.0000. Because there is a cointegration relationship in the variables, the research can be continued in the ECM test.

Error Correction Model (ECM)

Table 3. Cointegration Test Result

Dependent Variable: Y
Method: Least Squares
Date: 07/10/20 Time: 13:33
Sample: 2010Q1 2018Q4
Included observations: 36

Variable	Coefficient	Std. Error	t-Statistic	Prob.
X1	3.445644	0.422956	8.146584	0.0000
X2	0.951084	0.308817	3.079769	0.0043
X3	-0.037916	0.068790	-0.551184	0.5855
X4	-6643.818	2569.032	-2.586117	0.0146
C	929579.0	65609.86	14.16828	0.0000

R-squared	0.978277	Mean dependent var	2149518.
Adjusted R-squared	0.975474	S.D. dependent var	294610.3

S.E. of regression	46138.50	Akaike info criterion	24.44493
Sum squared resid	6.60E+10	Schwarz criterion	24.66486
Log likelihood	-435.0087	Hannan-Quinn criter.	24.52169
F-statistic	349.0107	Durbin-Watson stat	1.509706
Prob(F-statistic)	0.000000		

Source: Processed data result (2024)

Based on the table above, the long-term estimation results can be seen as follows:

$Y = 929579{,}0 + 3{,}445644\ X_1 + 0{,}951084\ X_2 - 0{,}037916\ X_3 - 6643{,}818\ X_4 + et$

Table 4. Short Term Regression Results

Dependent Variable: D(Y)
Method: Least Squares
Date: 07/10/20 Time: 13:41
Sample (adjusted): 2010Q2 2018Q4
Included observations: 35 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	17950.72	11324.01	1.585191	0.1238
D(X1)	0.270592	0.953899	0.283669	0.7787
D(X2)	1.068713	0.633392	1.687284	0.1023
D(X3)	-0.096404	0.056711	-1.699924	0.0998
D(X4)	-5138.286	1688.950	-3.042296	0.0049
ECT(-1)	-0.625009	0.167932	-3.721796	0.0008

Source: Processed data result (2024)

$D(Y) = 17950{,}72 + 0{,}270592\ D(X_1) - 1{,}068713\ D(X_2) - 0{,}096404\ D(X_3) - 5138{,}286\ D(X_4) - 0{,}625009\ ECT + et$

Hypothesis test
Simultaneous Test Results

Based on the results of calculations using the error correction model (ECM), the results obtained simultaneously on the influence of the independent variable on the dependent variable in the short term and long term are as follows:

1. In the short term, it can be seen that the resulting probability value is 0.000018 < ( ) 0.05 and the value of Fcount (9.543856) > Ftable (2.68), it can be concluded that foreign debt (X1), savings (X2) , domestic loans (X3) and total production factors (X4), simultaneously in the short term have a significant effect on economic growth (Y).
2. In the long term, it can be seen that the resulting probability value is 0.000000 < ( ) 0.05 and the value of Fcount (349.0107) > Ftable (2.68), it can be concluded that foreign debt (X1), savings (X2) , domestic loans (X3) and total production factors (X4), simultaneously in the long term have a significant effect on economic growth (Y).

Partial Test Results

1. External Debt (X1)

The foreign debt variable has a probability value of 0.7787 > 0.05 and a tcount value
(0.283669) < ttable (2.03951), then the conclusion is that partially the foreign debt variable in the short term does not have a significant effect on the economic growth variable. Partially, the long- term foreign debt variable has a significant effect on the economic growth variable, has a probability value of 0.0000 > 0.05 and a tcount (8.146584) > ttable (2.03951).

0. Savings (X2)

The savings variable has a probability value of 0.1023 > 0.05 and a tcount (1.687284) < ttable (2.03951), so the conclusion is that partially the savings variable in the short term has no significant effect on the economic growth variable.
Partially, the savings variable in the long term has a significant effect on the economic growth variable, having a probability value of 0.0043 < 0.05 and a tcount (3.079769) > ttable (2.03951).

0. Domestic Loans (X3).

The domestic loan variable has a probability value of 0.0998 > 0.05 and a tcount value (1.699924) < ttable (2.03951), then the conclusion is that partially the variable Domestic loans in the short term do not have a significant effect on economic growth. Partially, the domestic loan variable in the long term has no significant effect on economic growth, has a probability value of 0.5855 > 0.05 and a tcount (0.551184) < ttable (2.03951).

0. Total Production Factors (X4)

The total production factor variable has a probability value of 0.0049 <0.05 and a tcount value (3.042296) > ttable (2.03951), then the conclusion is that partially the production factor variables in the short term have a significant and negative effect on economic growth. Partially, the total variable of production factors in the long term has a significant and negative effect on economic growth, has a probability value of 0.0146 < 0.05 and a value of tcount (2.586117) > ttable (2.03951).

Discussion

1. The Effect of Foreign Debt on Economic Growth

The foreign debt variable (X1) partially in the short term has no effect on economic growth in Indonesia because it has a probability value of 0.7787 > 0.05 and tcount (0.2836669 < ttable (2.03951). This means that in the short term it has no effect significant impact on GDP in Indonesia, this rejects the opinion of classical economists that foreign debt for government spending only increases growth in the short term.

The foreign debt variable (X1) partially influences economic growth in Indonesia in the long term because it has a probability value of 0.0000 < 0.05 and a tcount (8.146584) > ttable (2.03951). This means that in the long term foreign debt has a significant effect on GDP in Indonesia. Indonesia's foreign debt has a long-term impact because it is used to develop infrastructure, communications, transportation and evenly develop Indonesia's territory.

This long-term research is in line with research conducted by Muflihul Khair and Bahrul Ulum Rusydi (2016) which states that the foreign debt variable has a positive and significant relationship with economic growth in Indonesia.

0. The Effect of Savings on Economic Growth

The savings variable (X2) partially in the short term has no effect on economic growth in Indonesia because it has a probability value of 0.1023 > 0.05 and tcount (1.687284) < ttable (2.03951). This means that in the short term savings do not have a significant effect on GDP in Indonesia.

This is because savings are the capital stock of the economy in a certain time. Savings which are not significant to GDP occur because people's income is still low, besides that the low interest rate is one of the reasons people don't save.

The savings variable (X2) partially in the long term influences economic growth in Indonesia because it has a probability value of 0.0043 < 0.05 and a tcount (3.079769) > ttable (2.03951). This means that in the long term savings have a significant influence on GDP in Indonesia, because every savings will be used over a long period of time and spent for economic needs, thereby increasing GDP. This is in accordance with Solow's opinion that all people's savings will be invested. In accordance with the assumption about the propensity to save, a proportion of the output is left to be saved and then invested. In this way, there will be an increase in capital stock which will cause an increase on economic activity, thereby causing an increase in GDP.

This research is in line with research conducted by Suhendra and Dita Ayu Irawati (2016) which states that savings have an effect on GDP in Indonesia in the long term and have no effect in the short term.

0. The Effect of Domestic Loans on Economic Growth

The domestic loan variable (X3) partially in the short term has no effect on economic growth in Indonesia because it has a probability value of 0.0998 > 0.05 and tcount (1.699924 < ttable (2.03951) and in the long term it also has no effect on economic growth in Indonesia 0.5855 > 0.05 and the value of tcount (0.551184)

< ttable (2.03951). This means that in the short and long term domestic loans do not have a significant effect on GDP in Indonesia domestically, what the

government does is only to cover the government's spending budget shortfall, so it has no significant impact on GDP. This research is not in line with research conducted by Aris Munandar (2017) which states that government debt has a significant influence on economic growth. Government debt in this study represents domestic borrowing.

0. Influence of Total Production Factors on Economic Growth

The variable total production factors (X4) partially in the short term has a negative effect on economic growth in Indonesia because it has a probability value of 0.0049 < 0.05 and tcount (3.042296) > ttable (2.03951) and in the long term it has a negative effect on economic growth in Indonesia because it has a probability value of 0.0146 < 0.05 and a tcount value
(2.586117) > ttable (2.03951). This means that in the short and long term the total factors of production have a negative relationship and have a significant effect on GDP in Indonesia. Total production factors are better known as Total Factor Productivity (TFP). This rejects the Solow Swan Theory which states that growth in output per capita (GDP) in the long term is driven by growth in technological progress (TFP). Because Indonesia still lacks the ability to use advanced technology, increasing technology in a sector will slow down GDP.
This research is in line with research conducted by Elly Suryani (2006) and Rosita Mellani Dewi (2014) which states that total productivity factors influence economic growth in Indonesia.

CONCLUSION

1. The conclusion is that the variables foreign debt (X1), savings (X2), domestic loans (X3) and total production factors (X4) simultaneously in the short and long term have a significant effect on economic growth in Indonesia. Foreign debt (X1) partially in the short term has no effect on economic growth in Indonesia and in the long term it has an effect on economic growth in Indonesia. Savings (X2) partially in the short term have no effect on economic growth in Indonesia and in the long term they have an effect on economic growth in Indonesia. Domestic loans (X3) partially in the short term and in the long term have no effect on economic growth in Indonesia. Total production factors (X4) are partially in short term and long term have a negative effect on economic growth in Indonesia.
2. The independent variable can influence the dependent variable in the short term by 55.68% and in the long term it is 97.54%, meaning that the variables of foreign debt, savings, domestic loans and total production factors can explain variations in economic growth variables in the long term more strongly than in the short term. The remaining 44.32% in the short term and 2.46% in the long term are influenced by other variables outside the model.

Suggestion

Based on the limitations of the researcher's abilities, the author proposes several suggestions as follows:

1. Indonesia's economic growth can be increased in the long term because in the long term because simultaneously the independent variables in this research have a greater influence than in the short term, it is recommended that the government accelerate the increase in GDP in the short term so that the Indonesian economy remains stable in the short term.
2. For further research, this research can be used as reference material. If you use the same variables, it is best to measure the variables using other measurement methods and it is recommended that further research add other variables outside this model to optimize more accurate research results.
3. Future researchers who carry out the same research can also add a longer time span or observation period so that this research can be more perfect and it is best to do this by improving the stages of this method or future researchers can also use other methods.

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