Determinants of Macroeconomic Factors Affecting Foreign Exchange Reserves in Indonesia

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Determinants of Macroeconomic Factors Affecting Foreign Exchange Reserves in Indonesia

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ABSTRACT
The research aims to analyze the influence of macroeconomic variables on foreign exchange reserves in Indonesia. This cannot be separated from the fact that the accumulation of foreign exchange reserves is very closely related to the condition of macroeconomic variables. The research uses time-series data from 2019:M01-2023:M12. The multiple linear regression approach is applied to determine the influence of the independent variable on the dependent variable in the foreign exchange reserve model. The research results show that imports, inflation and the exchange rate have a negative effect on foreign exchange reserves. An increase in these three variables will reduce foreign exchange reserves. The money supply has a positive effect on the exchange rate. The OLS approach produces a BLUE regression, indicating that the model is free from classical assumption problems. The implication of the research is that the government needs to implement an expansionary fiscal policy by increasing government spending, encouraging exports and maintaining the stability of the rupiah exchange rate against the US dollar. Stable domestic economic conditions will have an impact on increasing the accumulation of foreign exchange reserves.

Keywords*: Fiscal policy; Indonesia; Macroeconomics.*

INTRODUCTION

Foreign exchange reserves represent the foreign currency holdings of a central bank, critical for facilitating international transactions (Suripto et al., 2023). Beyond this, they serve as a vital financial buffer, enabling countries to manage economic instability, navigate financial stress, and meet international payment obligations (Cancer & Sentosa, 2023). Given the increasing global and domestic economic uncertainties in recent years, maintaining adequate foreign exchange reserves has become paramount. The greater a country's accumulated foreign exchange reserves, the greater its ability to engage in international trade, which, in turn, strengthens the value of its currency and fosters domestic stability (Dash, A.K., Shylajan, 2017). However, macroeconomic conditions play a crucial role in the accumulation of these reserves, with a direct link existing between macroeconomic variables and a country's foreign exchange reserves (Azar & Aboukhodor, 2017). The foreign exchange reserves play pivotal role on domestic economy and assessing the environment to increase the foreign exchange reserves is fundamental to further analysis, such as import has the impact to foreign exchange reserves, Garg et al (2024) argued that country with large trade deficit (import > export) will need to use their foreign exchange reserves to pay the trade deficit and led to reduce their country reserves. Thabana & Fasanya (2024) state higher inflation in a country led to depreciation its currency and reduce purchasing power will impact on foreign exchange reserves through domestic currency has less attractive and reduce its value. Broad money as a proxy for purchasing power on real sector and financial sectors (Melati & Kurniawan, 2023), if country has less purchasing power led to reduce production and consumption and has impact to decrease on growth. Decreasing on economic growth accumulating on reduce foreign exchange reserve through trade deficit and depreciation on exchange rate (Kashif et al., 2024).

From 2019 to 2023, Indonesia's foreign exchange reserves have demonstrated relative stability, as shown in Figure 1. While the highest value occurred in September 2021 (146870.0 billion USD) due to tax revenues, service revenues, and government foreign debt withdrawal, the lowest value was recorded in January 2019 (120075.0 billion USD) due to foreign debt payments. Overall, the reserves have remained relatively stable around 120,000.00 in the last 3 years amidst increasing global uncertainty (Kurniawan et al., 2022).

Macroeconomic conditions play an important role in the accumulation of foreign exchange reserves, Krušković (2023) argues that macroeconomic conditions play an important role in the accumulation of foreign exchange reserves. The relationship between foreign exchange reserves and exchange rates has a strong causal relationship, a country's stable exchange rate can create stable foreign exchange reserves, but if the exchange rate experiences fluctuations it can also create fluctuating foreign exchange reserves (He, 2010). However, there is debate regarding the exchange rate regime, a system of fixed or partially fixed foreign exchange rates, foreign exchange reserves used as a means to maintain the exchange rate (Krušković, 2023). Study from Adhitya (2021) stated that the free floating exchange rate regime causes high exchange rate fluctuations which can have an impact on fluctuations in foreign exchange reserves. Chaudhry & Hasan (2008) state that in fixed and freely floating exchange rates in developing countries there is cointegration between the exchange rate and foreign exchange reserves. Almost all countries, regardless of their economic size, keep their foreign exchange reserves in the form of US dollars. This cannot be separated from the fact that international trade transactions mostly use US dollars.

The importance of foreign exchange reserves has been a subject of study in Indonesia. Prior research indicates that exports play a significant role in bolstering foreign exchange reserves (Suripto et al., 2023), while domestic interest rates influence these reserves as well (Cancer & Sentosa, 2023; Juliansyah et al., 2020). This research updates the topic by applying of foreign interest rate, in recent years that domestic interest rates have been under pressure from foreign interest rates, especially the FED, Afonso et al (2024) states transmission of US interest rate has stronger effect on domestic interest rate on emerging markets countries and foreign exchange reserves help counteract the transmission of US interest rate. Narayan & Smyth (2006) influence foreign exchange reserves in the short and long term, this shows that differences in domestic versus overseas interest rates play an important role in the accumulation of foreign exchange reserves which have an impact on exchange rate fluctuations. Kurniyawati & Kurniawan (2021) state that the rupiah exchange rate against the dollar influences the stability of foreign exchange reserves. The update in this research is to apply the FED's international interest rate to determine its effect on Indonesia's foreign exchange reserves. This cannot be separated from the fact that after Covid-19, the FED's interest rate showed a significant increase with the aim of normalizing prices in the United States, which affected the value of exchange rate so that the domestic exchange rate becomes more volatile which can have an impact on foreign exchange reserves. This research analyzes the influence of foreign interest rates on foreign exchange reserves in Indonesia.

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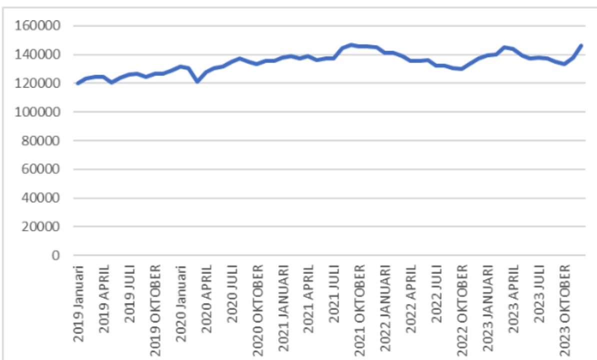

Figure 1. Foreign Exchange Reserves

METHOD

This research uses monthly time-series data from 2019:M01-2023:M12. The research uses data sources from Bank Indonesia, the Central Statistics Agency and the Ministry of Trade. The research uses the foreign exchange reserves variable as the dependent variable. Independent variables include imports, exports, inflation, the Fed's foreign interest rates, money supply (M2) and exchange rates. This research uses the Ordinary Least Square (OLS) method, which functions to determine the influence of the independent variable on the dependent variable. Garg et al (2024) argued that country with large trade deficit (import > export) will need to use their foreign exchange reserves to pay the trade deficit and led to reduce their country reserves. Thabana & Fasanya (2024) state higher inflation in a country led to depreciation its currency and reduce purchasing power will impact on foreign exchange reserves through domestic currency has less attractive and reduce its value. Adhitya (2021) stated that the free floating exchange rate regime causes high exchange rate fluctuations which can have an impact on fluctuations in foreign exchange reserves. Afonso et al (2024) states transmission of US interest rate has stronger effect on domestic interest rate on emerging markets countries and foreign exchange reserves help counteract the transmission of US interest rate. The OLS method equation is as follows:

$$Y = \beta_0 + \beta_1 LOGX_1 + \beta_2 X_2 + \beta_3 LOGX_3 + \beta_4 LOGX_4 + \beta_5 X_5 + \beta_6 LOGX_6 + \varepsilon_t$$

Where Y are foreign exchange reserves, X_1 is import, X_2 is inflation, X_3 is the rupiah exchange rate against the US dollar, X_4 is the export value, X_5 is the money supply, X_6 is the FED interest rate β_0 is the constanta value, $\beta_1 - \beta_6$ is the coefficient value of the independent variable, ε_t is the error term. To fulfill the BLUE concept (*best linier unbiased estimator*) then the research applies classical assumption tests consisting of normality, autocorrelation, multicollinearity and heteroscedasticity. The advantages of the regression method in research are generalizing and extracting from certain data patterns, being able to acquire knowledge even though there is no certainty, and being able to carry out calculations in parallel so that the process is shorter (Amrin, 2016).

RESULT AND DISCUSSION

Table 1 shows that the average value of Y is 134484.2 billion with a maximum value of 146870.0 billion which occurred in September 2021. Then the minimum value was 120075.0 which occurred in January 2019, this occurred because of the condition of foreign exchange reserves which were used for international financing and used to pay foreign debt government is due. Variable X3 or exchange rate has a mean value of 14626.85 then a maximum value of 16367.00, a minimum value of 13662.00. The maximum value of the exchange rate occurred in 2020 in March and the minimum value occurred in 2020 in January. This increase in the exchange rate can influence various factors such as exports in Indonesia, apart from that it can also increase the quality of competitiveness of domestic products that are exported abroad. This causes domestic product prices to become more competitive in the international market and the competitiveness of domestic products also increases.

Table 1. Descriptive Statistics

Variable	Mean	Max	Min	Std Dev
Y	134484.2	146870.0	120075.0	7019.005
X1	16076.34	22150.60	8438.630	3355.236
X2	2.859153	5.950000	1.320000	1.263575
X3	14626.85	16367.00	13662.00	552.7701
X4	18128.88	27928.70	2199.000	5065.378
X5	2.004	5.500	0.2500	1.9256
X6	7172259	8826531	5644985	950413.4

Source: *data processed*

The highest export value (X4) will be in August 2022, which will be largely supported by exports of non-oil and gas goods and oil and gas goods. Indonesia certainly already has data on the main destination markets for each product, such as non-oil and gas exports. Judging from the high export growth in August 2022, Indonesia's main destination markets are China, India and Malaysia. Exports of products in the year studied showed high numbers, this of course has a very positive effect on foreign exchange reserves. The higher the export figure, the higher the foreign exchange reserves Indonesia has. Likewise, when export figures decrease, foreign exchange reserves also decrease. Variable X5 (Foreign Interest Rate) shows that the average value is 2.00427, the max value is 5.500000 and the minimum value is 0.250000. The highest foreign interest rates will occur in 2023 from July to December.

Discussion

Table 2 shows that imports have a negative effect on foreign exchange reserves. If imports increase by 1 percent, foreign exchange reserves will decrease by 0.046 percent. This negative influence occurs when imports increase, there will be a trade balance deficit, this will have an impact on reducing foreign exchange reserves. The size of a country's accumulated foreign exchange reserves is determined by trade activities (exports and imports). The higher the level of exports, the higher the foreign exchange reserves will be, but if imports are higher, this will result in a decrease in foreign exchange reserves (Asmanto & Suryandari, 2008). These findings are in line with research by Rianda (2020) that imports have a negative effect on foreign exchange reserves due to the trade balance deficit which has an impact on reducing foreign exchange reserves. Suripto et al (2022) argue that high domestic demand can increase imports, if the value of imports is higher than exports, it can erode foreign exchange reserves to finance import activities which will result in a decrease in foreign exchange reserves. According to Dash, A.K., Shylajan (2017) that short-term vulnerability can occur if the ratio of foreign exchange reserves to imports is high.

Table 2. Estimation of Multiple Regression

Variables	Coefficient
C	10.659 (12.43)***
X1	-0.046 (-2.25)**
X2	-0.011 (-3.56)***
X3	-0.664 (-6.12)***
X4	-0.004 (0.43)
X5	-0.003 (-1.44)
X6	0.505 (13.29)***
Diagnostic Tools	
Normality Test	0.229
Autokorelasi	0.132
Heteroskedasticity	0.183
Multicolinearity	Free

Source: *data processed*

X2 is an inflation variable that shows the coefficient value of -0.011 and a t-count value is greater than t-table, so the inflation variable affects the foreign exchange reserves. A negative coefficient value indicates that an increase in inflation of 1 percent will reduce foreign exchange reserves by 0.011 percent. The increase in inflation is caused by the demand for goods increasing, the demand for goods increases causing prices to increase. Increased demand for goods causes demand for imports to increase. Increased imports can reduce foreign exchange reserves. The research results are in line with research by Khusnatun & Hutajulu (2021) which states that high inflation triggers domestic goods prices to increase, so that demand for imports will increase which can reduce foreign exchange reserves. Eulia et al (2021) also stated that inflation has a negative effect on foreign exchange reserves in Indonesia and Malaysia.

The exchange rate variable influences foreign exchange reserves. A negative exchange rate variable coefficient value indicates that if there is depreciation in the exchange rate it will reduce foreign exchange reserves by 0.664 percent. Adhitya (2021) states that the free-floating exchange rate regime causes high exchange rate fluctuations which can have an impact on fluctuations in foreign exchange reserves. The higher the rate of exchange rate depreciation will make transactions through international trade more expensive; this will have an impact on reducing foreign exchange reserves. In line with research. Chaudhry & Hasan (2008) state that freely floating exchange rates in developing countries have an influence on foreign exchange reserves. Suripto et al (2022) also found that the exchange rate had a negative effect on foreign exchange reserves in Indonesia. Exchange rate stability will have an impact on the stability of foreign exchange reserves.

M2 as the money supply in a broad sense shows a positive influence on foreign exchange reserves. An increase in the money supply by 1 percent will increase foreign exchange reserves by 0.51 percent. An increase in the money supply can be associated with an increase in public income, an increase in government spending and an increase in private sector spending, so that the accumulation of these 3 sectors can encourage the country's fiscal capacity to increase the accumulation of foreign exchange reserves. Apart from that, increasing government spending and increasing private sector spending can increase exports, thereby creating a trade balance surplus which has an impact on increasing foreign exchange reserves. These findings are in line with research by Sayoga & Tan (2017) that the money supply has a positive effect on foreign exchange reserves.

The international interest rate variable shows a t-count value that is smaller than the t-table, this indicates that international interest rates have no effect on foreign exchange reserves. External or global influences occur indirectly on domestic economic conditions, in international interest rates, changes in the Fed's interest rates will be responded to by changes in domestic interest rates. The export variable also shows a t-value that is smaller than the t-table, which indicates that exports have no effect on foreign exchange reserves. With the multiple regression approach, it shows that the model is BLUE, it can be seen that the regression model is free from classical assumption problems.

CONCLUSIONS

The research uses monthly time-series data from 2019:M01-2023:M12 and foreign exchange reserves can be used as an important financial buffer to cope with economic instability, deal with financial stress, and meet international payment obligations. Macroeconomic conditions play an important role in the accumulation of foreign exchange reserves. The stability of domestic economic conditions has an impact on the stability of the accumulation of foreign exchange reserves in a stronger position. The research aims to determine the influence of macroeconomic variables consisting of imports, inflation, exchange rates, exports, Fed interest rates and money supply (M2) on the accumulation of foreign exchange reserves in Indonesia.

The research results show that imports, inflation and the exchange rate have a negative effect on foreign exchange reserves. An increase in imports, inflation and exchange rate depreciation of 1 percent will reduce accumulated foreign exchange reserves by 0.05 percent, 0.01 percent and 0.66 percent. The money supply has a positive effect on the exchange rate. An increase in the money supply by 1 percent will increase foreign exchange reserves by 0.51 percent. The OLS approach produces BLUE regression, because the model is free from classical assumption problems.

The implication of the research is that the government needs to implement an expansionary fiscal policy by increasing government spending, encouraging exports and maintaining the stability of the rupiah exchange rate against the US dollar. Stable domestic economic conditions will have an impact on increasing the accumulation of foreign exchange reserves. The limitation of the research is applying the OLS method which cannot estimate the short and long term of the independent variable on the dependent variable. The limitation of the study that OLS model do not apply short and long run estimation and for the future research can develop the dynamic model for time-series data.

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