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Analysis Of Investment, Foreign Investment, Workforce, And Exchange Rate Influence For Economic Growth In North Sumatera

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ABSTRACT

The purpose of this study is to analyze the effect of the Foreign Investment, Domestic Investment , Workforce, and Exchange Rate on the economic growth of North Sumatra Province. This research is a study of how the factors that influence economic growth, which are the variables in this study are correlated. Moreover, after that, we can see which factors or variables have the most significant role in influencing economic growth in North Sumatra Province during the period 2001 to 2017. The type of data used in this study is secondary data in the form of time series data in the observation period 2001-2017, obtained from Bank Indonesia and the Central Bureau of Statistics. The analysis used is VAR; this model is used to explain the dynamic behavior between the variables observed and interrelationships. The results showed that the short-term Impulse Response Function test that most contributed to the workforce are domestic investment, followed by foreign investment, economic growth, and the exchange rate. For the medium term, the most significant contribution to the workforce are domestic investment, economic growth, foreign investment, and the exchange rate. In the long term, the most contributing to the workforce are domestic investment, foreign investment, economic growth, and the exchange rate. Based on the results of the Impulse Response Function test in the short term that most contribute to the exchange rate are the workforce, domestic investment, followed by foreign investment, and economic growth.

Keywords: Foreign investment, domestic investment, workforce, exchange rates, economic growth

INTRODUCTION

International trade has an essential meaning for a country, including Indonesia. Through international trade, many benefits can be achieved, both direct and indirect benefits. Indirect benefits of international trade include (1) International trade helps exchange goods that have low growth with foreign goods that have high growth ability, (2) As a means of introducing ideas, abilities, and skills that are stimulants for technological improvements, and (3) International trade provides the basis for foreign capital inflows. If there is no international trade, capital will not flow from developed countries to developing countries (Jhingan, 2003).

All international trade transactions that occur in a country summarized in the trade balance consisting of the export and import components of goods and services.

Economic growth is one indicator of a country's economic progress. According to Kuznets, economic growth is a long-term increase in capacity of the country concerned to provide various economic goods to its population. (Todaro, 2000). Economic growth is an essential phenomenon for a nation, the problem of economic growth is the nation's goal in order to increase national development that can improve the quality of people and people of Indonesia which is carried out sustainably based on national capabilities (Sukirno, 2003). The level of economic growth achieved by a country is measured by the development of real national income achieved by a country/region, namely real Gross Domestic Product (Sukirno, 2006).

Economic development is a reference for regional development, or it can be said in regional development planning, namely the concept of economic development compiled or planned by the central government outlined in the regional development plan. Economic development in Indonesia has the main objective to improve the welfare of the community through increasing national income. The increase in national income is expected to increase employment opportunities. With the progress of economic development that has been achieved by Indonesia, it is expected to be able to increase economic growth (Suindyah, 2011). One of the successes of the development can be shown from the increase in Gross Regional Domestic Product growth. The rate of economic growth in the Province of North Sumatra in the period 1998-2017 experienced fluctuations and was above the national economic growth, namely with an average growth of 5.87%, while nationally the average economic growth was 5.38% (BPS: 2017) and it can be seen in Table 1.

Table 1. Data on Economic Growth of North Sumatra in 1998-2017

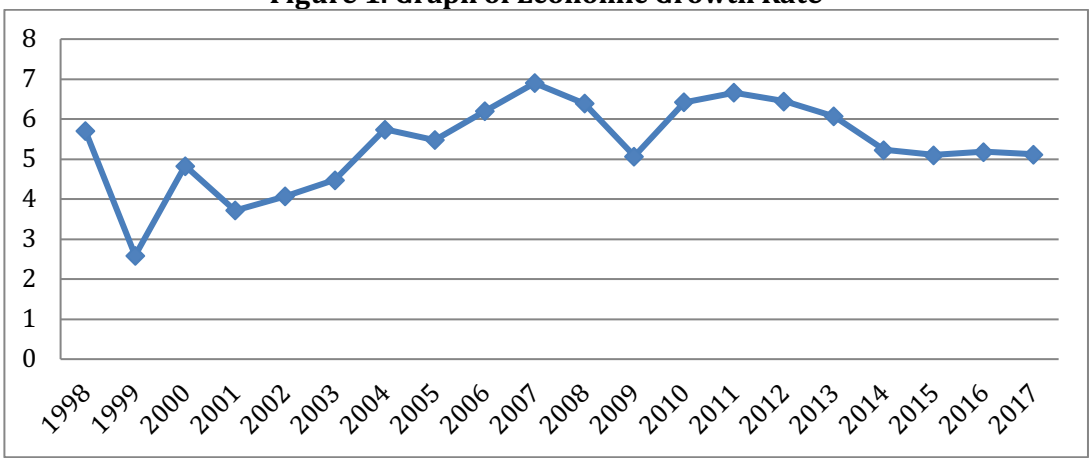
Year	Economic Growth (%)
1998	5.7
1999	2.59
2000	4.83
2001	3.72
2002	4.07
2003	4.48
2004	5.74
2005	5.48
2006	6.20
2007	6.90
2008	6.39
2009	5.07
2010	6.42
2011	6.66
2012	6.45
2013	6.07
2014	5.23
2015	5.10
2016	5.18
2017	5.12

Source: BPS, 2017

Economic growth and the rate of economic growth must be measured by analyzing the GRDP divided by constant prices. Between 1998 and 2008, the economy of North Sumatra showed an increase from year to year, ranging from 3.72% to 6.39%. In 2009 the economic growth of North Sumatra decreased at around 5.07%, but from 2010 to 2013 it increased again at around

6%. Moreover, in 2014 and 2017, economic growth declined again around 5%. This data can be seen in Figure 1.

Figure 1. Graph of Economic Growth Rate



Source: BPS, 2001-2017 (data processed by authors)

Figure 1 shows that during the period 1998-2017 the economic growth of North Sumatra Province experienced prolonged growth. From 2004 to 2008 the economic growth of North Sumatra Province experienced an average growth of 6.39%, but in 2009 the economic growth of North Sumatra Province decreased to 5.07% as a result of fuel prices rising. North Sumatra Province's economic growth increased again in 2010 and 2011 but declined again in 2014 to 2017 The economic growth of North Sumatra Province in the study period experienced fluctuations and was below the national economic growth.

From the expenditure side, gross regional income is the sum of various variables, including investment. Investments that occur in the area consist of government investment and private investment. Investment from the private sector can come from domestic or foreign. Government investment is carried out to provide public goods. The amount of government investment can be calculated from the difference between the total government budget and its routine expenditure (Mankiw, 2007). Table 2 presents data on several variables which are factors that influence economic growth in the Province of North Sumatra between 1998-2017.

Table 2. Several Economic Indicators Growth in North Sumatra

Year	Domestic Investment (Billion Rp.)	Foreitn Investment (Thousands Dollar)	Workforce (People)	Exchange Rate (Billion Rp.)
1998	103.250	3.332	5.006.265	8.025
1999	188.720	5.931	5.056.503	7.085
2000	245.616	6.966	5.329.445	9.595
2001	225.306	9.251	5.206.535	10.400
2002	11.788	8.364	5.283.857	9.595
2003	311.500	82.005	5.239.910	10.400
2004	273.969	30.765	5.514.170	8.940
2005	69.300	27.515	5.803.112	8.447
2006	797.260	233.913	5.491.696	9.290
2007	392.817	230.204	5.654.131	9.830
2008	391.334	255.176	6.094.802	9.020
2009	1.234.736	107.248	6.298.070	9.419
2010	501.844	32.678	6.617.377	10.950
2011	5.960.641	284.441	6.314.239	9.068
2012	24.667	217.265	6.131.664	9.670
2013	2.565.871	682.868	6.131.664	12.189
2014	5.231.905	550.835	6.272.083	12.396
2015	4.287.417	1.246.096	6.391.098	13.787
2016	4.954.829	1.057.989	6.362.909	13.600
2017	11.683.639	1.514.942	6.743.277	13.500

Source: Central Bureau of Statistics of North Sumatera, 2017 (procees by authors).

Domestic Investment was seen to fluctuate in 1998 amounting to 103,250 and rising in 2001 to Rp. 225 306 and dropped to Rp. 11,788 in 2002, because it needed considerable attention in inter-regional domestic investment activities in North Sumatra Province, but in 2003 the domestic investment rose to Rp. 311,500 and continued to increase until 2011 to Rp. 5,960,641. Based on these data, it can be seen that North Sumatra Province is much in demand to make domestic investments until 2017 domestic investment continues to increase until it reaches Rp. 11,683,639 and Foreign Investment in North Sumatra Province can be seen in Table 2. It can be seen that the data on foreign investment in North Sumatra Province in 1998-2017 has increased every year. It is expected that the entry of foreign investment can improve the economy of the North Sumatra Province and can improve the welfare of the community through employment with employment opportunities. Likewise, with domestic investment . It is just that domestic investment experienced ups and downs in the investment. Foreign investment and domestic investment in North Sumatra Province are expected to improve the economy and open up employment opportunities to accommodate the number of workers is a factor to support the welfare of the North Sumatra regional product.

According to Tambunan (2011) an increase in the workforce that is not proportional to the growth of the development sectors will worsen economic development. The agricultural sector is the sector that absorbs the most labor and is second in the manufacturing sector. It is known that exchange rate movements fluctuate; this is a problem because the exchange rate movements experience significant changes throughout the year of observation. In 2010 up to 2013, the exchange rate had strengthened to reach 10,950 US $. However, from 2011 until 2012, the exchange rate movement weakened but increased again in 2013 until 2017, the condition of the exchange rate continued to increase to 13,500 US $. The policy adopted by the government is the policy that must be able to overcome the overall economic problem. On the one hand it can increase exports as a foreign exchange earner to finance imports and the payment of interest and foreign debt installments, and on the other hand, can reduce the inflation rate.

The policy adopted by the government is the policy that must be able to overcome the overall economic problem. On the one hand it can increase exports as a foreign exchange earner to finance imports as well as interest payments and foreign debt installments. On the other hand, can reduce the inflation rate. The suppression of the inflation rate is directed at preventing the decline in public purchasing power, especially the majority who consume many staples, but on the other hand, is also a powerful tool to maintain a competitive exchange rate to support exports and can overcome labor problems.. (Mubyarto: 2000).

LITERATURE REVIEW

Economic Growth

Arsyad (2012) said that economic growth is defined as an increase in Gross Domestic Product / Gross National Income regardless of whether the increase is greater or smaller than the rate of population growth or whether changes in economic structure occur or not. National income reflects the total income received by all residents in the economy of a country represented by Gross Domestic Product (GDP) and measures two things at the same time, namely the total income of all residents in the economy and total state expenditure to buy goods and services result from the economy. GDP can measure total income and expenditure because the two things are the same. For an economy as a whole, income must be the same as expenditure (Mankiw, 2007).

According to Sukirno (2006) in macroeconomic theory, what is meant by national income is the value of goods and services produced in a country in a given year and conceptually the value is called gross domestic product. One component of national income that is always calculated is per capita income, which is the average income of a country's population at a particular time. The value is obtained by dividing the value of the gross domestic product or gross national product of a particular year by the number of population in that year. Thus per capita income can be calculated using one of the following formulas:

$$GDP\ per\ capita = \frac{GDP}{Total\ population} \quad (1)$$

$$GNP\ per\ capita = \frac{GNP}{Total\ Population} \quad (2)$$

There are two ways to calculate per capita income, which is based on current prices and fixed prices. Per capita income calculation according to current prices, is the value of goods and services produced by a country in a year and is valued according to the prices in effect in that year. Per capita income is essential to illustrate the average ability of the country's population to shop and buy the goods and services they need. One critical condition that will realize economic development is: The rate (percentage) of economic growth must exceed the rate of population growth. The higher the difference, the higher the level of development or economic development achieved. Supporting formula for increasing per capita income increase (Sukirno, 2014).

Lipsey, Courant, Purvis and Steiner (1995) explain that the Gross Domestic Product (GDP) is a reflection of a country's economic performance. There are two ways of looking at measuring GDP:

1) GDP is seen as the total income of every person in the economy. On the revenue side, GDP is the sum of various factor income generated in the process of producing final output such as wages or salaries, rent on land, interest, and profits plus indirect tax subsidies and depreciation.

2) GDP is seen from the total expenditure on the output of economic goods and services. GDP calculated from the expenditure side is the sum of consumption expenditure, government investment, and net exports.

Investment

Todaro (2006) states that the resources that will be used to increase income and consumption in the future are called investments. Thus, investment can be interpreted as expenditure or expenditure of investors or companies to buy capital goods and production equipment to increase the ability to produce goods and services available in the economy so that investment is also called capital investment or formation capital..

According to Mankiw (2007), there are three forms of investment expenditure:

Business Fixed Investment

Includes equipment and structures that the company buys for the production process. The standard business fixed investment model is called the neoclassical investment model. The neoclassical model examines the benefits and costs for companies to own capital goods.

Residential Investment

Includes new housing that people buy to live in and land bought for rent. Residential investment includes the purchase of new homes where buyers will be inhabited and those that will be leased by landlords to others. According to this home market model, residential investment depends on the relative price of the house. The relative price of a home depends on the demand for the home, which depends on the rental price that people expect when renting out their home.

Inventory Investment

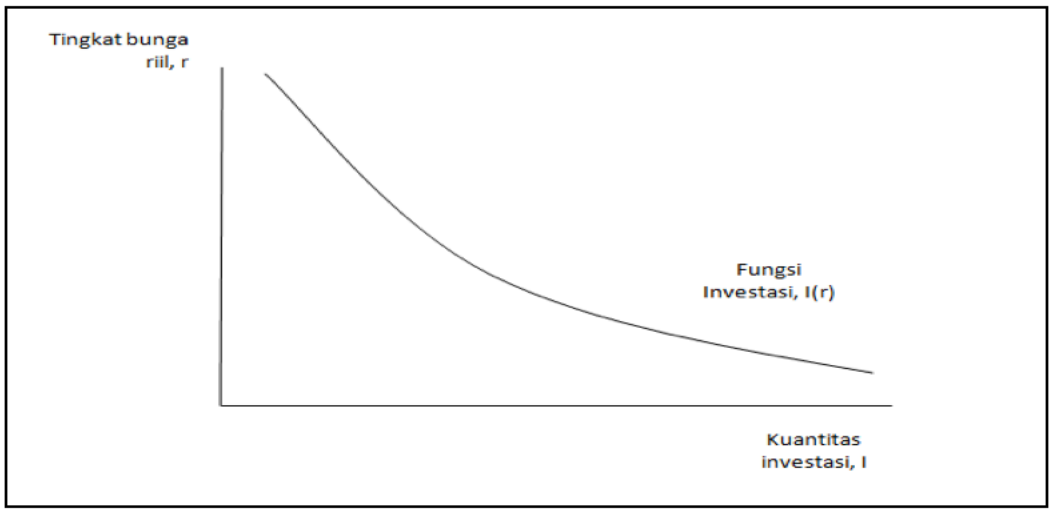
Includes items that companies place in warehouses including materials and equipment, semi-finished goods and finished goods.

According to Samuelson and Nordhaus (2004), investment is defined as an addition to productive assets such as capital goods that are used, built or in storage (inventory). Purchasing narrow land, houses or other property, in economics, is a financial transaction or "financial investment," because when someone buys, someone else means selling. Therefore, investment in the macroeconomy is only when real capital is formed.

The number of capital goods demanded depends on the interest rate that measures the cost of the funds used to finance investment. For investment projects to be profitable, the results (receipts from future increases in interest production and services) must exceed the costs (payments for loanable funds). If interest rates increase, fewer investment projects are profitable, and the number of investment goods requested will fall (Mankiw, 2007). When studying the role of interest rates in the economy, economists distinguish between the nominal interest rate and the real interest rate. This difference is relevant when the whole price level changes. The nominal interest rate is the interest rate commonly reported; that is the interest rate paid by investors to borrow money. The real interest rate is the nominal interest rate that is corrected to eliminate the effect of inflation. It can be concluded that with the equation that links investment *I* to the real interest rate *r*.

$$I = I(r) \qquad (3)$$

Figure 2. Investment Function



Source: Mankiw, 2007

Figure 2 shows the investment function. The function is tilted downward to the right because when the interest rate rises, the amount of investment requested decreases. The investment function relates the investment amount to the real interest rate r. Investment depends on the real interest rate because the interest rate is the cost of borrowing. The investment function is downward sloping: when the interest rate rises, fewer investment projects are profitable. Harrod-Domar's theory states that the model of economic growth is the development of Keynes's theory. The theory emphasizes the role of savings and industry is crucial in regional economic growth (Arsyad, 2012).

Workforce

Two factors affect the employment situation, namely, demand and supply factors. The demand factor is influenced by the dynamics of economic development, while the supply factor is determined by changes in the age structure of the population. Following the International Labor Organization (ILO) Convention, the working-age population restrictions used here are residents aged 15 years and over. The working-age population is divided into two groups, namely the workforce and Non-workforce. The workforce is the economically active population, that is those who work and look for work, while the non-workforce is the population that is not economically active with activities such as schools, household care, and others.

One problem that usually arises in the workforce is the imbalance between demand for labor (labor demand) and supply of labor, at a wage level (Kusumowidho, 1981). The imbalance can be in the form of (a) higher supply than demand for labor (excess supply of labor) and, (b) higher demand compared to labor supply (excess for labor).

An important theory related to employment issues is Lewis's theory (1959), which suggests that an excess of workers in one sector will contribute to the growth of output and supply of workers in other sectors. According to Lewis, the existence of an excess supply of workers does not cause problems in economic development. It is better if excess labor is capital to accumulate income, assuming that the movement of workers from the subsistence sector to the modern capitalist sector goes smoothly and that migration will never be "too much."

METHODOLOGY

This research is a study of how the factors that influence economic growth, which are the variables in this study are correlated. Moreover, after that, we can see which factors or variables have the most significant role in influencing economic growth in North Sumatra Province during the period 2001 to 2017. The type of data used in this study is secondary data. Secondary data used in this study are time-series data (periodic data) in the observation period 2001-2017. The data used in this study are secondary data obtained from Bank Indonesia and the Central Bureau of Statistics.

Analysis Method

Root Test

Time series data usually have problems in stationarity, so that it can decrease the validity of the estimated parameters. Unit root test or stationarity test is used to see whether the data observed is stationary or not. Time series is said to be stationary if stochastic data shows a constant pattern over time, or in other words, there is no increase or decrease in data. Data that are not stationary will result in spurious or spurious regression. Spurious regression is a regression that describes the relationship of two or more variables that appear statistically significant when in reality they are not (Gujarati, 2003).

Unit root tests, in general, can be done visually, whether there is a trend in the data or not, and see the data variance in the study period. If the data at the level is not stationary, then the data can be modified to the difference between the previous data (first difference) so that the data becomes stationary, this data is then called integrated into the first degree or I (1). Variables that are not stationary at the level cannot be used to see long-term relationships. Even though users of first difference can be used, identification of long r cannot be made. Therefore, data stationary must be known before using VAR (Gujarati, 2003)

According to (Gujarati, 2003), There are several ways that can be done to measure the existence of stationarity, one of which is to use what is called The Augmented Dickey Fuller (ADF) test, that is, if the absolute value of the ADF is considered statistically higher than the Mc Kinnon critical value, it can be concluded that the series is stationary. The solution that can be done if based on the ADF test is known that a series is non stationary by doing difference non stationary processes. The ADF test estimates the regression equation, as follows:

$$\Delta y_t = a + by_{t-1} + c_1\Delta y_{t-1} + c_2\Delta y_{t-2} + \cdots + e \qquad (4)$$

If from the stationary test results based on the Dickey-Fuller test obtained data that have not been stationary at the level or integration of zero degree, I (0), then the stationary condition requirements of the time series economic model can be obtained by differencing data, ie, reducing the data with previous period data. Thus through the first differencing (first difference) the difference data or deltas (Δ) are obtained. The Dickey – Fuller test procedure is then applied to test the stationarity of the differenced data (Widarjono, 2007).

Determine the Optimal Lag

Determination of the optimal lag is crucial in analyzes using the VAR method, because the VAR model of a variable is also influenced by itself in addition to other variables. The effect of the variable on itself must be the exact effect time, and it should not be too fast or too long so that the resulting estimation can be relied. If the lag that is set is too long, it will throw away free degrees, while if the lag that is set is too short it will result in incorrect model specifications. Before determining the optimal lag, it is necessary to test the maximum lag. Maximum lag is obtained if roots have modulus smaller than one and all are located in a unit circle so that a

stable VAR equation can be formed. Criteria that can be used to determine the optimal amount of lag include akaike information criterion (AIC), schwarz information criterion (SIC), hannan-quinn information criterion (HQ), and likelihood ratio (LR) test criteria. The lag test used in this study is based on the AIC and SIC criteria.

Cointegration Test

According to (Gujarati 2003), Cointegration relationship testing is done by using the optimal lag in accordance with tests that have been done before. Whereas the determination of deterministic assumptions underlying the formation of cointegration equations is based on the information criteria of AIC or SIC. The formation of the cointegration equation in this study is based on the SIC information criteria. Based on these deterministic assumptions, the information will be obtained about the number of cointegration relationships between variables studied in accordance with the trace and max methods. The presence or absence of cointegration is based on trace statistic test and Maximum eigenvalue. If the calculated trace statistic value and the maximum eigenvalue are greater than the critical value, then there is cointegration on a number of variables, then vice versa if the calculated trace statistic value and the maximum eigenvalue are smaller than the critical value then there is no cointegration. The critical value used is the one returned by Osterwald-Lenum (Gujarati, 2003).

VAR Model Analysis

To identify the effect of the variables used in this study, the VAR (Vector Autoregression) method is used). According to Widarjono (2007) VAR (Vector Autoregression) model is used to explain dynamic behavior between observed variables and interrelationships. The use of VAR is expected to eliminate the simultaneity problem between two endogenous variables. This research method will describe the impulse response and variance decomposition functions, which are properties of the VAR model to see the shock of the innovation variable on other variables through the development of the VAR structure. All variables are considered endogenous variables. Zero restriction is missing in the equation model parameters. So that each equation has one form of regressor that is the same. The general form of the VAR model is:

$$\bar{Y}_{\boldsymbol{t}} = \sum_{t=1}^{k} A_1 \overline{Y_{t-1}} + e \qquad (5)$$

Where Y is the column vector at time t for all observations, εt for all is the column vector of random disturbance values, which may correlate now with each other but do not correlate all the time, Ai is a parameter matrix which is all non-zero values.

This study will observe five endogenous variables namely Economic Growth (EG), Foreign Investment (FI), Domestic Investment (DI), Workforce (W), Exchange Rate (ER) in North Sumatra Province, the interdependent relationship between the five variables it is specified in the equation system consisting of the following five equations:

$$\mathrm{PE_t} = \alpha_1 + \sum_{j=1}^{k} 1\mathrm{jPE}_{t-j} + \sum_{j=1}^{k} 1\mathrm{jPMA}_{t-j} + \sum_{j=1}^{k} 1\mathrm{jPMDN}_{t-j} + \sum_{j=1}^{k} 1\mathrm{jAK}_{t-j} + \sum_{j=1}^{k} 1\mathrm{jNT}_{t-j} + \varepsilon_1 \qquad (6)$$

$$\mathrm{PMA_t} = \alpha_2 + \sum_{j=1}^{k} 2\mathrm{jPMA}_{t-j} + \sum_{j=1}^{k} 2\mathrm{jPMDN}_{t-j} + \sum_{j=1}^{k} 2\mathrm{jAK}_{t-j} + \sum_{j=1}^{k} 2\mathrm{jNT}_{t-j} + \sum_{j=1}^{k} 2\mathrm{jPE}_{t-j} + \varepsilon_2 \qquad (7)$$

$$PMDN_t = \alpha_3 + \sum_{j=1}^{k} 3jPMDN_{t-j} + \sum_{j=1}^{k} 3jAK_{t-j} + \sum_{j=1}^{k} 3jNT_{t-j} + \sum_{j=1}^{k} 3jPE_{t-j} + \sum_{j=1}^{k} 3jPMA_{t-j} + \varepsilon_3 \quad (8)$$

$$AK_t = \alpha_4 + \sum_{j=1}^{k} 4jAK_{t-j} + \sum_{j=1}^{k} 4jNT_{t-j} + \sum_{j=1}^{k} 4jPE_{t-j} + \sum_{j=1}^{k} 4jPMA_{t-j} + \sum_{j=1}^{k} 4jPMDN_{t-j} + \varepsilon_4 \quad (9)$$

$$NT_t = \alpha_5 + \sum_{j=1}^{k} 5jNT_{t-j} + \sum_{j=1}^{k} 5jPE_{t-j} + \sum_{j=1}^{k} 5jPMA_{t-j} + \sum_{j=1}^{k} 5jPMDN_{t-j} + \sum_{j=1}^{k} 5jAK_{t-j} + \varepsilon_5 \quad (10)$$

Dimana :
EG= Economic Growth of North Sumatra Province 2001-2017
FI= Foreign Investment 2001-2017
DI= Domestic Investments 2001-2017
W= Workforce 2001–2017
ER= Exchange Rate 2001–2017

RESULT

Data Stationarity Test

Stationarity test is the first step in building a VAR model to ensure that the data used are stationary so that the resulting regression results do not describe the relationship of variables that appear to be statistically significant but spurious. One important concept that must be kept in mind in an analysis that uses time-series data is whether the data is stationary or not. If the estimation uses non-stationary data, it will give a false regression result or called spurious regressions (Gujarati, 2004:148). Spurious regressions mean that the regression results of one time series variable on one or several other time series variables tend to produce conclusions of the estimation results indicated by characteristics such as obtaining very high R2 results (greater than 0.9), but in reality, the relationship between these variables has no meaning. Stationarity test can be done by the unit root test developed by Dikey Fuller. An alternative to the Dikey Fuller test is the Augmented Dikey Fuller (ADF) which seeks to minimize autocorrelation. This test contains a regression from the first time-series data differential to the lag variable, lagged difference terms, constants and trend variables (Kuncoro, 2001). To see the stationarity test using the DF or ADF test, it is done by comparing the t-statistic of the dependent variable lag variable with the critical value of DF or ADF in the table. Data that is not stationary can cause a regression which is not fair, so it needs to be tested for stationary data. To find out whether the time series data is stationary or not, the statistical significance test of the ADF-test was tested using the McKinnon one side p values. If McKinnon one side p values are smaller or equal to 0.01, 0.05 and 0.10 then the null hypothesis is rejected or the time series data is stationary. The ADF value is also said to be stationary if the ADF test value is higher than the McKinnon critical value. The results of the data stationarity test for the variables studied are as follows:

Table 3. Stationary Test Results

Variabel	ADF-test Level	ADF-test 1 *st* difference	ADF-test 2*nd* difference	Critical-test 1%	Critical-test 5%	Critical-test 10%
EG	-2.492720	-8.895753	-	-3.831511	-3.029970	-2.655194
DI	-3.058188	-4.639024	-	-3.831511	-3.029970	-2.655194
FI	-1.753063	-4.266496	-	-3.831511	-3.029970	-2.655194
W	-0.777800	-4.025699	-	-3.831511	-3.029970	-2.655194
ER	-1.124436	-5.227681	-	-3.831511	-3.029970	-2.655194

Source: Result of Unit Root Test Using Eviews 8.0

From the results of Augmented Dikey Fuller in Table 4.2. it can be seen that there is no stationary data at level 1 (level), while the data must be tested at the first different level or 1 (1) it appears that the stationary data is DI, FI, W and ER where the ADF-test value is greater than the critical value at various confidence level (1%, 5%, 10%).

Penentuan *Lag* Optimal

Determination of the optimal lag is a crucial step in the VAR model considering the purpose of building a VAR model is to see the behavior and relationships of each variable in the system that appears if the lag length is too small will make the model unusable because it is less able to explain the relationship. Moreover, conversely, if the lag length is used too large, then the degree of freedom will be higher so that it is no longer efficient in explaining. Testing this optimal lag length is very useful to eliminate the autocorrelation problem (correlation between t period disruptors and t-1 errors sorted by time) in a VAR system. So with the optimal lag test, it is hoped that autocorrelation problems will not appear again. Determination of optimal Lag length uses several information criteria as follows: Likelihood Ratio Test (LRT), Final Prediction Error (FPE), Aikake Information Crition (AIC) and Schwarz Crition (SC) and Hannan-Quin (HQ). Then according to the Optimal Lag results the interest rate path summarized in Table 4.2. shows that each criterion has a different optimal lag time reference. The LR criterion refers to a zero lag time, while the FPE, SC, AIC, and HQ criteria refer to a lag time of two 5% significance levels. Based on this study using the SC criteria, the grace period (lag) is 2.

Table 4. Optimal Lag Test Results

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-115.5760	NA	0.996708	14.18541	14.43047	14.20977
1	-92.50507	29.85645	1.464566	14.41236	15.88274	14.55852
2	-37.58300	38.76852*	0.126738*	10.89212*	13.58781*	11.16007*

Source: Eviews 8

Cointegration Test

Cointegration test results show based on Trace statistics as shown in Table 5, Cointegration Relations can be seen the value of Trace statistics compared to critical values at the 1-5% confidence level. in the results of Table 5. Comparison of Trace statistics with critical values at the 5% or 1% confidence level shows that the equation of the inflation VAR model has been cointegrated at the 1% level. This shows that the variables on inflation have long-term stability.

Table 5. Cointegration Test Results

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.935178	94.61595	69.81889	0.0002
At most 1	0.759525	45.36610	47.85613	0.0841
At most 2	0.538782	19.71361	29.79707	0.4424
At most 3	0.250017	5.783695	15.49471	0.7209
At most 4	0.033052	0.604998	3.841466	0.4367

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 *	0.935178	49.24985	33.87687	0.0004
At most 1	0.759525	25.65249	27.58434	0.0865
At most 2	0.538782	13.92991	21.13162	0.3708
At most 3	0.250017	5.178697	14.26460	0.7191
At most 4	0.033052	0.604998	3.841466	0.4367

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

VAR

VAR estimation results on Economic Growth (EG), Domestic Investment (DI), Foreign Investment (FI), Workforce (W) and Exchange Rate (ER) in lag 2 can be seen in Table 6:

	D(EG)	D(DI)	D(FI)	D(W)	D(ER)
D(EG(-1))	-0.150812	-0.443096	-0.630252	0.085952	-1.396585
	(0.42317)	(1.49319)	(0.90233)	(0.12121)	(0.34711)
	[-0.35639]	[-0.29674]	[-0.69847]	[0.70911]	[-4.02352]
D(EG(-2))	0.025414	0.165668	-1.215130	0.060623	-0.817146
	(0.35210)	(1.24243)	(0.75080)	(0.10086)	(0.28881)
	[0.07218]	[0.13334]	[-1.61846]	[0.60108]	[-2.82932]
D(DI(-1))	0.054967	-0.089102	-0.624296	-0.066752	0.075609
	(0.13161)	(0.46440)	(0.28064)	(0.03770)	(0.10795)
	[0.41765]	[-0.19186]	[-2.22458]	[-1.77070]	[0.70038]
D(DI(-2))	-0.066705	-0.013290	0.840105	-0.090569	0.467795
	(0.24985)	(0.88163)	(0.53277)	(0.07157)	(0.20494)
	[-0.26698]	[-0.01507]	[1.57687]	[-1.26550]	[2.28255]
D(FI(-1))	-0.153746	-0.248230	0.828276	-0.079452	0.371199
	(0.21647)	(0.76383)	(0.46158)	(0.06200)	(0.17756)
	[-0.71025]	[-0.32498]	[1.79444]	[-1.28139]	[2.09056]
D(FI(-2))	-0.019791	0.117468	-0.412886	-0.003125	0.046466
	(0.13304)	(0.46946)	(0.28369)	(0.03811)	(0.10913)
	[-0.14875]	[0.25022]	[-1.45539]	[-0.08200]	[0.42578]
D(AK(-1))	-1.452025	5.298014	3.938543	-0.494595	1.548192
	(1.83192)	(6.46415)	(3.90626)	(0.52473)	(1.50265)
	[-0.79262]	[0.81960]	[1.00827]	[-0.94256]	[1.03031]
D(W(-2))	1.323406	-2.201219	-0.215714	0.244712	-2.608072
	(1.49062)	(5.25981)	(3.17848)	(0.42697)	(1.22269)
	[0.88782]	[-0.41850]	[-0.06787]	[0.57314]	[-2.13306]
D(ER(-1))	0.100345	0.452141	-0.915666	0.069411	-0.741682
	(0.31105)	(1.09759)	(0.66327)	(0.08910)	(0.25514)
	[0.32260]	[0.41194]	[-1.38054]	[0.77904]	[-2.90692]
D(ER(-2))	-0.132211	-0.416183	-0.437339	0.062647	-0.506147
	(0.22005)	(0.77647)	(0.46922)	(0.06303)	(0.18050)
	[-0.60083]	[-0.53600]	[-0.93206]	[0.99391]	[-2.80419]
C	0.007421	-0.300558	0.085101	0.048679	0.971807
	(0.31754)	(1.12046)	(0.67709)	(0.09095)	(0.26046)
	[0.02337]	[-0.26824]	[0.12569]	[0.53520]	[3.73109]
R-squared	0.473935	0.395582	0.732539	0.532508	0.839834
Adj. R-squared	-0.402839	-0.611782	0.286770	-0.246645	0.572890
Sum sq. resids	4.726665	58.85215	21.49123	0.387809	3.180202
S.E. equation	0.887568	3.131883	1.892583	0.254234	0.728034
F-statistic	0.540544	0.392690	1.643317	0.683444	3.146106
Log likelihood	-13.24201	-34.67738	-26.11462	8.011909	-9.873671
Akaike AIC	2.852001	5.373810	4.366426	0.351540	2.455726
Schwarz SC	3.391139	5.912948	4.905564	0.890678	2.994864
Mean dependent	0.017059	-0.075753	-0.320650	0.083167	0.229706
S.D. dependent	0.749373	2.466905	2.240992	0.227699	1.113991

Determinant resid covariance (dof adj.)	0.010456
Determinant resid covariance	5.73E-05
Log likelihood	-37.58300
Akaike information criterion	10.89212
Schwarz criterion	13.58781

The results in Table 4.5 with Lag-2 for 1998-2017 data, the VAR model for Economic Growth (EG), Domestic Investment (DI), Foreign Investment (FI), Workforce (W) and Exchange Rate (ER) according to the research VAR model equation, respectively are:

EG= 0.007421 - 0.150812 EG(-1) + 0.025414 EG (-2) + 0.054967 DI (-1) - 0.066705 DI (-2) -0.153746 FI (-1) -0.019791 FI (-2) -1.452025 W (-1) + 1.323406 W (-2) + 0.100345 ER (-1) - 0.132211 ER (-2). (11)

CONCLUSIONS

The results of the Impulse Response Function show the interdependence of economic growth, domestic investment, foreign investment, workforce, and a cointegrated exchange rate (achieving balance) in the long run. Based on the results of the Impulse Response Function test in the short term that most contribute to economic growth is economic growth itself, followed by exchange rates, domestic investment, workforce, and foreign investment. For the medium term, the most significant contribution is economic growth itself, followed by workforce, domestic investment, and foreign investment. In the long run, the most significant contributors are economic growth itself, followed by the workforce, domestic investment, exchange rates, and foreign investment. Based on the results of the Impulse Response Function test in the short term that most contribute to the domestic investment is foreign investment, followed by economic growth, exchange rates, and the workforce. For the medium term, the most contributing to domestic investment are economic growth, the workforce, foreign investment, and the exchange rate. In the long term, the most significant contribution is domestic investment itself, followed by foreign investment, exchange rates, economic growth, and workforce. Based on the results of the Impulse Response Function test in the short term that most contribute to foreign investment is the workforce followed by economic growth, exchange rates, and domestic investment. For the medium term, the most significant contribution to foreign investment is domestic investment, economic growth, workforce, and exchange rates. In the long term, the ones that most contribute to foreign investment are the exchange rate, economic growth, workforce, and domestic investment.

Based on the results of Impulse Response Function test in the short term that most contribute to the workforce is domestic investment, followed by foreign investment, economic growth, and the exchange rate. For the medium term, the most significant contribution to the workforce is domestic investment, economic growth, foreign investment, and the exchange rate. In the long term, the most contributing to the workforce are domestic investment, foreign investment, economic growth, and the exchange rate. Based on the results of the Impulse Response Function test in the short term that most contribute to the exchange rate are the workforce, domestic investment, followed by foreign investment, and economic growth. For the medium term, the most contributing to the exchange rate are foreign investment, domestic investment, economic growth, and the exchange rate. In the long term, the ones that most contribute to the exchange rate are workforce investment, economic growth, foreign investment, and domestic investment.

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