

# Analysis of the Effect of Macroeconomic Indicators on Indonesia's Economic Growth in Open Economy

Nelly Hutajulu  
{nellyhutajulu@yahoo.co.id}

Faculty of Financial Management, Politeknik UCM Medan, Indonesia

**Abstract.** Openness serves as the first framework for most countries to consolidate their strengths and weaknesses. The primary objective of this study was to examine the impact of the gross domestic product (GDP), inflation, and money supply on Indonesia. This study employs a simultaneous equation model and is calculated using a Two-Stage Least Square method. The data represents yearly observations spanning from 1991 to 2021. The factors influencing the rate of economic growth include government expenditure, domestic inflation disparity, the disparity between the BI Rate and The FED Rate, money supply, exchange rate, and unemployment. The findings of the study on the initial model indicate that the government expenditure variable, as well as the economic growth in the preceding period, have a favourable impact on the economic growth in Indonesia. The variable representing the interest rate of the Bank Indonesia (BI) has a detrimental impact on the economic growth of Indonesia. Conversely, the Indonesian inflation variable and the exchange rate have little impact on economic growth in Indonesia. The second model demonstrates a positive correlation between inflation in Indonesia and three variables: the exchange rate, the money supply in the preceding period, and the current money supply. In Indonesia, the variable of economic growth exerts a detrimental impact on inflation. Government expenditure and the unemployment rate do not exert any influence on inflation in Indonesia. In the third model, it is shown that the exchange rate variable is negatively correlated with the demand for money in Indonesia, indicating that an increase in the BI interest rate in the preceding period leads to a decrease in the demand for money. However, the variable measuring the difference between the BI Rate and the FED Rate, as well as Indonesia's prior inflation and economic growth rate, had no impact on the demand for money in Indonesia.

**Keywords:** Two Stage Least Square (2SLS); Government Spending; Inflation; BI Rate; Money Supply; Exchange Rate; Unemployment, Economic Growth.

## 1 Introduction

Economic growth is the primary macroeconomic measure used to evaluate the economic performance of a country or region. Optimal economic growth indicates increased economic activity which is indicated by an increase in the utilization of available funding resources. This economic growth is a characteristic of optimizing people's welfare (Wijono, 2005). The economic growth of a country with an open economy can be measured using different indicators, including those related to the real sector and the financial sector. These indicators encompass issues such as output, consumption, and investment. Each of these industries plays a crucial part in the expansion of our economy. A country with an open economy is a country that carries out

export-import activities of goods or services and borrows or provides loans to the world capital market (Mankiw, 2003)

Indonesia, a developing nation, has long embraced an open economic structure. This is apparent from Indonesia's involvement in numerous free trade agreements. The agreements include the Asean Free Trade Area (AFTA), Asean China FTA (ACFTA), Asean Korea FTA (AKFTA), Asean Australia and New Zealand (AANZFTA), Asean India FTA (AIFTA), Asean Japan CEP (AJCEP) and Indonesia. Japan Economic Partnership Agreement (IJEPA).

Based on data on economic growth in Indonesia during the years 1991-2021, the rate of economic growth in Indonesia shows a fluctuating movement from year to year



Fig. 1. The Development of Economic Growth in Indonesia in 1991-2021

Meanwhile, the phenomenon that occurs is that the current economic growth is slowing down. Meanwhile, the phenomenon that occurs is that the current economic growth is slowing down. Indonesia's economic growth in 2008 showed a figure of 6.01 percent while in 2009 it was 4.62 percent. Which means that in that year, economic growth decreased. But looking at the data on the unemployment rate in Indonesia in 2008 of 8.39 percent, it decreased in 2009 by 7.87 percent. This means that in that year there was a discrepancy with Adam Smith's theory of economic growth which said that if economic growth decreased, the unemployment rate would increase.

The short-term interest rate in Indonesia rose from 8% in 2007 to 9.25% in 2008. Concurrently, Indonesia experienced a 6.01 percent rise in economic growth. The objective of implementing this monetary policy is to counterbalance the rise in global interest rates, with the aim of curbing the outflow of capital and encouraging investors to allocate their funds within the country. In addition to the objective of enhancing the value of the rupiah relative to the US dollar. The statement provided is inconsistent with Keynes' perspective.

The inflation rate in Indonesia had reached the level of 11.06 percent in 2008. This inflation was also driven by the surge in world oil prices which prompted the issuance of a policy of increasing subsidized fuel prices. Inflationary pressures are getting higher due to high global commodity prices. However, this inflation gradually decreased at the end of 2009 by 2.78 percent due to a decrease in the price of fuel subsidies followed by a decrease in transportation fares within the city and province so that commodity prices fell (Syarif, 2008).

The decline in people's purchasing power in America led to a decrease in import demand from Indonesia. As a result, Indonesia's exports declined. This has led to a deficit in Indonesia's Balance of Payments (BOP). Bank Indonesia estimates that the overall BOP will record a deficit of US\$2.2 billion in 2008 (Purna, 2009). The economic crisis that occurred in the United States caused an increase in bankrupt companies and layoffs, especially in labor-intensive and export-oriented industries (Kuncoro, 2013:115).

However, in 2008 changes in the money supply increased by 3.4 percent to 14.92 percent, and economic growth declined during that period of 6.01 percent. In real economic conditions this can be said to be inconsistent with the quantity theory of money. Where the increase was influenced by the global economic crisis which resulted in inflation. So it can be said that 2008 was in accordance with the economic phenomena that occurred

In 2012-2013 it can be seen that economic growth has decreased every year. This is influenced by the occurrence of an unhealthy global economy, where the exchange rate of the Rupiah against the US Dollar continues to depreciate. Until 2014 until now the global economic crisis is still ongoing. , thus making the rupiah to depreciate. The money supply in 2014 grew by 11.95 percent, while economic growth decreased by 5.02 percent.

Previous study indicates that economic growth in several nations, including Indonesia, is influenced by both local and external influences. The variables encompass government expenditure, workforce, foreign exchange rates, interest rates, monetary supply, inflation, and economic fluctuations in other nations (Yudisthira, 2013: 50) in (Nasution, 1991).

Multiple studies examining the relationship between economic openness and economic growth have been conducted, although the findings remain subject to ongoing controversy. Some individuals argue that the correlation between economic openness and economic growth is good, while other research suggest that it is unfavourable. There are even studies that conclude that there is no relationship between economic openness and economic growth. Nowbutsing (2014) analyzes the effect of economic openness on economic growth in member states of the Indian Ocean Rim (IOR) for 15 countries for the period 1997-2011. The independent variables used by Nowbutsing are government spending, gross capital formation, inflation, labor and economic openness. Nowbutsing utilises three measures to measure economic openness: the export-to-GDP ratio, the import-to-GDP ratio, and the export-import-to-GDP ratio. Nowbutsing's research findings indicate a direct correlation between openness and economic growth. The degree of openness, as indicated by the ratio of imports to GDP, exerts the most significant impact on the rate of economic growth.

From the description above, it can be seen that the effect of economic openness on economic growth represented by Gross Domestic Product (GDP) is still a matter of debate. Therefore, to find out the real effect of economic openness on economic growth in Indonesia.

## **2 Method**

This study uses secondary data in the form of time series for the years 1991-2021. The variables of economic growth in percent, government spending in billions of rupiah, unemployment in percent and the calculation of the inflation rate in this study use the concept of CPI inflation obtained from BPS and Indonesian Economic and Financial Statistics (SEKI) published by Bank Indonesia. BI Rate in percent, the rupiah exchange rate against US\$ using the middle rate determined by Bank Indonesia in thousand rupiah obtained from SEKI. The

FED Rate in percent is sourced from the publication of FRED Economic Data. The data on the money supply used is money in a broad sense (M2) in billions of rupiah, sourced from SEKI and the Indonesian Economic Report (LPI) published by Bank Indonesia.

An open monetary economic analysis with rational expectations includes a floating exchange rate. Trade relations with certain countries adhere to the fiat money system, meaning that paper money sold by the monetary authority is an internal transaction tool. The price of one currency unit against another is determined by the foreign currency market which is called the exchange rate. The inclusion of international trade in the IS model explains the open economy model. Income increases or decreases according to Keynes's theory depending on the total aggregate demand. The aggregate demand model is formed from the variables C, I, G, X-M with the form of an open economy (Manurung J dan A.H, 2009:223).

The structural model of Economic Growth is as follows:

$$Y_t = \alpha_0 + \alpha_1 \pi_t + \alpha_2 \pi_{t-1} + \alpha_3 r_t + \alpha_4 G_t + \alpha_5 E_t + \alpha_6 Y_{t-1} + \varepsilon_{1t}$$

Description :

Y<sub>t</sub> = Economic Growth (percent)  
 Y<sub>t-1</sub> = Economic Growth in the previous period (percent)  
 r<sub>t</sub> = BI rate difference – FED Rate (percent)  
 π<sub>t</sub> = Inflation (percent)  
 π<sub>t-1</sub> = Inflation in the previous period (percent)  
 G<sub>t</sub> = Government Expenditure (Billon Rupiah)  
 E<sub>t</sub> = Exchange Rate (IDR/USD)  
 α<sub>0</sub>,...,6 = regression coefficient  
 ε<sub>1t</sub> = error term (residual)

The model in this study was adapted from the dynamic inflation model used by A.W. Philip is a model that explains the relationship between the price level and the money stock. According to J.M. Keynes theory, the relationship between monetary variables and real variables is very strong. The relationship between the price level and the unemployment rate of labor is explained by the Philips curve which states that the nominal wage rate in a certain period can be explained by the current unemployment rate.

The structural model of Inflation is as follows;

$$\pi_t = \beta_0 + \beta_1 Y_t + \beta_2 Y_{t-1} + \beta_3 G_t + \beta_4 E_t + \beta_5 M_{t-1} + \beta_6 M_t + \beta_7 TPT_t + V_{1t}$$

Description :

Y<sub>t</sub> = Economic Growth (percent)  
 Y<sub>t-1</sub> = Economic Growth in the previous period (percent)  
 G<sub>t</sub> = Government Expenditure (Billon Rupiah)  
 E<sub>t</sub> = Exchange Rate (IDR/USD)  
 M<sub>t</sub> = Money Supply (Billon Rupiah)  
 M<sub>t-1</sub> = Money Supply in the previous period (Billon Rupiah)  
 π<sub>t</sub> = Inflation (percent)  
 UN<sub>t</sub> (TPT<sub>t</sub>) = Unemployment (percent)  
 β<sub>0</sub>,...,6 = regression coefficient  
 v<sub>1t</sub> = error term (residual)

An open economy The LM model comprises two equations: the money demand equation and the interest rate parity condition. The interest rate [R] is calculated by adding the international interest rate [R\*] to the anticipated depreciation of the home currency. Demand for money supply and interest parity circumstances (Manurung J dan A.H, 2009:104). Indonesia that meets the criteria for a small and open economy. Then the model used by Mundell Fleming. Mundell Fleming showed that the effect of economic policy on an open economy depends on the exchange rate system. Indonesia adheres to a free floating exchange system. In the Mundell Fleming model that fiscal policy does not affect aggregate income in a floating exchange rate system (free floating exchange system). Fiscal expansion causes the currency to appreciate which reduces net exports and removes expansionary aggregate income. Fiscal policy affects aggregate income under a fixed exchange rate (Mankiw, 2007:356).

The structural model of money supply is as follows:

$$M_t = c_0 + c_1 Y_t + c_2 R^*_t + c_3 E_{t-1} + c_4 r_t + c_5 \pi_{t-1} + c_6 Y_{t-1} + V_{2t}$$

Description :

- Y<sub>t</sub> = Economic Growth (percent)
- R\*<sub>t</sub> = BI rate difference – FED Rate (percent)
- E<sub>t-1</sub> = Exchange Rate in the previous period (IDR/USD)
- r<sub>t</sub> = BI Rate (percent)
- π<sub>t-1</sub> = Inflation in the previous period (percent)
- Y<sub>t-1</sub> = Economic Growth in the previous period (percent)
- c<sub>0,....,6</sub> = regression coefficient
- v<sub>1t</sub> = error term (residual)

Through the structural equations above, the next step in the Simultaneous Equation Model using the 2SLS method is to arrange the reduced form equations so that the estimation results are consistent and unbiased. Reduction equation is an equation that states the relationship between one endogenous variable with only exogenous variables and errors. The function of the form of the reduction equation is to generate estimation variables on endogenous variables, namely economic growth, inflation and money demand (Gujarati, 2004). Below is an equation of the reduced form of the structural equation that has been modeled above

Reduced Form of Economic Growth (Y<sub>t</sub>) as follows:

$$Y_t^* = \Pi_{10} + \Pi_{11} \pi_{t-1} + \Pi_{12} r_t + \Pi_{13} G_t + \Pi_{14} E_t + \Pi_{15} Y_{t-1} + \varepsilon_{1t}$$

From the economic growth equation above, it can be seen that the exogenous variables (predetermine) in this study are inflation in the previous period (π<sub>t-1</sub>), BI rate (r<sub>t</sub>), Government Expenditure (G<sub>t</sub>), Exchange Rate (E<sub>t</sub>), Economic Growth in the previous period (Y<sub>t-1</sub>).

Reduced Form of Inflation (π<sub>t</sub>) as follows:

$$\pi_t^* = \Pi_{20} + \Pi_{21} Y_{t-1} + \Pi_{22} G_t + \Pi_{23} E_t + \Pi_{24} M_{t-1} + \Pi_{25} M_t + \Pi_{26} UN_t + V_{1t}$$

From the inflation equation above, it can be seen that the exogenous variables (predetermine) in this study are Economic Growth in the previous period (Y<sub>t-1</sub>), Government

Expenditure ( $G_t$ ), Exchange Rate ( $E_t$ ), Money Supply in the previous period ( $M_{t-1}$ ), Money Supply ( $M_t$ ) dan Unemployment ( $TPT_t$ )

$$M_t^* = \Pi_{30} + \Pi_{31} R^*_t + \Pi_{32} E_{t-1} + \Pi_{33} r_t + \Pi_{34} \pi_{t-1} + \Pi_{35} Y_{t-1} + V_{2t}$$

From the money supply equation above, it can be seen that the exogenous variables (predetermine) in this study are BI rate difference – FED Rate ( $R^*_t$ ), Exchange Rate in the previous period ( $E_t$ ), BI rate ( $r_t$ ), Inflation in the previous period ( $\pi_{t-1}$ ), Economic Growth in the previous period ( $Y_{t-1}$ ).

## 4 Results and Discussion

### 4.1 Order Condition Test

The next test of the identification with the order condition in this study are:

**Table 1.** Integration Test Results

Equation	K-k	m-1	Result	Identification
GDP ( $Y_t^*$ )	5-2	3-1	3>2	<i>Over Identified</i>
Inflation ( $\pi_t^*$ )	6-2	3-1	4>2	<i>Over Identified</i>
Money supply ( $M_t^*$ )	5-2	3-1	3>2	<i>Over Identified</i>

### 4.2 Unit Root Test

The test results with the Augmented Dickey-Fuller (ADF) reveal the value of the statistical regression coefficients t on the observed variable ( $X$ ). If the value exceeds the critical values of the ADF test according to MacKinnon at the 1 percent, 5 percent, or 10 percent significance levels, then it indicates that the data is stationary.

The value of the test results with the Augmented Dickey-Fuller (ADF), indicated by the value of the statistical regression coefficients t on the observed variable ( $X$ ). If the value is greater than the value of the ADF test critical values MacKinnon on the level. That At the stationary 1nd difference level, there are economic growth variables ( $Y_t$ ), Government Expenditures ( $G_t$ ), Indonesian Inflation ( $\pi_t$ ), AS Inflation –Inflation Indonesia Difference (INF DN\_LN), BI Rate (BI Rate), FED Rate ( FED Rate), Difference BI RATE\_FED Rate ( $r_t$ ), Money Supply ( $M_t$ ), Exchange Rate ( $E_t$ ), Unemployment ( $UNT$ ) because it has a small probability of =5 percent and the statistical ADF value > the critical value (Mackinon Critical Values) at = 5 percent.

**Table 2.** Unit Root Test Results (Level)

Variables	Value ADF	Critical Value McKinnon ( $\alpha = 5\%$ )	Description
Economic Growth ( $Y_t$ )	-3.805914	-2.976263	Stationary
Government Expenditure ( $G_t$ )	-1.304101	-2.976263	Non-Stationary
Inflation Indonesia (INF_DN)	-5.202523	-2.976263	Stationary
Inflation AS (INF_LN)	-4.269759	-2.976263	Stationary
Inflation Diference DN_LN (INF DN_LN)	-5.248693	-2.976263	Stationary
BI Rate ( $r_t$ )	-1.638972	-2.976263	Non-Stationary
FED Rate (FED Rate)	-1.521662	-2.976263	Non-Stationary
BI rate difference – FED Rate ( $R^*_t$ )	-2.734458	-2.976263	Non-Stationary
Money Supply ( $M_t$ )	-3.429939	-2.976263	Stationary
Exchange Rate ( $E_t$ )	-1.706201	-2.976263	Non-Stationary
Unemployment ( $UN_t$ )	-2.294985	-2.976263	Non-Stationary

Based on table 2 shows that at the level level, only economic growth variables ( $Y_t$ ), Indonesian Inflation ( $\pi$ ), Inflation AS (INF\_LN), AS Inflation –Inflation Indonesia Difference (INF DN\_LN), Money Supply ( $M_t$ ) are stationary because they have a small probability of =5 percent and the statistical ADF value > its critical value (Mackinon Critical Values) at =5 percent. Government Expenditure ( $G_t$ ), BI Rate (BI Rate), FED Rate (FED Rate), BI rate difference – FED Rate ( $R^*_t$ ), Exchange Rate ( $E_t$ ), Unemployment ( $UN_t$ ) at levels that are not stationary because they have a probability which is greater than =5 percent and the ADF statistic value < its critical value (Mackinon Critical Values) at = 5 percent.

A test of the degree of integration is a test done to measure at the level of difference to how data all the variables are stationary. The taking of decision is when the count of an ADF variable is greater than the critical value of MacKinnon, means the variable is stationary, and vice versa.

**Table 3.** Unit Root Test Results(1st Difference)

Variables	Value ADF	Critical Value McKinnon ( $\alpha = 5\%$ )	Decription
Economic Growth ( $Y_t$ )	-6.508750	-2.981038	Stasioner
Government Expenditure ( $G_t$ )	-6.554035	-2.981038	Stasioner
Inflation Indonesia (INF_DN)	9.017722	-2.981038	Stasioner
Inflation AS (INF_LN)	-7.012501	-2.981038	Stasioner
Inflation Diference DN_LN (INF DN_LN)	-8.418946	-2.981038	Stasioner
BI Rate ( $r_t$ )	-5.261890	-2.981038	Stasioner
FED Rate (FED Rate)	-3.518289	-2.981038	Stasioner
BI rate difference – FED Rate ( $R^*_t$ )	-6.596567	-2.981038	Stasioner
Money Supply ( $M_t$ )	-3.298762	-2.981038	Stasioner
Exchange Rate ( $E_t$ )	-4.055219	-2.981038	Stasioner
Unemployment ( $UN_t$ )	-4.240570	-2.981038	Stasioner

Based on table 3 shows that the stationary 1st difference level, there are economic growth variables (Yt), Government Expenditure (Gt), Indonesian Inflation (INF\_DN), BI rate difference – FED Rate (R\*t), BI rate (rt), FED Rate ( FED Rate), BI rate difference – FED Rate (R\*t), Exchange Rate (Et), Money Supply (Mt), Exchange Rate (Et), Open Unemployment (UNt) because it has a small probability of =5 percent and the statistical ADF value > the critical value (Mackinon Critical Values) at = 5 percent

### 4.3 Cointegration Test

The Granger test is a statistical test used to determine the presence of unit roots and the degree of integration. The Granger test is used to determine the long-term relationship between related variables by assessing if there is evidence of Granger causality based on economic theory.

**Table 4.** Integration Test Results

Equation	Trace Statistic	CV 0.05	Max-Eigen Statistic	CV 0.05
None*	253.2267	125.6154	73.25759	46.23142
At most 1*	179.9691	95.75366	48.03899	40.07757
At most 2*	131.9301	69.81889	42.10395	33.87687
At most 3*	89.82616	47.85613	34.42889	27.58434
At most 4*	55.39727	29.79707	26.06458	21.13162
At most 5*	29.33269	15.49471	15.33376	14.26460
At most 6*	13.99894	3.841466	13.99894	3.841466

Based on table 5, the cointegration test results from the trace test and max eigen values indicate the existence of cointegration in the seven equations because the trace statistic value is greater than the critical value at the confidence level = 5 percent or the probability value (p-value) is smaller than = 5 percent. The presence of cointegration in the Johansen test shows an early indication of a long-term relationship between variables (cointegrated) so that the variables form a linear relationship. Cointegration test results show that the variables of economic growth with inflation and money demand in Indonesia have a long-term relationship Prob F-statistic sebesar  $0,000039 < 0,05$ .

#### 1. Model Reduced Form of Economic Growth (Yt)

$$Y_t^* = \Pi_{10} + \Pi_{11} \pi_{t-1} + \Pi_{12} r_t + \Pi_{13} G_t + \Pi_{14} E_t + \Pi_{15} Y_{t-1} + \varepsilon_{1t}$$

$$Y_t^* = 11.72140 + 0.143265 \pi_{t-1} - 2.258432 r_t + 0.670775 G_t - 0.426016 E_t + 0.015035 Y_{t-1} + \varepsilon_{1t}$$

The variable of government expenditure in the previous period has a positive and considerable impact on economic growth in Indonesia. The Keynesian Theory, developed by



John Maynard Keynes, states that in the short term, national output and employment are primarily influenced by aggregate demand. Keynesians advocate for the utilisation of both monetary policy and fiscal policy to address unemployment and mitigate inflation. Keynesian notions demonstrate that government has a significant role in fostering economic growth. The market economy presents challenges in ensuring the accessibility of essential items for the community and frequently leads to instability, inequality, and inefficiency. Persistent instability, inequality, and inefficiency in the economy will undoubtedly impede long-term economic progress (Murni, 2006: 183). Government expenditure exerts a substantial and favourable impact on the economic growth of Indonesia. Augmenting government expenditure, such as for the creation or enhancement of infrastructure, will facilitate the production of products and services. This will result in a surge in the production of commodities and services. The augmentation in the production of commodities and services will result in a corresponding escalation in economic expansion. Conversely, a reduction in government investment that prevents the resolution of infrastructure issues will impede the creation of products and services. This will significantly affect the decrease in the production of products and services. A decline in the production of products and services will result in a corresponding fall in economic growth. This is in accordance with the theory of Mankiw (2006) and Fisher (2008) which means that government spending is a function of economic growth.

The variable representing the interest rate of the Bank Indonesia (BI) exerts a notable and adverse impact on the economic growth of Indonesia. In the Classical theory, the interest rate is defined as the compensation value of capital, which differs from the micro theory. Additionally, the Classical theory states that public saving is influenced by interest rates. As the interest rate increases, so does the propensity of individuals to save. Consequently, when the interest rate is elevated, individuals will be incentivized to curtail or diminish their expenditure on consumption in order to augment their savings. Investment is directly influenced by the interest rate. As the interest rate increases, the public's inclination to invest decreases. This is because the use of funds (cost of capital) is becoming increasingly expensive. Conversely, the lower the interest rate, the desire to invest will increase (Nasution, 1991).

Conversely, the Indonesian inflation variable and the Exchange Rate do not exert any influence on the economic growth in Indonesia. Nevertheless, inflation has no impact on the Indonesian economy. An expansion in the economy does not necessarily entail a corresponding rise in inflation, and conversely, a contraction in the economy does not always result in a decline in inflation. An economy in decline might lead to an increase in inflation. This may be attributed to a decline in the country's overall production caused by a rise in global oil prices, leading to a general increase in the pricing of products and services and subsequently reducing domestic production. The decline in the output of goods and services is a result of rising manufacturing costs. This circumstance inevitably leads to a scarcity of goods and services, resulting in an escalation of inflation.

The results of this study are supported by the theory put forward by Mankiw (2007) which states that fluctuations in the economy affect Aggregate Demand and Aggregate Supply both in the short term and in the long term. Fluctuations in the economy can decrease and increase Aggregate Demand and can also decrease and increase Aggregate Supply. The occurrence of economic fluctuations resulting in a decrease in aggregate supply in the short term will further reduce the balance in the economy. This type of fluctuation, for example, occurs because there is an increase in the price of oil which is one of the important production factors in the economy. An increase in world oil prices will reduce aggregate supply so that it will have a bad impact on the economy, namely a decrease in national output and an increase in prices. From the demand side, there is an increase in aggregate demand in the short term, resulting in an increase in output.

This condition occurs because in the short term prices are rigid and the economy is not yet in a full-employment condition so that an increase in aggregate demand does not result in inflation.

## 2. Model Reduced Form of Inflation ( $\pi_t$ )

$$\pi_t^* = \Pi_{20} + \Pi_{21} Y_{t-1} + \Pi_{22} G_t + \Pi_{23} E_t + \Pi_{24} M_{t-1} + \Pi_{25} M_t + \Pi_{26} UN_t + V_{1t}$$

$$\pi_t^* = 0.962984 - 0.243903 Y_{t-1} + 0.226855 G_t + 1.385095 E_t + 4.774262 M_{t-1} + 3.826346 M_t - 0.077189 UN_t + \varepsilon_{1t}$$

Impact of inflation in Indonesia. The exchange rate exerts a substantial and favourable impact on inflation. In the event of a depreciation of the rupiah against the US dollar, inflation will increase, and if the rupiah appreciates against the US dollar, inflation will decrease. This occurs due to the depreciation of the rupiah exchange rate, which in turn leads to an increase in the prices of imported commodities and subsequently raises the cost of imported raw materials. The rise in the price of imported raw materials leads to a decrease in industrial output. A reduction in production output will lead to a scarcity of manufactured goods, so prompting a general increase in the prices of domestic commodities and consequently causing inflation to grow. On the supply side, the devaluation of the currency rate will result in comparatively higher pricing for foreign items compared to domestic ones. This will lead to a rise in the demand for domestic products, driven by both local consumption and the foreign demand for export commodities. The surge in demand will prompt a corresponding surge in prices, leading to an escalation in inflation. According to the Purchasing Power Parity concept, an increase in inflation necessitates a depreciation of the currency rate in order to uphold the Law of One Price. The Purchasing Power Parity theory also says that a country whose currency experiences a high rate of inflation should reduce the value of its currency relative to a currency with a lower inflation rate. (Mishkin, 2009).

The money supply in the previous period have a positive and significant effect on inflation in Indonesia. The money supply in the previous period also had a significant and positive effect on inflation in Indonesia. The existence of a significant and positive influence between the money supply in the previous period on inflation indicates that inflation in Indonesia is determined by the money supply in the previous period. If the money supply in the previous period increases, inflation will increase. This condition is caused by the increase in the money supply in the previous period which will encourage an increase in domestic demand until the next period. The increase in domestic demand will cause an increase in the amount of output produced in the economy. With this increase in output, the amount of money in circulation in the next period will also increase. This is in accordance with the opinion of Mishkin (2001) which states that, the higher the output at a certain interest rate, the higher the money supply will be. An increase in the money supply in the next period will cause inflation. On the other hand, if the money supply decreased in the previous period, it will cause inflation to fall due to reduced domestic demand so that output also decreases. The decrease in the amount of output causes the money supply in the next period to decrease and this will cause inflation to also fall. The existence of a significant influence between the money supply in the previous quarter and the inflation rate proves that there is a time-lag in monetary policy.

The money supply exerts a notable and meaningful impact on inflation in Indonesia. This aligns with the Classical inflation theory, which posits that there is a direct relationship between the money supply and the inflation rate in Indonesia. According to this theory, an increase in the money supply leads to a larger percentage of inflation. An expansion of the money supply

within the community leads individuals to accumulate a significant amount of money, hence stimulating a rise in domestic demand. The rise in domestic demand, for instance, was prompted by the growing consumerism within the community. If the propensity for consumption in society grows without a corresponding growth in the production of goods, the scarcity of these goods will result in a rise in the price of domestic products. Continued escalation of consumer expenditure will lead to a general upsurge in prices and the eventual onset of inflation, which has the potential to damage the Indonesian economy in the long run.

In Indonesia, there is a clear and substantial negative correlation between economic growth and inflation. This aligns with the Classical inflation hypothesis, which posits that there is a direct relationship between the money supply and the inflation rate in Indonesia. Specifically, as the money supply increases, the percentage of inflation also rises. An expansion of the money supply within the community leads individuals to accumulate a significant amount of money, hence stimulating a rise in domestic demand. The rise in domestic demand can be attributed to the growing consumerism within the community. If the level of consumption in society grows without a corresponding growth in the production of commodities, the scarcity of these goods will lead to a rise in the price of domestic products. Continued escalation in people's expenditures will lead to a general increase in prices, resulting in long-term inflation, which has the potential to damage the Indonesian economy. The determinants of government expenditure do not exert any influence on inflation in Indonesia. Hence, government expenditure has no impact on inflation in Indonesia. This is due to the fact that the current administration is allocating funds to finance energy-intensive projects, such as infrastructure development, which will provide results over a considerable period of time. Meanwhile, the government has already allocated a budget to cover labour wages, among other expenses. This will enhance individuals' ability to buy goods and services and stimulate the overall demand for products. The surge in demand for output is not met by a corresponding surge in supply owing to the delay between government expenditure on the project and the actual production, resulting in a spike in prices.

Fiscal policy is divided into two, namely the impact on the demand side (demand side effect) and the impact on the supply side (supply side effect). The impact of fiscal policy on the economy through the aggregate demand approach is explained through the Keynes approach. The Keynesian approach assumes the existence of price rigidity and excess capacity so that output is determined by aggregate demand (demand driven). Keynes stated that in a recession, a market-based economy would not be able to recover without government intervention. Monetary policy is powerless to restore the economy because policy only relies on lowering interest rates, while in a recession, interest rates are generally low and can even approach zero. In Keynes's approach, fiscal policy can move the economy because an increase in government spending or a tax cut has a multiplier effect by stimulating additional demand for household consumer goods. Likewise, if the government cuts taxes as an economic stimulus. Tax cuts will increase disposable income and ultimately affect demand. The tendency of households to increase consumption by increasing the marginal probability to consume (MPC), becomes the economic chain for increasing spending more and ultimately on output

And the unemployment rate have no effect on inflation in Indonesia. Based on descriptive analysis, general inflation in Indonesia for twenty-four years on average is also influenced by the monetary crisis, the increase in the need for basic commodities, the increase in fuel prices, not as a result of the pull of demand. This is in accordance with the theory of A.W Philips (Mankiw, 2003) in the Philips Curve describing how the relationship between inflation and the unemployment rate is. The Philips curve shows a negative relationship between changes in the wage rate and the unemployment rate, i.e. when the wage rate rises, unemployment is low or

vice versa. The Philips curve proves that price stability and high employment are not possible simultaneously, which means that if you want to achieve high employment or low unemployment, you must be willing to bear the burden of high inflation as a consequence. In other words, this curve shows a trade off (negative relationship) between inflation and the unemployment rate, namely the unemployment rate will always be lowered by encouraging an increase in the inflation rate and the inflation rate will always be lowered by allowing the unemployment rate to increase

### 3. Model Form of Money Supply (Mt)

$$M_t^* = \Pi_{30} + \Pi_{31} R^*_t + \Pi_{32} E_{t-1} + \Pi_{33} r_t + \Pi_{34} \pi_{t-1} + \Pi_{35} Y_{t-1} + V_{2t}$$

$$M_t^* = 5.118293 - 0.047178 R^*_t - 1.304651 E_{t-1} + 0.919588 r_t + 0.144935 \pi_{t-1} + 0.147654 Y_{t-1} + \varepsilon_{1t}$$

The exchange rate variable period had a negative and significant effect on the demand for money in Indonesia. The existence of a significant influence between the exchange rate in the previous quarter and the demand for money proves that there is a time-lag in monetary policy. Research conducted by Arif Widodo (2015) using the ECM method shows the results of the analysis of the effect of the exchange rate (exchange rate) on the demand for money with the Error Correction Model, both in the short term the exchange rate (exchange rate) has a positive effect on the demand for money and in the long term the exchange rate (exchange rate) has a negative effect on the demand for money in Indonesia. The negative relationship between the exchange rate and the long-term demand for money in Indonesia can occur, when the exchange rate of the rupiah against the US dollar depreciates (depressed), people will prefer to hold the US dollar. So that people will exchange the rupiah they have for dollars, because holding dollars will be more profitable. Thus, when there is an increase in the rupiah exchange rate (rupiah depreciation) in the long term, it will reduce the demand for money

The interest rate set by the Bank of Indonesia (BI) in the previous period had a noteworthy and adverse impact on the demand for money in Indonesia. The study findings align with the Cambridge theory, which posits that an increase in interest rates leads individuals to decrease the amount of money they wish to retain, while maintaining their planned transaction volume. Due to the opportunity cost associated with storing cash, individuals choose to deposit their money in banks as interest rates rise, as it becomes more lucrative than keeping cash on hand. Interest rates exert a detrimental impact on the demand for money. This occurs due to the inverse relationship between interest rates and the quantity of cash allocated for transactions. As interest rates rise, individuals tend to prioritise saving in order to maximise their earnings, specifically through interest.

While the BI Rate – FED Rate difference variable, Indonesia's inflation in the previous period did not affect the demand for money in Indonesia. This is not in accordance with the classical quantity theory which states that the more the money supply, the higher the percentage of the Consumer Price Index (CPI) in Indonesia. And according to the theory put forward by Irving Fisher, where  $MV = PT$ , if  $V$  and  $T$  are considered constant then an increase in  $P$  (price level/inflation) will cause an increase in  $M$  (demand/supply of money). Based on the belief that the values of  $V$  and  $T$  are constant, classical economists argued that changes in the money supply would only affect the price level

And Indonesia's economic growth rate in the previous period did not affect the demand for money in Indonesia. This is in accordance with the theory of Keynes (2006), the demand for money for transactions is determined by the level of income. the higher the income level of the community, the demand/supply for money will increase because with an increase in income, individuals tend to make larger transactions and this right requires individuals to hold more money. And in accordance with Baumol's theory that people receive a certain amount of income on a regular basis every time (eg at the beginning of the month) and always spend or use that income for the purpose of transaction a certain amount (fixed) every day. In other words, the need for funds (cash) per unit time is constant

## 5 Conclusion

The variable of government expenditure in the previous period has a positive and considerable impact on economic growth in Indonesia. The variable representing the interest rate of the Bank of Indonesia (BI) has a noteworthy and detrimental impact on the economic growth of Indonesia. Conversely, the Indonesian inflation variable and the exchange rate do not exert any influence on the economic growth in Indonesia.

In Indonesia, inflation is positively and significantly influenced by the changeable exchange rate, as well as the money supply in the previous period and the current money supply. Economic expansion exerts a detrimental and substantial impact on inflation in Indonesia. The factors of government expenditure and the unemployment rate do not exert any influence on inflation in Indonesia.

The previous period's BI interest rate had a considerable and negative impact on the demand for money in Indonesia, as observed through the exchange rate variable. The variables of the BI Rate – FED Rate difference, Indonesia's inflation in the previous period, and Indonesia's economic growth rate in the previous period had no impact on the demand for money in Indonesia.

Monetary policy can effectively manage inflation by regulating the money supply. The expansion of the money supply should align with the genuine demands of the general public and be tailored to meet Bank Indonesia's inflation target. Raising interest rates can effectively curb inflation by incentivizing individuals to deposit their money in banks.

## References

- [1] Abdul Karim Zulkefly, etc 2014. Monetary Policy and Inflation Targeting in Small Open-Economy. Journal MRPA, January 2009.
- [2] Alejandro Justiniano and Bruce Presto. 2010. Monetary Policy and Uncertainty in an Empirical Small Open-Economy Model. Journal of Applied Econometrics, Vol. 25 No. 1, pp 93-128
- [3] Aries Soelistyo. 2015. Suatu Pendekatan Moneter Terhadap Pertumbuhan Ekonomi Pada Perekonomian Terbuka Kecil Dengan Kontrol Modal: Studi Kasus Indonesia 2010:1-2014:12. Jurnal Ekonomi Pembangunan. Vol. 13, No. 2 Desember 2015
- [4] Chang, Ching-Cheng & Mendy, Michael. 2012. Economic Growth and Openness in Africa: What is the Empirical Relationship?. Applied Economics Letters. 19. 1903-1907
- [5] Dede, Ruslan. 2017. The Monetary Policy Transmission Mechanism based Macroeconomic Model of North Sumatera: A Projection Using Stochastic Simulation. The 7th Annual International Conference (AIC) Syiah Kuala University, October 18-20, 2017, Banda Aceh, Indonesia
- [6] Gujarati, Damodar. 2004. Dasar - Dasar Ekonometrika Jilid 1. Jakarta; Erlangga

- [7] Mankiw, N Gregory. Harvard University. 2007. Teori Makro Ekonomi. Edisi Keempat. Alih Bahasa Imam Nurmawan. Editor Yati Sumiharti. Jakarta; Penerbit Erlangga
- [8] Mankiw, N. Gregory. 2003. Teori Makro Ekonomi. Edisi Kelima. Jakarta; Erlanga.
- [9] Mankiw, N. G. 2007. Makroekonomi Edisi Keenam. Jakarta; Erlangga.
- [10] Marelli, Enrico & Signorelli, Marcello. 2011. China and India: Openness, Trade and Effects on Economic Growth. *The European Journal of Comparative Economics*. Vol. 8, No. 1, pp. 129-154
- [11] Nowbutsing, Baboo M. 2014. The Impact of Openness on Economic Growth: Case of Indian Ocean Rim Countries. *Journal of Economic and Development Studies*. Vol.2, No.2, pp. 407-427
- [12] Vijil, Mariana. 2011. The Relationship between Trade Openness and Economic Growth: Some New Insights on the Openness Measurement Issue. *Semes Journees de Recherches en Sciences Sociales*. pp 1-17
- [13] Wahyuni, Herawati. 2016. Analisis Pengaruh Keterbukaan Ekonomi Terhadap Pertumbuhan Ekonomi Di Indonesia Tahun 1980-2012. Skripsi. Universitas Negeri Yogyakarta
- [14] Grossman, Gene M & Elhanan Helpman. 2005. Trade, Innovation, and Growth. *The American Economic Review*, Vol. 80 No.2. pp 86-91