Long-term Analysis of Inflation, Exports and Exchange Rate of Economic Growth in Indonesia

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Abstract. Economic growth is one of the macroeconomic indicators that show the level of welfare of a country. The factors that effect to economic growth is inflation, exports and Exchange Rates. This study aims to analyze the effect of Inflation, Exports and Exchange Rates to Economic Growth in the long run. Data collecting used documentation. Data were analyzed using Vector Error Correction Model (VECM) and cointegration test. The results of the study were (1) there is In the short-term estimation only inflation affects economic growth while exports and the exchange rate have no short-term effect on economic growth. The most important thing from the short term equation is the value of error correction. Error Correction coeficient of -0.733053. This shows that the imbalance in economic growth in the current year (2018) will be corrected in the following year by 73.3053%. and (2) there is a long term effect of variabels inflation, exports and exchanger rate to economic growth in Indonesia in 1988-2018. Based on the long-term analysis of the VECM model it is found that inflation and exports negatively affect economic growth. While the exchange rate variable has a positive influence on economic growth. the results of the analysis of an increase in inflation of 1% will have an impact on the decline in economic growth of 3.73178%.export variable has a negative influence which explains that an increase in exports of 1% will reduce economic growth 3,65662%.

Keywords: Long term · VECM · Cointegration

1 Introduction

Globalization can be interpreted as the opening gate of intertwining cooperative relations between countries with other countries. Integration process between countries which occur on a global scale which subsequently occurs the existence of globalization of production as well as market globalization. Market globalization Stop the merger of previously separate national markets become a global market with a large choice [1]. Market globalization is also the globalization of production which createsthe existence of international trade between countries. The economy is one of the main foundations in a country's strength. But economic stability does not always run smoothly because there are many factors such as inflation, export and exchange rate.

Inflation is the tendency of prices to increase generally against groups of goods needed by the community and is continuous that efect economic growth. Inflation also affects the economic growth that finally affect to the exports[2]. According to keynes inflation is an

increase in the average price level, what is meant by prices in this case namely the price of exchanging money for goods / services [3]. Inflation is one of the classic problems in an economy that can result in a decline in real income of the community which has a negative impact on the macro economy on an ongoing basis. This puts the issue of inflation as a very important indicator in maintaining economic stability. The monetary crisis that emerged in mid-1997 has caused a surge in inflation in Indonesia which has an impact on the decline in purchasing power and a decline in economic growth.

These developments have placed inflation as a strategic indicator for efforts to exclude the national economy from a prolonged recession. Until now, various efforts have been made by the government both through controlling inflation from the monetary side by Bank Indonesia as the monetary authority, as well as the disinflationary policy on the aggregate supply side related to the production side.

In relation to monetary policy, one of the most important factors for the effectiveness of monetary polic International trade is trade between countries which includes export-import activities [4]. The purpose of trade activities is to improve the welfare of the people of a country, because in international trade activities all countries compete in the international market. International trade is a form of economic cooperation between two or more countries provide immediate benefits. The form of cooperation between countries can be in the form of export activities. The increase in Indonesian exports has a very important significance for the economy of Indonesia. Besides being able to stimulate the national production, the increase in exports could increase the employment and the foreign-exchange revenues, mainly the US dollar. The increased revenue dollars to the Indonesian economy will increase the Indonesian foreign exchange reserves and will give impact on the strengthening of the rupiah against the US dollar [5].

The exchange rate is the value of one country's currency into another country's currency. Different economists argue that a flexible exchange rate is considered an important factor for any economy. [6]Moffett et al. (2017) group exchange rates into four types. The exchange rate is still controlled by the government, which uses the country's reserves for a certain period of time. The floating exchange rate that is managed is the rate based on the demand and supply of certain currencies under certain interactions from the government. A free floating exchange rate is an exchange rate that is entirely dependent on the strength of supply and demand on the open market, without government interaction. The last type of exchange rate is the exchange rate pegged - when the local currency is pegged compared to other countries 'currencies, and the two countries are similar compared to other countries currencies.

Macroeconomic variables of inflation, exports and exchange rates are determinants that affect economic growth. Economic growth in Indonesia has been very volatile. During the 1998 monetary crisis, Indonesia's economic growth slowed to -13.33%. Is this volatile and slow economic growth affected by inflation, exports or the exchange rate in the long run? This is what underlies the authors to examine further about the long-term effects of inflation, exports and exchange rates on economic growth.

2 Literature Review

Economic growth is a process of increasing per capita output in the long run [7]. This understanding covers three aspects, namely: process, per capita output and long term.

Reflecting the dynamic aspects of an economy developing or changing over time. According to Sukirno[8] economic growth is a means of measuring achievement from an economic development.

In a macroeconomic analysis the level of economic growth to be achieved by a country is measured by the development of real national income achieved in a given year. Gross Domestic Product (GDP) is total national income and total expenditure on output of goods and services in a given period. This GDP can reflect economic performance, so the higher the GDP of a country, it can be said the better the economic performance in that country. According to Keynes's theory, GDP is formed from four factors that positively influence it, these four factors are consumption (C), investment (I), government expenditure (G), and net exports (NX). The four factors are again influenced by various factors, including those influenced by factors such as income levels, price levels, interest rates, inflation rates, money supply, exchange rates.

Putong [9] says that "inflation is the process of increasing general prices continuously". While the opposite of inflation is deflation, which is a continuous decline in prices, as a result the purchasing power of the community increases, so that in the early stages of goods become scarce, but in the next stage the number of goods will be more and more due to the reduced purchasing power of the people. Inflation can cause disruption to economic stability in which economic actors are reluctant to speculate in the economy. In addition, inflation can also worsen the level of public welfare due to the general decline in public purchasing power due to rising prices. In addition, the distribution of income is getting worse because not everyone can adjust to inflation. Inflation has positive impacts and negative effects depend on whether or not inflation is severe. If inflation is mild, it has a positive influence in the sense that it can encourage a better economy, which is to increase national income and make people eager to work, save and invest. plummeted and plummeted over time. In general, inflation can result in reduced investment in a country, encourage an increase in interest rates, encourage speculative capital investment, failure of development, economic instability, a balance of payments deficit, and a decline in the level of life and welfare of the people.

According to Mankiw [4] , exports are defined as exports goods / services produced domestically can then be sold out country. For countries that have implemented an open economic system, then the country will interact with other countries' economies throughout world freely. One of the activities of economic interaction international is to export goods and services. One of the benefits of exports is to look for new market shares when the domestic market is already too saturated by competitors. Viewed from the side expenditure, exports become one of the most important factors for the GNP, so if the value of exports changes so the people's income also it will immediately change. On the other hand, the high exports of one country will cause the country's economy to be very sensitive shocks or fluctuations that occur in the market international / world economy. Trade is a process of exchanging goods and services which is carried out on the basis of like and like, to obtain the goods needed. In the period of globalization, trade is not only conducted in one country. Even the world has entered free trade. There is hardly a single country that has no relations with other countries [10]. Export is an effort to sell commodities that we have to other nations or foreign countries with government provisions by expecting payment in foreign currencies, as well as communicating in foreign languages. So the results obtained from exporting activities are in the form of a sum of money in foreign currency or commonly referred to as foreign exchange which is also one of the sources of state income. What is meant by

exports is trade activities that provide stimulation to grow domestic demand which causes the emergence of large factory industries, together with stable political structures and efficient social institutions [11]. Exports play an important role in a country's economic activities. Exports will generate foreign exchange which will be used to finance the import of raw materials and capital goods needed in the production process which will form added value. The added value aggregation produced by all production units in the economy is the value of Gross Domestic Product. An important function of the export component of foreign trade is that the country gains profits and national income rises, which in turn increases the amount of output and the rate of economic growth. With a higher level of output the vicious cycle of poverty can be broken and economic development can be increased [12].

According to Mankiw [4] the exchange rate between two countries is the price of the currency used by residents of these countries to trade with one another. From this definition it can be concluded that the foreign exchange rate is the price of a country's currency that is valued or expressed in another currency. The weakening of the rupiah exchange rate makes the price of imported goods increase due to the need for more rupiah to obtain these imported goods, as well as goods with imported raw materials. This will also increase the price of domestic production which can lead to economic growth. Depreciation of the rupiah against foreign currencies also resulted in an increase in the value of exports. Cheaper domestic goods prices attract foreign parties to increase the amount of demand for their goods so that prices will slowly rise and cause inflation [13].

3 Methodology

Data analysis method used in this study is quantitative or time series data, that is, data within a certain period of time, is used to simplify calculations using statistical data. To see the effect of inflation, exports and exchange rates the regression model used in this study is the model dynamic with the Vector Error correction model (VECM) approach. There are a number of steps that must be taken before estimating VECM: (1). Stationarity test, (2). Optimal lag test, (3). Cointegration test, (4). Estimation VECM. This study uses time series data from 1988-2018. The basic equation in this study is as follows:

$$Eg_t = \text{ß}o + \text{ß}1Inf_t + \text{ß}2logExp + \text{ß}3log\ Er + \mu_t \qquad (1)$$

Furthermore, if the equation is formulated in the form of a Vector Error Correction Model (VECM) then the equation is as follows:

$$\Delta Eg_t = \text{ß}o + \beta_1\Delta Inf_t + \beta_2\Delta logExp_t + \beta_3\Delta logEr_t + \beta_4VECM_{1\text{-}t} + \mu_t \qquad (2)$$

Where it:

Eg	= Economic growth
Inf	= Inflation
Exp	= Export
Er	= Exchange rate
ßo	= constanta
ß1, ß2, ß3	= coefecient regresion
μt	= Error Term

4 Results and Discussion

4.1 Stationarity Test

Stationarity test is intended to determine the nature and tendencies the data analyzed whether it has a stable pattern (stationary) or not. If found data that does not have the properties above (non-stationary), then the various indicators that accompany empirical results do not indicate a trait valid.

Table 1. Stationarity test.

ADF Unit Root Test				
Series	Prob.	Lag	Max Lag	Obs
D(Eg)	0.0000	0	6	29
D(Inf)	0.0000	1	6	28
D(logExp)	0.0005	0	6	29
D(logEr)	0.0015	0	6	29

Notes: Based on the stationarity test conducted by the ADF unit root test, the inflation, exchange rate, exports and stationary economic growth variables are obtained at the 1st difference. In the ADF test results show us the probability each variable less than $\alpha = 0,05$.

4.2 Optimal Lag Test

Table 2. Optimal Lag.

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-183.1543	NA	21.01274	14.39649	14.59004	14.45222
1	-104.3749	127.2591	0.171219	9.567297	10.53506	9.845979
2	-75.51724	37.73689*	0.070373*	8.578249	10.32023*	9.079876
3	-61.23093	14.28631	0.105717	8.710072	11.22626	9.434644
4	-36.47706	17.13730	0.101299	8.036697	11.32710	8.984215
5	-1.182872	13.57469	0.100492	6.552529*	10.61715	7.722992*

Notes: From the table above it can be seen that the optimal lag occurs in lag 2, where in lag 2 there are the most signs *. for further analysis lag 2 is used.

4.3 Cointegration Test

Cointegration test is one of the tests in the dynamic model. The purpose of the test is to find out whether there is a relationship the long run among variables. This test is a continuation of the test stationary. The main purpose of this cointegration test is to find out whether stationary cointegrated residuals or not. If the variable is cointegrated then there is a stable relashionship in the long run. Conversely, if there is no cointegration between variables, the implications no long term relationship. After knowing that the

data is not stationary, then the next step is to do identify whether the data is cointegrated. For this reason, cointegration testing is needed. cointegration is used as an initial indication that the model is used have a long-term relationship (cointegration relation). Cointegration test results obtained by forming residuals that are obtained by way of regenerating independent variables to the dependent variable OLS. Cointegration Test can be done with DF testing to test the residuals generated, if the residuals are not stationary (prob> 0.05), then it can be said that the data it is not cointegrated [14] [15].

Cointegration test is used to see whether there is a long run relationship among the variables. To see the cointegration test used in this research is the Johansen test, if the statistical trace value is greater than the critical value it's means there is cointegration each variabels in the research. So the model chosen is the Vector Error Correction Model (VECM). Based on the results of the cointegration test variable data shown in table 3, there is 1 cointegration equation at a significant level of 5%. Therefore, the variables of economic growth, inflation, exports and the exchange rate have the liniear combination which is stationary (cointegration). cointegration shows that there is a long-term relationship between variables so that the variables form a linear relationship. cointegration in the equation system implements that in the system there is a Vector Error Corection Mechanism which illustrates the existence of a short-term dynamic relationship that is consistent with its long-term relationship.

Table 3. Uji Kointegrasi-*Johansen Cointegration Test.*

Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.716362	70.07701	63.87610	0.0137
At most 1	0.543324	34.79544	42.91525	0.2536
At most 2	0.293594	12.84958	25.87211	0.7498
At most 3	0.105373	3.117756	12.51798	0.8622

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

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.716362	35.28157	32.11832	0.0198
At most 1	0.543324	21.94586	25.82321	0.1499
At most 2	0.293594	9.731821	19.38704	0.6475
At most 3	0.105373	3.117756	12.51798	0.8622

Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Notes: based on the cointegration test variables inflation, exports and the exchange rate have a long-term effect on economic growth. This can be seen from the trace value of statistics> critical value and can also be seen from the value of max eigen> critical value.

4.4 Estimation VECM

The concept of cointegration states that if one or more variables are not stationary cointegrated then the linear combination between the variables in the system will be stationary so we get a term equation system stable length. Here are the results of the long-term model estimation:

Table 4. Vector Error Corection Model.

Cointegrating Eq:	CointEq1			
Eg(-1)	1.000000			
Inf(-1)	-0.656773			
	(0.17599)			
	[-3.73178]			
logExp(-1)	-6.361451			
	(1.73971)			
	[-3.65662]			
Log Er(-1)	5.809337			
	[3.76947]			
C	22.19523			
Error Correction:	D(Eg)	D(Inf)	D(logExp)	D(logEr)
CointEq1	-0.733053	2.499481	0.000190	0.011717
	(0.16862)	(0.57775)	(0.00844)	(0.01386)
	[-4.34725]	[4.32626]	[0.02249]	[0.84529]

Notes: VECM model is used in this study to see the long-term relationship of cointegrated equations. From the estimation results of the VECM equation the long-term relationship between economic growth, inflation, exports and the exchange rate is obtained. VECM estimation results can be seen in table 4 which explains that the variables of economic growth have a long-term relationship with variables of inflation, exports and the exchange rate. Based on the long-term analysis of the VECM model it is found that inflation and exports negatively affect economic growth. While the exchange rate variable has a positive influence on economic growth. the results of the analysis of an increase in inflation of 1% will have an impact on the decline in economic growth of 3.73178%.export variable has a negative influence which explains that an increase in exports of 1% will reduce economic growth 3,65662%. This is due to Indonesia exporting more agricultural products which have lower exchange rate than industrial goodsthis is due to Indonesia exporting more agricultural products which have lower exchange rate than industrial goods. Exchange rate variables have a positive influence on economic growth, this means that if the exchange rate increases 1% then

economic growth will increase 3.76947%. In the short-term estimation only inflation affects economic growth while exports and the exchange rate have no short-term effect on economic growth. The most important thing from the short term equation is the value of error correction. Error Correction coeficient of -0.733053. This shows that the imbalance in economic growth in the current year 2018 will be corrected in the following year by 73.3053%

5 Conclusion

Based on the research that has been done, it can be concluded all stationary variables in the first diference and cointegrated in lag 2. There is a long-term effect between inflation, exports and the exchange rate on economic growth. Inflation and exports has negative affect on economic growth.While the exchange rate variable has a positive affect on economic growth. While the exchange rate variable has a positive influence on economic growth. the results of the analysis of an increase in inflation of 1% will have an impact on the decline in economic growth of 3.73178%.export variable has a negative influence which explains that an increase in exports of 1% will reduce economic growth 3,65662%. In the short-term estimation only inflation affects economic growth while exports and the exchange rate have no short-term effect on economic growth While in the short term only exchange rate variables affect economic growth. The most important thing from the short term equation is the value of error correction. Error Correction coeficient of -0.733053. This shows that the imbalance in economic growth in the current year 2018 will be corrected in the following year by 73.3053%.

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