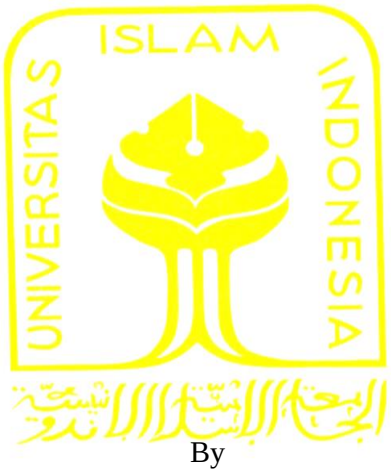
THE ANALYSIS OF THE EFFECT OF MONEY SUPPLY, EXTERNAL DEBT, EXCHANGE RATE (RUPIAH TO USD), AND BI RATE TO THE INFLATION RATE IN INDONESIA
(Case Study in Indonesian from 2010-2020)

A THESIS

Presented as Partial Fulfillment of the Requirements to Obtain the Bachelor Degree in Accounting Department



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INTERNATIONAL PROGRAM

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A BACHELOR DEGREE THESIS

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DECLARATION OF AUTHENTICITY

Herein I declare the originality of the thesis; I have not presented anyone else's work to obtain my university degree, nor have I presented anyone else's words, ideas or expression without acknowledgment. All quotations are cited and listed in the bibliography of the thesis.

If in the future this statement is proven to be false, I am willing to accept any sanction complying with the determined regulation or its consequence.

Mataram, December 21, 2021

Satrio Agung Wicaksono

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Alhamdulillahi rabhil'alamin, all praise to Allah SWT for giving me blessing and help in every other way so that I can finish the thesis which entitled "THE ANALYSIS OF THE EFFECT OF MONEY SUPPLY, EXTERNAL DEBT, EXCHANGE RATE (RUPIAH TO USD), AND BI RATE TO THE INFLATION RATE IN INDONESIA (Study Case in Indonesian from 2010-2020)" as a partial requirement to obtain the bachelor degree in Economics Department, International Program, Faculty of Economics, Universitas Islam Indonesia is finally finished.

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Last but not least the researcher hopes this research will be helpful to give inspiration in improving knowledge in the future.

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ABSTRACT

This study aims to analyze the effect of Interest Rates, External Debt, Rupiah Exchange Rate against the US Dollar, and BI Rate on the inflation rate in Indonesia. The type of research used is descriptive research with a quantitative approach. The sample of this research is secondary data in the form of numbers regarding Inflation, Interest Rates, Foreign Debt, Exchange Rate of Rupiah against the US Dollar, and Money Supply taken with the period 01.2010 - 12.2020 (10 years). This study uses the Error Correction Model (ECM). The ECM model used has passed the Stationarity test and cointegration test and is free from all problems from these tests. So that the ECM model is eligible to be use and analyze.

The analysis showed that in long run only exchange rate is significant with positive effect on inflation hence in the short run all the variable is significant with money supply and interest rate has negative coefficient to the inflation

Key: Inflation, Interest Rates, External Debt, Exchange Rate (Rupiah – USD), Money Supply

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh Suku Bunga, Utang Luar Negeri, Nilai Tukar Rupiah terhadap Dolar Amerika, dan BI Rate terhadap laju inflasi di Indonesia. Jenis penelitian yang digunakan adalah penelitian deskriptif dengan pendekatan kuantitatif. Sampel penelitian ini adalah data sekunder dalam bentuk angka mengenai Inflasi, Suku Bunga, Utang Luar Negeri, Nilai Tukar Rupiah terhadap Dolar Amerika, dan Uang Beredar yang diambil dalam kurun waktu 01.2010 - 12.2020 (10 tahun). Penelitian ini menggunakan model Error Correction Model (ECM). Model ECM yang telah digunakan melalui uji Stasioneritas dan kointegrasi serta bebas dari semua permasalahan dari pengujian tersebut. sehingga model ECM yang sudah digunakan untuk dipakai dan dianalisis. Hasil analisis menunjukkan bahwa dalam jangka panjang hanya nilai tukar yang berpengaruh positif terhadap inflasi sedangkan dalam jangka pendek semua variabel berpengaruh negatif terhadap jumlah uang beredar dan suku bunga.

Kata Kunci: Inflasi, Suku Bunga, Utang Luar Negeri, Nilai Tukar (Rupiah – USD), Uang Beredar.

CHAPTER I

INTRODUCTION

1.1 Background of the Study

Inflation is a dilemma that haunts the economy of every country. Its ever-increasing development provides obstacles to economic growth in a better direction. Economic development is an effort to improve the standard of living in the community, which is often measured by the high and low income of the population each year or per capita income (Suparmoko, 1992:5).

Almost all countries, both developed countries and developing countries, face problems of stability and problems of economic growth. Indonesia, as one of the developing countries where its economic life is highly dependent on the monetary system and the world economy, always faces these problems. Indonesia's economic growth in the last few decades has been very poor, and this has been accompanied by the increasing integration of the Indonesian economy with the world economy.

High economic growth coupled with a dynamic economy caused by an increase in the money supply can drive up commodity prices, usually leading to inflation. On the other hand, it is undeniable that development is expensive and that an increase in development activity, characterized by increased government spending, will create inflationary pressures. Inflationary pressure is a monetary

event that can be found in almost all countries in the world that are carrying out the development process. High inflation rates can cause obstacles to the pace of the national economy. The emergence of chaos in the business climate in Indonesia is due to economic uncertainty, which makes it difficult for business actors to invest and produce.

In the monetary sector, the monetary authority issues monetary policies to anticipate rising inflation rates, such as policies to increase interest rates, open market policies and increase cash ratios as well as policies in the mechanism for determining foreign exchange rates. With monetary policy, apart from achieving a fairly high target of economic growth and equitable development, public confidence in the value of the rupiah can also be increased, further enhancing the efficiency of banks and other non-bank financial institutions, which is expected to encourage investment and consumption. Investment is part of total expenditure, where changes in total expenditure will have a double effect on the balance of national income.

Meanwhile, matters relating to fiscal policy are policies in the field of the State Revenue and Expenditure Budget (APBN). The government's role in this case is very important in controlling the money supply in relation to the inflation rate, so it is hoped that there will be a balanced budget, namely equal expenditures and revenues, government savings are sought to increase, tax objects are expanded, prioritize spending only on productive sectors, routine spending limited and the

policy is aimed at the utilization of natural resources and potential human resources, to increase national income and reduce inflation.

The inflation rate at the end of 2009 which was only 2.78 percent (annual) was one of the lowest inflation figures in Indonesia's history. Since 1970, there were only been two periods with lower inflation rates, namely in 1971 which reached 2.56 percent and 1999 at 2.01 percent. However, the publication of inflation data for January by the Central Statistics Agency some time ago implied that inflationary pressures were starting to pick up again. Throughout January, there was inflation of 0.84 percent. The amount of inflation was higher than the estimates of many parties, which estimated that inflation would be in the range of 0.50 percent. In 2005-2008, inflation that occurred in January was always above 1 percent. In 2005, it was 1.43 percent, in 2006 it was 1.36 percent, in 2007 it was 1.04 percent, and in 2008 it was 1.7 percent. BI did reduce the benchmark interest rate to 6.5 percent (without easing monetary policy). However, at the same time, BI also limited its money supply to the system by absorbing a lot of banking funds by issuing Bank Indonesia Certificates (tightening monetary policy).

Several indicators later showed that the easing of monetary policy launched by BI had not actually been achieved. Such indicators included negative growth in base money (M0), difficulty in falling loan interest rates, and declining credit growth. Inflationary pressures that continued to increase in 2010 certainly limited BI's space to maintain the benchmark interest rate at a low level. Until the first

semester of 2010, the inflation rate was estimated to remain in the range of 5 percent. Therefore, until mid-2010, BI was likely to be able to maintain its benchmark interest rate at the current level.

Based on the description above, the researcher analyzed the effect of money supply, government spending, interest rates for Bank Indonesia Certificates (SBI), and foreign exchange rates on the inflation rate in Indonesia from January 2010 – December 2020.

1.2 Problem Formulation

Based on the background that has been stated above, the research problems can be formulated as follows:

1. Do money supply, external debt, exchange rate (Rupiah to USD), and BI Rate affect the inflation rate in Indonesia?
2. Which of the money supply, external debt, exchange rate (Rupiah to USD) and BI Rate has the most influence on the inflation rate in Indonesia?

1.3 Research Objectives

In accordance with the background and problems mentioned above, the objectives of the research are as follow:

1. To analyze the effect of money supply, external debt, exchange rate (Rupiah to USD, and BI Rate on the inflation rate in Indonesia.

2. To find out whether money supply, external debt, exchange rate (Rupiah to USD), and BI Rate simultaneously or partially affect the inflation rate in Indonesia.

1.4 Benefits from this research

The results of this research are expected to give the following contributions:

1. As a material consideration for relevant agencies that have a relationship with the factors that affect the rate of inflation in Indonesia.
2. As a reference for future research, especially those related to the same problem.
3. As material for information and considerations that are expected to be useful for future research.

1.5 Systematic of Writing

To simplify and clarify the writing of this thesis, the researcher uses the following systematic of writing:

CHAPTER I: INTRODUCTION

This chapter covers the background of the study, problem identification, problem formulation, problem limitation, research purpose, and systematization of writing.

CHAPTER II: LITERATURE REVIEW AND THEORETICAL FRAMEWORK

This chapter describes the findings of research conducted in the same field and the basis of the theory used to approach the questions to be studied.

CHAPTER III: RESEARCH METHOD

This chapter elaborates the method of analysis used in the research and data sources that are used.

CHAPTER IV: DATA ANALYSIS & DISCUSSIONS

This chapter contains the findings result from the research data that have been obtained previously and analysis in order to find out the influence of the respective data obtained.

CHAPTER V: CONCLUSIONS & RECOMMENDATIONS

This chapter is the concluding chapter which contains the conclusions and recommendations from the analysis results of the data in the previous chapters.

CHAPTER II

LITERATURE REVIEW & THEORETICAL FRAMEWORK

2.1 Literature Review

According to a study by Cheney and Stout (1966), the main cause of the massive foreign debt in developing countries and developing countries is the lack of savings and investment. Countries that lack savings turn to domestic or international bond markets to borrow money to control economic growth. Joha (1996) found a similar inverse relationship between foreign debt and economic growth in sub-Saharan Africa due to the same pushing effect.

(Baharumshah et al., 2002) conducted a study titled "Saving Trends in Asian Countries". They investigated factors influencing savings behavior in Singapore, South Korea, Malaysia, Thailand and the Philippines, including income, interest rates, dependency ratios, and foreign capital inflows. First, it examines the fact that overseas savings impede domestic savings in the short and long term. Second, the study used Granger's test of the causal relationship between savings and economic growth. Third, the effect of the interest rate on savings was investigated. Fourth, the long-term causal relationship between domestic and foreign savings was

investigated using VECM (Vector Error Correction Model) and Engle & Granger. The empirical results of cointegration in five countries showed that there is a strong relationship between savings and the determinants of savings, savings, GNP, dependency ratio, interest rate, and foreign exchange balance. The empirical results of short-term dynamics conducted using the error correction model show that Singapore, Korea, Malaysia, and Thailand have common determinants of saving, and economic growth has a positive effect on saving. There was a causal direction from external saving to internal saving. However, the causal relationship between these two variables was weak in all countries except Singapore. In short, capital inflows and domestic savings were negative in all countries except Thailand. However, the results were completely different. Contrary to the popular belief that savings can drive economic growth, it was also found that there was no correlation between savings and economic growth. Empirical studies of interest rates have shown a positive trend in Singapore and South Korea.

Mohan (2006) conducted a study titled "The Causal Relationship between Savings and Economic Growth in Countries with Different Income Levels". This study examined the relationship between domestic savings and economic growth in countries with different income levels. This study examines whether the causal relationship between domestic savings and economic growth is different in low-income, lower-middle-income, upper-middle-income, and high-income countries. The study looked at 25 countries, including 10 high-income countries (HIC), with

the rest focused on developing countries, including 5 upper-middle-income countries (UMC), 5 low-middle-income countries (LMC) and low-income countries. . Country (LIC). Models were performed using the test of normality (ADF test), Johansen's test of cointegration, and Granger's test of causality. In the normal test (ADF test), LogGDP and LogGDS were found to be abnormal in 22 of 25 countries. After taking the difference series (DlogGDP and DlogGDS), the results showed that both were unchanged. However, in Egypt, Malaysia, and the United States, one of the variables was abnormal and the other was normal. It was therefore excluded from the analysis as it leads to an incorrect specification issue. The cointegration of logGDP and logGDS for the 18 countries co-integrated using Johansen's test was tested and estimated using the VEC model.

However, in the four countries where LogGDP and LogGDS were not co-integrated, Granger's causal relationship was calculated using the VAR model. An empirical study of low-middle-income countries (LMC) found similar results for high-income countries (HIC), demonstrating a causal relationship between economic growth and increased savings. However, in Ecuador, there was no causal relationship between savings growth and economic growth. Empirical results for low-income countries (LICs) show that in some countries a two-way causal relationship exists. In some countries, the direction of the causal relationship varies from the rate of growth in savings to the rate of economic growth, and in some countries the direction of causality varies from growth in savings to growth in

savings. In India, there is no causal relationship between the two variables. In conclusion, this study is based on the finding that in terms of causality, the economic growth rate extends to the savings rate. Moreover, they believed that income class played an important role in the direction of causality. Empirical results from low-income countries (LICs) show that in some countries there is a two-way causal relationship. In some countries, the direction of the causal relationship is from savings growth to economic growth, and in some countries causation is economic growth in savings. In India, there is no causal relationship between the two variables. As a result, based on the result, the causal relationship was traced from the economic growth rate to the savings growth rate.

Low government revenues, low investment and balanced budget deficits are other reasons developing countries are moving closer to debt markets (Gohar et al, 2012). Government external debt is debt owed to holders of government securities such as treasury bills, treasury bills and treasury bills. The government borrows by issuing bills, promissory notes, bonds, and securities. These are the two main reasons governments borrow.

External government borrowing can have both positive and negative impacts on economic growth. Presbyero (2012) argues that developed countries use debt better than developing countries. As a result, developed countries are better able to cope with the adverse effects of large-scale debt: (1) oppressive

effects, (2) constrained investment environments, (3) market and policy volatility, and (4) capital outflows from capital outflows. This is because of the fear of currency depreciation. External debt is negatively affected by mismanagement in developing countries, and these negative impacts can outweigh the potential benefits of using debt in a project. More efficient will add value to the economy. Presbitero (2012) also found that public debt has a negative impact on economic growth when debt is greater than 90% of GDP. His research is based on a sample of 114 developing countries in the period 1980 ~ 2004.

Another study by Calderón and Fuentes (2013) in Latin America shows the negative impact of external debt on economic growth in the period 1970-2010. Tchereni et al. (2013) found a negative but not statistically significant relationship between economic growth and Malawi's external debt for the period 1975-2003 using time series analysis. They therefore suggest that the government should provide more incentives to local producers to help them compete in the domestic and international markets instead of relying on debt for economic development. In addition, another study in Jamaica has shown a negative relationship between total public debt and productivity growth. This study concludes that government foreclosure is negatively affected by productivity growth (Panth et al., 2006). Akram (2011) and Rais and Anwar (2012) also reached similar conclusions for Pakistan between 1972-2009 and 1972-2010. As a result, large public debt led to

poor economic and social conditions. Issues (2010) and Chikuba (2003) give similar results for Nigeria and Zambia. Umaru et al. (2013) and Mbah et al. (2016) also support this view based on the results of their study in Nigeria, finding negative effects of debt on economic performance from 1970-2011 and 1970-2013, respectively.

Setiartiti and Hapsari (2019) conducted a study titled "Factors Determining Inflation in Indonesia". This study aims to analyze the influence of several explanatory variables that can affect inflation in Indonesia. Also, one of the variables observed by the Central Bank of Indonesia is a variable that can affect the stability of Indonesia's inflation due to volatility. These explanatory variables are classified into four categories: money supply, exchange rate, interest rate BI rate, and gross domestic product. The data were obtained from the Economic and Financial Statistics Indonesia (SEKI) of the Central Bank of Indonesia and Statistics Indonesia from 2010 to 2017. This study uses Error Correction Model (ECM) to derive the equilibrium model and explore the influence of each independent variable in the short run and long run. The results show that money supply has a positive and significant effect on inflation in the short run when money supply increases by one point and then inflation increases by 9.68 points. However, the money supply has a negligible effect on the long-run equilibrium. Exchange rates and BI rates also have a negligible effect on inflation, both in the long run and the short run. Gross domestic product has a negligible effect on

inflation in both the long run and the short run equilibrium. In summary, this study summarizes the results carried out and makes some recommendations that can be considered to improve and strengthen the model's estimates to make it more relevant for future implementations.

2.2 THEORETICAL FRAMEWORK

2.2.1 Definition of Inflation

Inflation is generally defined as a general and continuous increase in prices. Bank Indonesia's monetary policy is aimed at managing price pressures originating from the aggregate demand side relative to supply side conditions. Monetary policy is not intended to respond to the rising inflation caused by temporary shock factors that will disappear by themselves over time.

An increase in the price of one or two types of goods that does not have an impact on an increase in the price of other goods cannot be called inflation. Even seasonal increases, such as price increases before Idul Fitri, Christmas or the New Year cannot be called inflation, because these increases are temporary and have no further effect. This kind of price increase is not considered as an economic disease that requires special handling to overcome it.

Because this increase takes place continuously, it is necessary to take action from the government to be able to control it, namely with monetary policy to re-

stabilize the economy. As stated by Latumaerissa (2011: 22), a brief definition of inflation is the tendency of prices to continuously increase. In addition to occurring continuously, price increases can be considered inflationary if the price increases include all goods. As stated by Mankiw et al. (2012:155), inflation is an increase in the general price level.

Inflation can have a number of causes if based on its root causes. Firstly, inflation arises due to a strong increase in public demand, the price of finished goods increases before the increase in the prices of inputs, which is called demand-driven inflation. Second, inflation occurs due to increased production costs, unlike demand-driven inflation, where input prices lead to an increase in finished product prices. In general, the inflation that occurs in different countries around the world is a combination of the two types of inflation and often both reinforce each other. If based on the principle that inflation is divided into domestic inflation and import inflation, domestic inflation is inflation originating in the country, and import inflation is inflation originating from abroad. Domestic inflation occurs for example due to budget deficits financed by new money printing, poor harvests, etc. Foreign inflation is inflation caused by rising prices abroad or in commercial subscriber countries of our country (Latumaerissa, 2011).

The increase in the price of the goods we import causes a direct increase in the cost of living index because some of the goods included in it come from imports, indirectly increasing the price index through an increase in production

costs (which will be followed by an increase in selling prices) of various goods. Using raw materials or machines that must be imported (cost inflation); and indirectly lead to an increase in domestic prices because there is a possibility (but not necessarily so) an increase in the price of imported goods resulting in an increase in government/private spending trying to offset the increase in imports (demand inflation). An increase in the price of export goods means an increase in the income of exporters (and also the producers of these export goods) increases.

This increase in income will then be spent on buying goods (both from within and outside the country). If the number of goods available in the market does not increase, as a result the prices of other goods will also increase (Latumaerissa, 2011). Therefore import and export activities can also be the cause and effect of inflation itself.

2.2.2 Amount of Money Supply

The theory that highlights the relationship between inflation and money supply is the quantity theory of money. First, inflation can only occur if there is an increase in the volume of money in circulation, without an increase in the money supply, but only a temporary increase in prices. If the quantity of money does not increase, inflation will stop on its own, whatever the reason, as soon as prices start to rise. Second, the rate of inflation is determined by the growth rate of the money supply and by society's sentiment (expectations) regarding future price increases.

In discussing money in the economy, it is very important to distinguish between currency in circulation and money in circulation. Currency in circulation is the entire amount of money that has been issued and circulated by the Central Bank, where the currency consists of two types, namely coins and paper money. Thus, the currency in circulation is equal to currency, meanwhile the money supply is all types of money in the economy, namely the amount of currency in circulation plus demand deposits in commercial banks. Money supply or money supply is divided into two meanings, namely in a narrow sense and in a broad sense.

The definition of the money supply in a narrow sense (M1) that the money supply is purchasing power that can be used directly for payments, can be expanded to include payment instruments that are close to money, for example time deposits and saving deposits at the banks. The money stored in the form of time deposits and savings is actually also a potential purchasing power for the owner, although it is not as easy as cash or check to use it (Boediono, 1994:3-5).

2.2.3 External Debt

External debt is the portion of a country's total debt collected from creditors outside the country. The recipient of a foreign debt can be a government, a company, or an individual. The form of debt can be proceeds from private banks, governments of other countries or international financial institutions such as IMF and World Bank (Ulfa, 2017).

According to Todaro (1998), foreign debt is the total of all loans officially in the form of cash or other forms of assets. In addition, it is used to channel funds from developed countries to developing countries to realize development to distribute income. In terms of repayment obligations, foreign debt has 2 forms of grants and foreign loans (loans). Although these two forms have different terms of return, both have a close relationship between the form of loans and grants (Wibowo, 2012).

Theoretically, the problem of foreign debt can be explained through the national income approach. As a source of financing for state development, foreign debt is useful to cover three deficits, namely:

1. Investment savings gap
2. Budget deficit
3. Current account deficit

Debtor countries will find it easier to provide funds for free to countries that have strong and long-standing ties in terms of debt and receivables. Security and politics are also sometimes considered factors in the provision of funds by creditor countries. Not all loans are given in the form of money, but in the form of certain experts or in kind.

From the material aspect, foreign debt is an inflow of capital from outside to the country that can increase the existing capital in the country. The formal aspect defines foreign debt as a receipt or gift that can be used to increase investment to

support economic growth. So based on the aspect of its function, foreign loans are one of the alternative sources of financing needed in development (Astanti, 2015).

2.2.4 Rupiah Exchange Rate (IDR – USD)

Exchange rate is the price of one currency against another currency. When we want to exchange one domestic currency for another country's currency, we will exchange it based on the prevailing currency. In accordance with the statement of Samuelson & Nordhaus (2004), exchange rate is the price of one currency unit in another currency unit. Likewise, according to Sukardi (2008), the exchange rate or exchange rate is the comparison of the value of foreign currency with the domestic currency (rupiah).

The exchange rate is one of the economic indicators of a country. The exchange rate of a country will refer to another country's currency which is considered strong or commonly referred to as Hard Currency. Thus, if the country that is used as a reference for the exchange rate experiences a crisis, it will have an impact on the exchange rate of the country that refers to it, for Indonesia the reference is the US Dollar. Therefore, there are situations where a currency can weaken or strengthen against the currencies of other countries due to various conditions. According to Joesoef (2008), the increase in the exchange rate of a country's currency against other currencies happened because the market mechanism is called appreciation and the decline in the exchange rate of a

country's currency against other currencies due to a market mechanism is called depreciation.

Currency exchange is often done by most people, either for business purposes or speculation. Currency exchange is done to get profit from the difference between buying and selling a currency. This is usually done especially if the domestic currency strengthens against the currencies of other countries. Not only that, for productive activities such as export and import businesses, or businesses that use imported raw materials, they must also monitor the stability of the exchange rate, both selling, buying and middle rates. The first is the selling rate which is the rate determined by a bank for the sale of certain foreign currencies at a certain time,

2.2.5 Interest Rate (BI Rate)

The BI rate is a key interest rate that reflects the monetary policy stance set by the Central Bank of Indonesia and announced to the public. The BI rate is announced by the Board of Governors of Bank Indonesia at each monthly meeting of the Board of Governors and is carried out in monetary operations conducted by Bank Indonesia through liquidity management in the money market.

The operating objective of monetary policy is reflected in the movement of the overnight interbank money market interest rate (PUAB Y/N). It is expected that this movement of interbank interest rates will lead to movements of deposit

rates and lending rates of banks. Taking into account other factors of the economy, Bank Indonesia will generally increase the BI rate if future inflation is predicted to exceed the set target, on the other hand, Bank Indonesia will reduce the BI rate if future inflation is estimated to be less than the predetermined value.

Determination of the monetary policy response (stance) is carried out every month through the Monthly RDG mechanism with monthly material coverage.

1. The monetary policy response (BI Rate) is set to be valid until the next RDG
2. The determination of the monetary policy response (BI Rate) is carried out by taking into account the lag of monetary policy in influencing inflation.

In the event of developments beyond the original estimate, the determination of the Monetary Policy stance can be carried out before the Monthly RDG through the Weekly RDG.

2.3 The Theoretical Framework

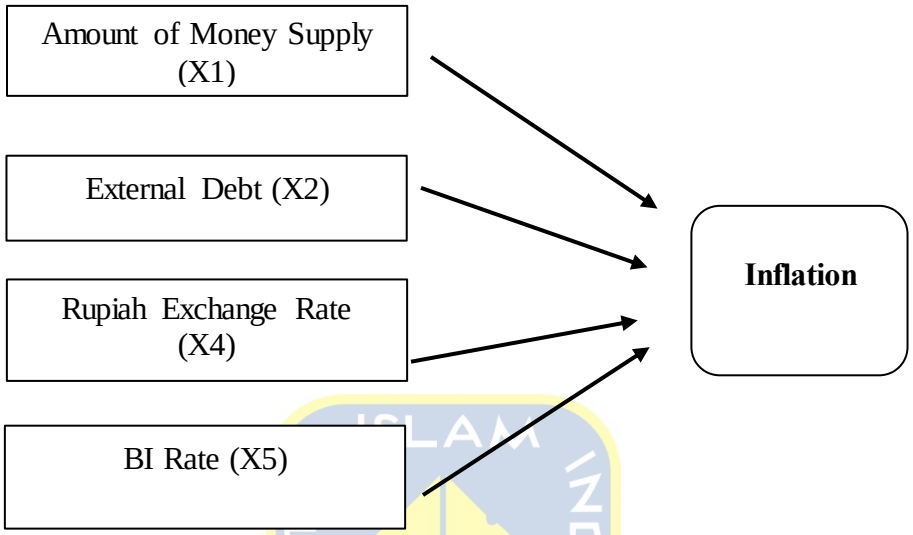

Figure 2.1 Theoretical Framework

2.4 The Hypothesis Research

Based on relevant theories and concepts as well as previous research, the hypothesis in this research are:

1. Money supply has positive and significant influence on inflation in Indonesia.
2. Foreign Debt has positive and significant influence on inflation in Indonesia.
3. Rupiah exchange rate has positive and significant influence on inflation in Indonesia.
4. If BI Rate increases, the Money Supply decreases; thus, inflation decreases.

CHAPTER III

RESEARCH METHODOLOGY

3.1 Type of Study

The type of research that the researcher used was quantitative research. Quantitative research with a descriptive approach is a research method based on the philosophy of positivism used to examine certain populations or samples, data collection used research instruments, data analysis used quantitative/statistical, with the aim of testing hypotheses that had been applied. Furthermore, the data that has been collected is analyzed quantitatively using descriptive statistics so that it can be concluded that the formulated hypothesis is proven or not (Sugiyono, 2013).

3.2 Population and Sample

The sample of this research was secondary data in the form of numbers regarding Inflation, Money Supply, Interest Rate, Rupiah Exchange Rate against US Dollar, and External Debt taken from 2010-2020 (10 years).

3.3 Research Variable & Data Resources

This research was conducted to analyze inflation in Indonesia, where inflation was the dependent variable (Y) and the variables that affected inflation were the Money Supply, Interest Rate, Rupiah Exchange Rate against US Dollar, and External Debt as the independent variables (X). The sources of the data are as follows:

1. Money Supply (https://satudata.kemendag.go.id/amount-of-circulate-money)
2. Exchange Rate (https://satudata.kemendag.go.id/exchange-rates)
3. Inflation (https://www.bi.go.id/id/statistik/indikator/data-inflasi.aspx)
4. BI Rate (https://www.bps.go.id/indicator/13/379/1/bi-rate.html)
5. External Debt (https://www.bi.go.id/en/statistik/ekonomi-keuangan/sulni/Documents/1bdab4aca17c4cde8e6909aaa12c7e94FinalisJuli2013_Web.pdf

3.4 Data analysis

This research used the Error Correction Model (ECM). The ECM model used has been done through data linearity test, degree of integration test, Engle-Granger (EG) test, cointegration and it was free from all problems of the test. Thus, the ECM model used was feasible to be used and analyzed.

In this resesarch, to analyze the data obtained, namely the influence of interest rates, money supply, rupiah exchange rates, and foreign debt on inflation, it used Microsoft Excel and Eviews software.

One way to identify the relationship between non-stationary variables is to perform error correction modeling. With the condition that in a group of non-stationary variables there is a cointegration, the error correction modeling is valid. This condition is stated by Engle-Granger's in Ariefianto (2012:142).

An error correction model (ECM) is a model used to adjust the regression equation between individual unstable variables to return to their long-run equilibrium values (Ajija et al., 2011). This method explains the long-run and short-run relationships of the research variables caused by the imbalance of the relationships in the model and the unusual and non-stationary data.

In testing this ECM method, according to Ajija et al. (2011) testing the ECM method can be done with the following stages:

1. Stationary Test

In conducting the time series test, it is necessary to use the stationarity of the data series used. The purpose of this test is to obtain a stable average value and random error equal to zero; thus, the obtained regression model has reliable predictive ability and avoids spurious regression. Absent regression is a situation where the regression results show the value of the coefficient of

determination (high but actually the relationship between variables in the model has no meaning) (Gujarati, 2004).

a. Unit Root Test

This root test is carried out to determine whether the data used is stationary or not. Stationary data is time series data that does not contain unit roots and vice versa. Data testing is done by using the Augmented Dickey Fuller (DF) test.

b. Integration Degree Test

The degree of integration test is carried out if the stationarity test used the unit root test at the level that shows the data is not stationary. Like the unit root test, the degree of integration test is performed using the Augmented Dickey Fuller (DF) test.

2. Cointegration Test

Cointegration test is performed to detect the stability of the long-term relationship between two or more variables. If there is cointegration among the related variables, it means that there is a long-term relationship between these variables. The integration test of two or more time series data shows that there is a long-term relationship. Time series data is said to be cointegrated if

the residuals from the regression level are stationary, the regression level will provide an accurate estimate for the long-term relationship.

To see if a model has integration or not, it can be done by running the following tests:

a. Johansen's Test

b. CRDW test

c. EG test

To see whether there is an integration, the Engel-Granger (EG) test or the Augmented Engel-Granger test is carried out, which is a test carried out using the Augmented Dickey-Fuler test by estimating the regression model and then calculating the residual value. After that, the DF-ADF test which is the Engel-Granger test is carried out to obtain the results of whether the model is cointegrated or not. The hypotheses used are as follow:

Ho: If ADF value < critical value, the model is not cointegrated

Ha: If ADF value > critical value, the model is integrated

The stages in conducting this long-term test are regressing the research variables at the level, where all the variables are stationary on the same order.

3. ECM (Error Correction Model) Test

ECM (Error Correction Model) is a model to correct regression equations between individual non-fixed variables to return to their long-run

equilibrium values, the main condition is the existence of a co-relationship connections between the constituent variables. (Ajija et al., 2011). Error correction is a technique used to adjust short-run equilibrium towards long-run equilibrium, introduced by Sargan and popularized by Engle and Granger. To use the ECM model, there must be a cointegration relationship between variables. After that, the ECM model is formed using the residuals from the long-term equation or the cointegrated equation. The residual from the long-term equation is used as a correction for the error correction term (ECT) which has an effect on the short-term equation.

ECM model **training** is **done** by **inputting** the first lag of residual regression results into the regression **equations** of stationary variables at the same difference. The ECM model can be **considered** valid if the **cointegration** variables are supported by significant and negative ECT **coefficients.** If the ECT coefficient is positive, the direction of the variables used will be further away from the **long-run equilibrium** so the ECM model cannot be used (Rahutami, **2011).**

3.1 ECM Short term

$$DYt = \beta 0 + \beta_1 DX1t + \beta_2 X2t + \beta_3 DX3t + \beta_4 DX4t + ECT + \mu t$$

$$ECT_1 = X1(-1) + X2(-1) + X3(-1) + X4(-1)$$

The data used in this research were annual data from 01.2010 – 12.2020

Y : Inflation

X1 : Money Supply

X2 : External Debt

X3 : Exchange Rate of Rupiah to US Dollar

X4 : BI Rate

$\beta 0 \ldots \beta 4$: Coefficient in short term

ECT : Error Correction Term

3.2 ECM Long Term

$$Yt = \alpha 0 + \alpha 1X1t + \alpha 2X2t + \alpha 3X3t + \alpha 4X4t$$

The data used in this resaerch were annual data from 01.2010 - 12.2020.

Y : Inflation

X1 : Money Supply

X2 : External Debt

X3 : Exchange Rate of Rupiah to US Dollar

X4 : BI Rate

$\alpha 0, \alpha 1, \alpha 2 \ldots \alpha 4$: Coefficient in the long-term

CHAPTER IV

DATA ANALYSIS AND DISCUSSION

4.1 Description of Research Data

In this chapter the researcher analyzed the data collected in the form of secondary data from the Central Statistics Agency (BPS), BI website, and the Ministry of Trade. The results of data processing presented in this resaerch were in the form of information to determine whether inflation was influenced by the Money Supply, Foreign Debt, Rupiah Exchange Rate against the US Dollar, and BI Rate. In accordance with the problems and formulation of the model that had been put forward, as well as the interests of hypothesis testing, the analytical techniques used in this research included descriptive analysis and statistical analysis.

Based on the formulation of the model described in chapter 1, which was used to see the truth about the hypothesis, the regression used was Error Correction Model (ECM) using annual data from January 2010 to Decemebe 2020.

Table 4.1.1 Inflation Descriptive Statistic

	Inflation
Mean	4.55969697
Standard Error	0.156518069
Median	4.155
Mode	4.61
Standard Deviation	1.798255703
Sample Variance	3.233723572
Kurtosis	-0.454643021
Skewness	0.593752703
Range	7.47
Minimum	1.32
Maximum	8.79
Sum	601.88
Count	132

Source: Secondary data processed, 2021

The highest inflation in Indonesia happened on August 2013 of 8.97%, meanwhile the lowest inflation happened on August 2020 at 1.32%, inflation multiple times happened at 4.61% and the average was 4.55

Table 4.1.2 Exchange Rate Descriptive Statistic

	Exchange Rate
Mean	12084.1818
Standard Error	190.32668
Median	13089
Mode	9180
Standard Deviation	2186.68707
Sample Variance	4781600.35

Kurtosis	-1.39372214
Skewness	-0.36748803
Range	7859
Minimum	8,508
Maximum	16,367
Sum	1595112
Count	132

Source: Secondary data processed, 2021

The highest exchange rate (IDR – USD) happened on March 2020 at Rp. 16,367, the lowest happened on July 2011 at Rp. 8,508, multiple times of Rp 9,180 and the average rate of Rp. 12,084.

Table 4.1.3 Money Supply Descriptive Statistic

	Money Supply
Mean	4,301,634.19
Standard Error	117539.6527
Median	4,366,004.81
Mode	#N/A
Standard Deviation	1350427.797
Sample Variance	1.82366E+12
Kurtosis	-1.10885261
Skewness	0.036770671
Range	4833568.5
Minimum	2,066,480.99
Maximum	6,900,049.49
Sum	567,815,713.68
Count	132

Source: Secondary data processed, 2021

The highest money supply happened on December 2020 of 6,900,049, meanwhile the lowest was on February 2010 of 2,066,480 in Indonesia, and the average money supply was 4,301,634

Table 4.1.4 External Debt Descriptive Statistic

	External Debt
Mean	301,165.33
Standard Error	5926.199249
Median	303,577.50
Mode	#N/A
Standard Deviation	68086.84568
Sample Variance	4635818555
Kurtosis	-1.04311473
Skewness	-0.032670409
Range	239486
Minimum	178,041
Maximum	417,527
Sum	39,753,824
Count	132

Source: Secondary data processed, 2021

The amount of external debt in Indonesia was the highest of 417,527 (million USD) on December 2020, the lowest was on January 2010 of 178,041 (Million USD), and the average external debt was 301,165 (million USD) from January 2010 – December 2020.

Table 4.1.5 Interest Rate Descriptive Statistic

	Interest Rate
Mean	5.971591
Standard Error	0.099103
Median	6
Mode	7.5
Standard Deviation	1.138604
Sample Variance	1.29642
Kurtosis	-1.08894
Skewness	-0.16643
Range	4
Minimum	3.75
Maximum	7.75
Sum	788.25
Count	132

Source: Secondary data processed, 2021

Interest rate level in Indonesia on February 2014 was the highest of 7.75, meanwhile the lowest was on November 2020 of 3.75, and the average was 5.97.

4.2 Stationary & Cointegration Test

a. Inflation Variable (Y)

Table 4.2.1 Stationarity Test at Level (Y) and Stationarity Test at First Difference (Y)

Null Hypothesis: INFLATION has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, max lag=12)

	t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics	-2.715278	0.0741

Test critical values:	1% level	-3.481217
	5% level	-2.883753
	10% level	-2.578694

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(INFLATION) has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-8.549244	0.0000
Test critical values:	1% level	-3.481623	
	5% level	-2.883930	
	10% level	-2.578788	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

b. Interest Rate Variable (X1)

Table 4.2.2 Stationarity Test at Level (X1)

Null Hypothesis: INTERESTRATE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-0.829372	0.8071
Test critical values:	1% level	-3.481217	
	5% level	-2.883753	
	10% level	-2.578694	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

Table 4.2.3 Stationarity Test on First difference (X1)

Null Hypothesis: D(INTERESTRATE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-16.40368	0.0000
Test critical values:	1% level	-3.481217	
	5% level	-2.883753	
	10% level	-2.578694	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

c. External Debt Variable (X2)

Table 4.2.4 Stationarity Test at Level (X2)

Null Hypothesis: EXTERNALDEBT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-0.597340	0.8662
Test critical values:	1% level	-3.480818	
	5% level	-2.883579	
	10% level	-2.578601	

*MacKinnon (1996) one-sided p-values

Source: Secondary data processed, 2021

Table 4.2.5 Stationarity Test on First difference (X2)

Null Hypothesis: D(EXTERNALDEBT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-12.50137	0.0000
Test critical values:	1% level	-3.481217	
	5% level	-2.883753	
	10% level	-2.578694	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

d. Exchange Rate Variable (X3)

Table 4.2.6 Stationarity Test at Level (X3)

Null Hypothesis: LNEXCHANGERATE has a unit root
Exogenous: Constant
Lag Length: 1 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-3.145772	0.6514
Test critical values:	1% level	-3.565641	
	5% level	-2.456213	
	10% level	-2.754115	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

Table 4.2.7 Stationarity Test on First difference (X3)

Null Hypothesis: D(LNEXCHANGERATE) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-12.16872	0.0000
Test critical values:	1% level	-3.481217	
	5% level	-2.883753	
	10% level	-2.578694	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

e. Variable (X4) Money Supply

Table 4.2.8 Stationarity Test at Level (X4)

Null Hypothesis: MONEYSUPPLY has a unit root
Exogenous: Constant
Lag Length: 12 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		1.286954	0.9985
Test critical values:	1% level	-3.486064	
	5% level	-2.885863	
	10% level	-2.579818	

*MacKinnon (1996) one-sided p-values

Source: Secondary data processed, 2021

Table 4.2.9 Stationarity Test on First difference (X4)

Null Hypothesis: D(MONEYSUPPLY) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-1.444693	0.5581
Test critical values:	1% level	-3.486064	
	5% level	-2.885863	
	10% level	-2.579818	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

The table below is the result of the unit root tests at the level:

Table 4.2.10 Level (All Variable)

Variable	ADF Value t-Statistic	MacKinnon Critical Value			Information
		1%	5%	10%	
Y	-2.715278	-3.481217	-2.883753	-2.578694	Not Stationary
X1	-0.829372	-3.481217	-2.883753	-2.578694	Not Stationary
X2	-0.597340	-3.480818	-2.883579	-2.578601	Not Stationary
X3	-3.145772	-3.565641	-2.456213	-2.754115	Stationary
X4	1.286954	3.486064	2.885863	-2.579818	Not Stationary

Source: Secondary data processed, 2021

The table below is the result of the unit root tests at the level:

Table 4.2.11 First Difference (All Varibles)

Variable	ADF Value t-Statistic	MacKinnon Critical Value			Information
		1%	5%	10%	
Y	-8.549244	-3.481623	-2.883930	-2.578788	Stationary
X1	-16.40368	-3.481217	-2.883753	-2.578694	Stationary
X2	-12.10754	-3.481217	-2.883753	-2.578694	Stationary
X3	-12.16872	-3.481217	-2.883753	-2.578694	Stationary
X4	-8.108508	-3.486064	-2.885863	-2.579818	Stationary

Source: Secondary data processed, 2021

The ADF Statistical value will be compared with the Mackinon critical value to determine the degree of integration of the stationarity of a variable. If the statistical value of the ADF is absolutely smaller than the Mackinnon value, the variable is stationary at a certain integration. In other words, the hypothesis that had been made that H0 : There is a unit root or not stationary at the level, was accepted. Whereas what we want was that H0 was rejected, for that the next step was to find the stationary form of the variable data at a certain stationary level, whether it is 1st Difference.

The hypothesis used:

H0 = 1 (there is a Unit Root Test/ the data is not stationary)

H1 = 1 (there is no Unit Root Test/the data is stationary)

Confidence levels are at 1%, 5% and 10% and reject H0 if the ADF statistic value with absolute value is greater than Mackinnon's critical value. By comparing the ADF t-statistic value with the Mackinnon critical value from the table above, it can be seen that there was a Unit Root of each variable used in the model. Based on the table above, it is clear that all variables were not stationary at level and other variables were stationary at level 1st Difference.

Table 4.2.12 Cointegration Test

Null Hypothesis: ECT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, max lag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-3.176195	0.0237
Test critical values:	1% level	-3.480818	
	5% level	-2.883579	
	10% level	-2.578601	

*MacKinnon (1996) one-sided p-values.

Source: Secondary data processed, 2021

This test is conducted to see whether there is a long-term relationship between the dependent and independent variables. By looking at the value of the ECT stationarity prob at the level level. The result of the prob above is 0.0237 <0.05, meaning that the variable ect is stationary at the level which

indicates that the inflation rate, money supply, external debt and interest rate variables are cointegrated so that the model can be continued to Error correction Model

Table 4.2.13 LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	117.9670	Prob. F(2,125)	0.0000
Obs*R-squared	86.28526	Prob. Chi-Square(2)	0.0000

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 12/24/21 Time: 10:33
Sample: 2010M01 2020M12
Included observations: 132
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.251129	0.902605	0.278227	0.7813
EXCHANGE_RATE	0.000109	0.000114	0.954709	0.3416
EXTERNAL_DEBT	1.23E-05	9.47E-06	1.301252	0.1956
INTEREST_RATE	-0.235676	0.096969	-2.430423	0.0165
MONEY_SPREAD	-9.00E-07	6.18E-07	-1.456706	0.1477
RESID(-1)	0.794067	0.087877	9.036117	0.0000
RESID(-2)	0.033526	0.087846	0.381648	0.7034

R-squared	0.653676	Mean dependent var	2.66E-15
Adjusted R-squared	0.637053	S.D. dependent var	1.118233
S.E. of regression	0.673681	Akaike info criterion	2.099452
Sum squared resid	56.73071	Schwarz criterion	2.252327
Log likelihood	-131.5638	Hannan-Quinn criter.	2.161573
F-statistic	39.32232	Durbin-Watson stat	1.754509
Prob(F-statistic)	0.000000		

Source: Secondary data processed, 2021

The test is conducted to see if there are any autocorrelation from the table above can be seen that the Obs R-Squared 86.285 with Prob. Chi-Square(2) 0.0000, since the Prob. Chi-Square < 5% (0.05) it means that there are autocorrelation with the variables

4.3 Error Correction Model Test (ECM)

Table 4.3.1 Long-Term ECM REGRESSION

Dependent Variable: INFLATION
Method: Least Squares
Date: 11/13/21 Time: 07:00
Samples: 1 132
Included observations: 132

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-43.99151	13.29504	-3.308867	0.0012
LNEXHANGERATE	5.842446	2.862339	2.041144	0.0433
LNMONEYSUPPLY	2.419935	5.406930	0.447562	0.6552
LNEXTERNALDEBT	-3.363098	5.985740	-0.561852	0.5752
INTERESTRATE	-0.127475	0.158859	-0.802443	0.4238

R-squared	0.455334	Mean dependent var	4.559394
Adjusted R-squared	0.438179	SD dependent var	1.798407
SE of regression	1.347991	Akaike info criterion	3.472250
Sum squared resid	230.7691	Schwarz criterion	3.581447
Likelihood logs	-224.1685	Hannan-Quinn Criter.	3.516623
F-statistics	26.54257	Durbin-Watson stat	0.190723
Prob(F-statistic)	0.000000		

Source: Secondary data processed, 2021

As seen in the long-term model it can be seen that the variables that affected inflation were only LNEXCHANGERATE, LNMONEYSUPPLY, LNINTERESTRATE and LNEXTERNALDEBT they did not affect inflation. R-squared = 0.455 meaning that the variable being used can describe 46% to

the inflation, the other 54% was other variable that was not being used. F-statistic value = 26.54257/ Prob(F-statistic) = 0.000000 meaning that all independent variables that impacted the inflation was 26.54257. If the probability value of a variable was 0.05, the variable can be said to have an effect on the dependent variable.

Interpretation:

After all the ECM stages were affected, the researcher got 2 equations which became this from using this method. This was where the influence of the independent variables on the dependent variable that researcher wanted to examine can be explained.

Yt = -43.99151 + 5.842446 X1t* + 2.419935 X2t* + -3.363098 X3t + -0.127475 X4t*

Note:

(*) : significant variable (<0.05)

(t) : period or year

This equation can only give us information that in the long run X2, X3, X4 did not have a significant effect on Y, and only X1 that had significant impact on Y.

Table 4.3.2 Short-term ECM REGRESSION

Dependent Variable: INFLATION
Method: Least Squares
Date: 11/13/21 Time: 06:43
Sample (adjusted): 2 132
Included observations: 131 after adjustments

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-61.46159	6.595183	-9.319164	0.0000
LNEXCHANGERATE	10.56665	1.465353	7.210990	0.0000
LNMONEYSUPPLY	-8.110649	2.731207	-2.969621	0.0036
LNEXTERNALDEBT	7.313748	2.993832	2.442939	0.0160
INTERESTRATE	-0.288404	0.079897	-3.609694	0.0004
ECT(-1)	0.923217	0.046427	19.88527	0.0000

R-squared	0.867941	Mean dependent var	4.581374
Adjusted R-squared	0.862658	SD dependent var	1.787423
SE of regression	0.662412	Akaike info criterion	2.058863
Sum squared resid	54,84878	Schwarz criterion	2.190551
Likelihood logs	-128.8555	Hannan-Quinn Criter.	2.112374
F-statistics	164.3090	Durbin-Watson stat	1.364867
Prob(F-statistic)	0.000000		

Source: Secondary data processed, 2021

Based on the above table, it showed that R-squared = 0.86 meaning that all variables being used can describe 86% on the inflation, the other 14% was not used in the analysis. F-stat = 164.3090/ Prob (F-stat) = 0.00 meaning that all variables together impacting the inflation of 164.3090. The ECT unbalance error coefficient was statistically significant, meaning the specification model used in this research was valid. The ECT coefficient value was 0.923217

which means that the difference between the actual value of Y and the balance value of 0.923217 would be adjusted within one year. The variable X2 was also statistically significant and had negative sign. Thus, in the short term X2 had negative effect on changes in Y. The coefficient X2 of -8.110649 was a short-term coefficient while the long-term coefficient was 2.419935.

The output of the short-term equation is obtained as follows:

Yt = -61.46159 - 10.56665 X1t - -8.110649 X2* + 7.313748 X3* + -0.288404 X4t - 0.923217 ECT

Note:

(*) : significant variable (<0.05)

(t) : period or year

The equation explains that in the short term X1, X2, X3, and X4 had significant effect on Y.

1. An increase in the change in X1 by 1 rupiah caused a change in Y by 10.56665.
2. An increase in the change in X2 by 1 percent caused a change in Y by -8.110649.
3. An increase in the change in X3 by 1 percent caused a change in Y by 7.313748.
4. An increase in the change in X4 by 1 percent changed Y by -0.288404.

4.4 Interpretation of Regression Results

Based on the various parameters in the regression equation regarding the factors that affect inflation, the following interpretation can be given:

1. EXCHANGE RATE Coefficient

   From the regression results, it was found that in the long run Exchange rate was impacting the inflation. This results was different with Achsani et al. (2010) that stated the exchange rate role in explaining inflation is not significant. In addition, in short run the exchange rate had significant impact with positive coefficient to inflation and in accordance with the proposed research hypothesis, the hypothesis of this research can be accepted.

2. MONEY SUPPLY Coefficient

   In long run, money supply was not significant towards inflation. This result goes along with the result of Mahendra (2016) that stated Money Supply was not significant toward inflation. Meanwhile in short run, the money supply had significant impact towards inflation. Because the results of the research indicated that money supply had positive effect on the inflation rate in accordance with the proposed research hypothesis, the research hypothesis can be accepted.

3. External Debt Coefficient

   In the long run, external debt did not have a significant effect on inflation. This result was in accordance with Hutapea (2007). In short run, external debt is significant with a positive influence on inflation in Indonesia. These results explained that a high external debt can increase the inflation rate.

4. Interest Rate Coefficient

   In long run, interest rate has no significant effect on inflation. This result goes along with Marseto (2014) that stated the fluctuation of inflation is temporary caused by specific event which is Ramadhan, Eid, and increase in CPI. Meanwhile in short run, the interest rate had significant effect on inflation with negative coefficient, meaning that the inflation can be reduced by increasing the interest rate. The results showed that the interest rate level had a positive effect on inflation in accordance with the proposed research hypothesis; thus, the research hypothesis was accepted.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

Based on the results of research on the effect of interest rates, foreign debt, exchange rate of rupiah against US Dollar, and exchange rate on the inflation rate in Indonesia between 01. 2010 – 12. 2020 using multiple linear regression analysis techniques, it can be concluded the following:

1. Exchange rate both in long run and short run had significant effect and positive coefficient toward inflation in Indonesia.
2. External Debt in long run had no significant effect on inflation in Indonesia, but in short run external debt had significant effect with positive coefficient toward inflation in Indonesia.
3. Interest rate in long run had no significant effect on inflation, meanwhile in short run the interest rate had significant effect on inflation with negative coefficient toward inflation.

4. Money Supply in long run had no significant effect on inflation, meanwhile in short run the money supply had significant effect on inflation with negative coefficient toward inflation.

5.2 Recommendations

Bank Indonesia as the central bank is expected to be careful when issuing policies to increase interest rates and to pay attention to the inflation rate that has been set. This is to fulfill the main objective of Bank Indonesia, namely to achieve and maintain a stable Rupiah value to encourage quality economic growth not only to attract Foreign Direct Investment to Indonesia. Given that, the independent variables in this resesarch were important in influencing the inflation rate in Indonesia. It is hoped that the results of this resaerch can be used as a reference for further research to develop this research by considering other variables which were not included in this research.

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APPENDICES

Appendix 1 Data of Dependent and Independent Variables

Period	Inflation (Percent)	Exchange Rate (Rupiah to USD)	Money Supply	External Debt (Million USD)	Interest Rate (Percent)
Jan-10	3.72 %	9365	2073859,77	178.041	6.5
Feb-10	3.81 %	9335	2066480,99	178.966	6.5
Mar-10	3.43 %	9115	2112082,7	180.834	6.5
Apr-10	3.91 %	9012	2116023,54	185.843	6.5
Mei-10	4.16 %	9180	2143234,05	180.344	6.5
Jun-10	5.05 %	9083	2231144,33	183.329	6.5
Jul-10	6.22 %	8952	2217588,81	188.650	6.5
Agu-10	6.44 %	9041	2236459,45	190.576	6.5
Sep-10	5.8 %	8924	2274954,57	194.349	6.5
Okt-10	5.67 %	8928	2308845,97	198.835	6.5
Nov-10	6.33 %	9013	2347806,86	196.052	6.5
Des-10	6.96 %	8991	2471205,79	200.050	6.5
Jan-11	7.02 %	9057	2436678,95	200.603	6.5
Feb-11	6.84 %	8823	2420191,14	204.561	6.75
Mar-11	6.65 %	8709	2451356,92	210.080	6.75
Apr-11	6.16 %	8574	2434478,39	216.799	6.75
Mei-11	5.98 %	8537	2475285,98	221.514	6.75
Jun-11	5.54 %	8597	2522783,81	222.816	6.75
Jul-11	4.61 %	8508	2564556,13	227.456	6.75
Agu-11	4.79 %	8578	2621345,74	230.452	6.75
Sep-11	4.61 %	8823	2643331,45	224.504	6.75
Okt-11	4.42 %	8835	2677786,93	222.828	6.5
Nov-11	4.15 %	9170	2729538,27	221.600	6
Des-11	3.79 %	9068	2877219,57	224.757	6
Jan-12	3.65 %	9000	2857126,93	231.333	6
Feb-12	3.56 %	9085	2852004,94	229.627	5.75
Mar-12	3.97 %	9180	2914194,47	228.761	5.75
Apr-12	4.5 %	9190	2929610,37	235.425	5.75
Mei-12	4.45 %	9565	2994474,39	237.622	5.75
Jun-12	4.53 %	9480	3052786,1	238.917	5.75
Jul-12	4.56 %	9485	3057335,75	241.788	5.75

Agu-12	4.58 %	9560	3091568,49	241.474	5.75
Sep-12	4.31 %	9588	3128179,27	243.649	5.75
Okt-12	4.61 %	9615	3164443,15	248.115	5.75
Nov-12	4.32 %	9605	3207908,29	251.121	5.75
Des-12	4.3 %	9670	3307507,55	251.200	5.75
Jan-13	4.57 %	9698	3268789,15	251.501	5.75
Feb-13	5.31 %	9667	3280420,25	253.298	5.75
Mar-13	5.9 %	9719	3322528,96	254.295	5.75
Apr-13	5.57 %	9722	3360928,07	257.046	5.75
Mei-13	5.47 %	9802	3426304,92	258.519	5.75
Jun-13	5.9 %	9929	3413378,66	257.980	6
Jul-13	8.61 %	10278	3506573,6	262.160	6.5
Agu-13	8.79 %	10924	3502419,8	259.181	7
Sep-13	8.4 %	11613	3584080,54	260.617	7.25
Okt-13	8.32 %	11234	3576869,35	263.531	7.25
Nov-13	8.37 %	11977	3615972,96	261.394	7.5
Des-13	8.38 %	12189	3730197,02	264.060	7.5
Jan-14	8.22 %	12226	3652349,28	271.295	7.5
Feb-14	7.75 %	11634	3643059,46	273.678	7.5
Mar-14	7.32 %	11404	3660605,98	276.897	7.5
Apr-14	7.25 %	11532	3730376,45	278.266	7.5
Mei-14	7.32 %	11611	3789278,64	285.145	7.5
Jun-14	6.7 %	11969	3865890,61	285.805	7.5
Jul-14	4.53 %	11591	3895981,2	292.183	7.5
Agu-14	3.99 %	11717	3895374,36	290.337	7.5
Sep-14	4.53 %	12212	4010146,66	293.681	7.5
Okt-14	4.83 %	12082	4024488,87	295.365	7.5
Nov-14	6.23 %	12196	4076669,88	294.743	7.75
Des-14	8.36 %	12440	4173326,5	292.579	7.75
Jan-15	6.96 %	12625	4174825,91	300.936	7.75
Feb-15	6.29 %	12863	4218122,76	300.565	7.5
Mar-15	6.38 %	13084	4246361,19	299.025	7.5
Apr-15	6.79 %	12937	4275711,11	300.498	7.5
Mei-15	7.15 %	13211	4288369,26	303.379	7.5
Jun-15	7.26 %	13332	4358801,51	305.284	7.5
Jul-15	7.26 %	13481	4373208,1	305.034	7.5

Agu-15	7.18 %	14027	4404085,03	304.544	7.5
Sep-15	6.83 %	14657	4508603,17	302.659	7.5
Okt-15	6.25 %	13639	4443078,08	303.776	7.5
Nov-15	4.89 %	13840	4452324,65	305.040	7,5
Des-15	3.35 %	13795	4546743,03	310.730	7.5
Jan-16	4.14 %	13846	4498361,28	310.737	4.25
Feb-16	4.42 %	13395	4521951,2	314.277	7
Mar-16	4.45 %	13276	4561872,52	318.344	6.75
Apr-16	3.6 %	13204	4581877,87	321.651	6.75
Mei-16	3.33 %	13615	4614061,82	316.999	6.75
Jun-16	3.45 %	13180	4737451,23	327.369	6.5
Jul-16	3.21 %	13094	4730379,68	327.370	6,5
Agu-16	2.79 %	13300	4746026,68	325.640	5.25
Sep-16	3.07 %	12998	4737630,76	328.853	5
Okt-16	3.31 %	13051	4778478,89	326.209	4.75
Nov-16	3.58 %	13563	4868651,16	318.192	4.75
Des-16	3.02 %	13436	5004976,79	320.006	4.75
Jan-17	3.49 %	13343	4936881,99	323.824	4.75
Feb-17	3.83 %	13347	4942919,76	324.863	4.75
Mar-17	3.61 %	13321	5017643,55	329.382	4.75
Apr-17	4.17 %	13327	5033780,29	331.720	4.75
Mei-17	4.33 %	13321	5126370,15	335.353	4.75
Jun-17	4.37 %	13319	5225165,76	336.799	4.75
Jul-17	3.88 %	13323	5178078,75	341.012	4.75
Agu-17	3.82 %	13351	5219647,63	342.494	4.5
Sep-17	3.72 %	13492	5254138,51	344.561	4.25
Okt-17	3.58 %	13572	5284320,16	341.705	4.25
Nov-17	3.3 %	13514	5321431,77	347.633	4.25
Des-17	3.61 %	13548	5419165,05	352.469	4.25
Jan-18	3.25 %	13413	5351684,67	356.558	4.25
Feb-18	3.18 %	13707	5351650,33	355.564	4.25
Mar-18	3.4 %	13756	5395826,04	357.452	4.25
Apr-18	3.41 %	13877	5409088,81	356.319	4.25
Mei-18	3.23 %	13951	5435082,93	357.592	4.75
Jun-18	3.12 %	14404	5534149,83	353.807	5.25
Jul-18	3.18 %	14413	5507791,75	356.472	5.25

Agu-18	3.2 %	14711	5529451,81	359.814	5.5
Sep-18	2.88 %	14929	5606779,89	357.090	5.75
Okt-18	3.16 %	15227	5667512,1	358.043	5.75
Nov-18	3.23 %	14339	5670975,24	370.844	6
Des-18	3.13 %	14481	5760046,2	375.430	6
Jan-19	2.82 %	14072	5644985,17	381.387	6
Feb-19	2.57 %	14062	5670777,57	385.776	6
Mar-19	2.48 %	14244	5747246,82	386.246	6
Apr-19	2.83 %	14215	5746731,77	388.018	6
Mei-19	3.32 %	14385	5860508,75	384.940	6
Jun-19	3.28 %	14141	5908509,27	388.758	6
Jul-19	3.32 %	14026	5941133,1	393.087	5.75
Agu-19	3.49 %	14237	5934561,51	391.090	5.5
Sep-19	3.39 %	14174	6004277,17	393.448	5.25
Okt-19	3.13 %	14008	6026908,5	400.006	5
Nov-19	3%	14102	6074377,02	400.972	5
Des-19	2.72 %	13901	6136551,81	403.336	5
Jan-20	2.68 %	13662	6046650,66	410.325	5
Feb-20	2.98 %	14234	6116495,24	406.486	4.75
Mar-20	2.96 %	16367	6440457,39	388.867	4.5
Apr-20	2.67 %	15157	6238266,99	399.744	4.5
Mei-20	2.19 %	14733	6468193,5	403.783	4.5
Jun-20	1.96 %	14302	6393743,8	408.736	4.25
Jul-20	1.54 %	14653	6567725,02	409.779	4
Agu-20	1.32 %	14554	6731760,25	412.892	4
Sep-20	1.42 %	14918	6748574,03	408.685	4
Okt-20	1.44 %	14690	6780844,54	413.271	4
Nov-20	1.59 %	14128	6817456,68	416.321	3.75
Des-20	1.68 %	14105	6900049,49	417.527	3.75

Appendix 2 Stationary and Cointegration

Stationary at Level

Variable	ADF Value t-Statistic	MacKinnon Critical Value			Information
		1%	5%	10%	
Y	-2.715278	-3.481217	-2.883753	-2.578694	Not Stationary
X1	-0.829372	-3.481217	-2.883753	-2.578694	Not Stationary
X2	-0.597340	-3.480818	-2.883579	-2.578601	Not Stationary
X3	-3.145772	-3.565641	-2.456213	-2.754115	Stationary
X4	1.286954	3.486064	2.885863	-2.579818	Not Stationary

Stationary in First Different

Variable	ADF Value t-Statistic	MacKinnon Critical Value			Information
		1%	5%	10%	
Y	-8.549244	-3.481623	-2.883930	-2.578788	Stationary
X1	-16.40368	-3.481217	-2.883753	-2.578694	Stationary
X2	-12.10754	-3.481217	-2.883753	-2.578694	Stationary
X3	-12.16872	-3.481217	-2.883753	-2.578694	Stationary
X4	-8.108508	-3.486064	-2.885863	-2.579818	Stationary

Cointegration

Null Hypothesis: ECT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistics	Prob.*
Augmented Dickey-Fuller test statistics		-3.176195	0.0237
Test critical values:	1% level	-3.480818	
	5% level	-2.883579	
	10% level	-2.578601	

*MacKinnon (1996) one-sided p-values.

Error Correction Model

Long Term ECM

Dependent Variable: INFLATION
Method: Least Squares
Date: 11/13/21 Time: 07:00
Samples: 1 132
Included observations: 132

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-43.99151	13.29504	-3.308867	0.0012
LNEXHANGERATE	5.842446	2.862339	2.041144	0.0433
LNMONEYSUPPLY	2.419935	5.406930	0.447562	0.6552
LNEXTERNALDEBT	-3.363098	5.985740	-0.561852	0.5752
INTERESTRATE	-0.127475	0.158859	-0.802443	0.4238

R-squared	0.455334	Mean dependent var	4.559394
Adjusted R-squared	0.438179	SD dependent var	1.798407
SE of regression	1.347991	Akaike info criterion	3.472250

Sum squared resid	230.7691	Schwarz criterion	3.581447
Likelihood logs	-224.1685	Hannan-Quinn Criter.	3.516623
F-statistics	26.54257	Durbin-Watson stat	0.190723
Prob(F-statistic)	0.000000		

Short Term ECM

Dependent Variable: INFLATION
Method: Least Squares
Date: 11/13/21 Time: 06:43
Sample (adjusted): 2 132
Included observations: 131 after adjustments

Variable	Coefficient	Std. Error	t-Statistics	Prob.
C	-61.46159	6.595183	-9.319164	0.0000
LNEXCHANGERATE	10.56665	1.465353	7.210990	0.0000
LNMONEYSUPPLY	-8.110649	2.731207	-2.969621	0.0036
LNEXTERNALDEBT	7.313748	2.993832	2.442939	0.0160
INTERESTRATE	-0.288404	0.079897	-3.609694	0.0004
ECT(-1)	0.923217	0.046427	19.88527	0.0000

R-squared	0.867941	Mean dependent var	4.581374
Adjusted R-squared	0.862658	SD dependent var	1.787423
SE of regression	0.662412	Akaike info criterion	2.058863
Sum squared resid	54,84878	Schwarz criterion	2.190551
Likelihood logs	-128.8555	Hannan-Quinn Criter.	2.112374
F-statistics	164.3090	Durbin-Watson stat	1.364867
Prob(F-statistic)	0.000000		