

The Impact of Monetary Policy in Influencing Foreign Exchange Reserves in Indonesia

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ABSTRACT

This study aims to analyze the effect of exchange rates, Foreign Direct Investment (FDI), export value, foreign debt, money supply, and inflation on Indonesia's foreign exchange reserves in the period 2004 to 2024. Given The significance of foreign exchange reserves for the stability of the nation's economy, this study uses multiple regression analysis to identify factors that affect Indonesia's foreign exchange reserves. This study uses an econometric methodology and is quantitative in nature, by uses data time series, coefficient correlation dan determination. The analysis's findings demonstrate that Indonesia's foreign currency reserves are significantly impacted by all investigated factors at the same time, including the exchange rate, foreign data investment, export value, foreign debt, money supply, and inflation. The coefficient of determination (R^2) of 0.97 indicates that 97% of the variation in Indonesia's foreign exchange reserves can be explained by the six independent variables in this regression model. The export value and FDI variables have the most dominant influence, while inflation and foreign debt tend to have a smaller but still significant influence. This study makes a significant contribution to our understanding of the variables affecting Indonesia's foreign exchange reserves and can serve as a guide for policymakers as they develop measures that promote foreign exchange reserve stability, which can bolster Indonesia's economic resilience in the face of international difficulties.

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1. INTRODUCTION

Foreign investment has been an important pillar in the Indonesian economy since 2004. In 2004, the realization of Foreign Direct Investment (PMA) was recorded at around USD 6.08 billion [1]. Over time, the Indonesian government has implemented various policies to improve competitiveness and attract more foreign investment. These initiatives include offering financial incentives, enhancing infrastructure, and streamlining rules. In 2022, Indonesia recorded a record foreign direct investment (FDI) of IDR 654.4 trillion (around USD 45.6 billion), with the base metals and mining sectors being the main recipients[2]. This positive trend continued in 2023, where the realization of foreign direct investment reached IDR 328.9 trillion (around USD 22.8 billion) in the first quarter, an increase of 16.5% compared to the same period the previous year. In the third quarter of 2024, investment realization was recorded at IDR 431.48 trillion, an increase of 15.24% compared to the same period the previous year. The downstream sector contributed IDR 91.51 trillion or 21.2% of the total realization in that quarter [3]. However, challenges such as complex regulations, difficult land acquisition, and uneven infrastructure remain obstacles to attracting more foreign investment. The government continues to strive to overcome these obstacles through various reforms and policies that support the investment climate[4] Overall, despite the challenges, Indonesia shows a positive trend in attracting foreign investment

from 2004 to 2024, with the manufacturing and downstream sectors being the main focus in efforts to increase added value and job creation.

Central banks and monetary authorities have foreign assets known as foreign exchange reserves, that can be used to finance balance of payments imbalances, stabilize exchange rates, and as a means of international payment [5]. Foreign exchange reserves are very important for Indonesia. The quantity of assets held by a nation's central bank or monetary authority in the form of foreign currencies and other financial instruments is referred to as its foreign exchange reserves. These foreign exchange reserves are used to pay for imports of goods and services, pay foreign debts, and maintain the stability of the domestic currency exchange rate, therefore when foreign exchange reserves decrease, it can be a serious warning signal about the health of the Indonesian economy as a country that adheres to an open economy.

The decline in Indonesia's foreign exchange reserves is certainly a concern for foreign investment in the international economy[1]. This factor has experienced a declining phenomenon caused by the government's need to maintain the stability of the rupiah exchange rate and pay foreign debts that are due, therefore an analysis is needed to state that foreign exchange reserves are still adequate to support the resilience of the external sector and maintain macroeconomic stability and the financial system.

One of the key measures of a nation's economic health is its foreign exchange reserves. According to [6], As an asset owned by the central bank in the form of foreign currency, foreign exchange reserves have a major role in maintaining economic stability, especially in facing global economic shocks, maintaining exchange rate stability, and financing international transactions. Exchange rates, foreign direct investment (FDI), export value, foreign debt, money supply, inflation, and other macroeconomic factors all have an impact on Indonesia's foreign exchange reserve dynamics.



Figure 1. Indonesia's Foreign Exchange Reserves 2004-2024 (Source: BPS Data Processed (2025))

Although there has been a variable development tendency, overall, there has been a notable increase in Indonesia's foreign exchange reserves between 2004 and 2024. Foreign exchange reserves increased from 32.6 billion USD (2004) to 51.7 billion USD (2008). This increase was relatively stable and was likely driven by export growth and foreign investment. In 2009, foreign exchange reserves jumped to 70.6 billion USD and continued to increase to 112.8 billion USD in 2011. This surge was most likely influenced by the influx of foreign investment (PMA) as well as economic policies that support a trade surplus. In 2013, foreign exchange reserves decreased to 99.4 billion USD, but rose again to 117.2 billion USD in 2016. This decline could be caused by the current account deficit and the need to pay foreign debt. Foreign exchange reserves increased from 130.2 billion USD (2017) to 145.9 billion USD (2021) This can be linked to Bank Indonesia's policy in maintaining exchange rate stability and increasing exports and foreign capital flows. After dropping to USD 135 billion in 2022, foreign exchange reserves rose again to USD 155.7 billion in 2024, setting a record high. This increase could be influenced by post-pandemic economic recovery and tighter monetary policies to maintain economic stability. In general, Indonesia's foreign exchange reserves have shown an increasing trend with some fluctuations, reaching a peak of USD 155.7 billion in 2024. This reflects solid economic growth, but also indicates challenges in maintaining a balance between exports, investment, and foreign debt obligations. According to research from (Fitria et al., 2021). That foreign exchange reserves are influenced by several factors such as exchange rates, inflation and foreign investment.

The rupiah exchange rate against foreign currencies has a significant impact on foreign exchange reserves. Exchange rate appreciation can increase Indonesia's purchasing power against foreign currencies, thus potentially strengthening foreign exchange reserves. On the other hand, because market intervention is

required to preserve currency rate stability, rupiah depreciation may put more strain on foreign exchange reserves.

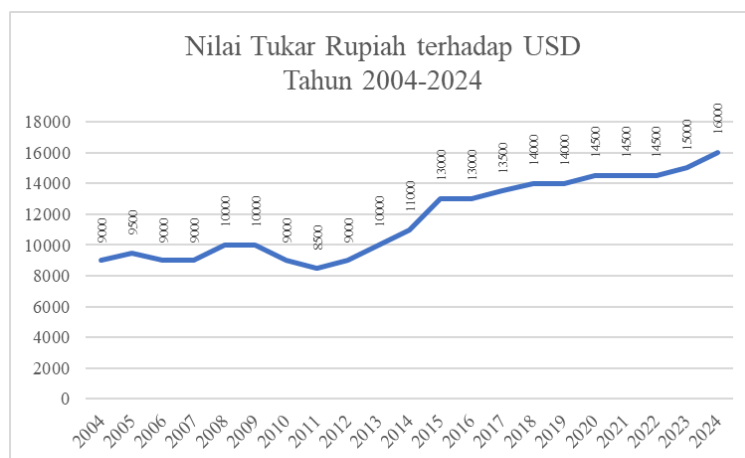


Figure 2. IDR/USD Exchange Rate 2004-2024

Source: BPS Data Processed (2025)

Changes in monetary policy in developed countries, especially the United States, as well as global commodity prices, greatly affect capital flows and the Rupiah exchange rate. The COVID-19 pandemic in 2020 put significant pressure on the Rupiah, which had weakened to IDR16,650 per USD in March 2020. Although it had strengthened along with the economic recovery, in April 2024, the Rupiah weakened again to IDR16,000 per USD, influenced by US inflation data and global financial market dynamics. Considering the findings of the study, (Bunga Uli, 2016) it is conclude that while the rupiah exchange rate has a major negative impact on Indonesia's foreign exchange reserves, export value and foreign debt have a positive and considerable impact as well.

Moreover, foreign direct investment (FDI) contributes to the growth of foreign exchange reserves. The country's foreign exchange supply will rise as a result of the influx of foreign investment, whether it be direct investment or long-term capital. The higher the realization of FDI, the greater the potential for increasing foreign exchange reserves, especially through the export sector and economic activities based on foreign investment. The entry of direct foreign investment increases foreign exchange reserves through capital flows. This is consistent with research. From, [7] In particular, it is known from the regression's findings that exports significantly and favorably impact Indonesia's foreign exchange reserves, [8] The assets a nation possesses in the form of foreign currency that are utilized in international trade are known as foreign exchange reserves.

2. Literature review

Export value is the main source of foreign exchange earnings for Indonesia. The amount of foreign exchange that enters the economy increases with the export value. However, dependence on certain commodities in exports can cause volatility in foreign exchange reserves, especially when commodity prices experience sharp fluctuations in the global market. Good export performance increases foreign exchange reserves, while high imports can reduce them. Based on the research from [9], Indonesia's foreign exchange reserves are known to be significantly impacted negatively by the rupiah exchange rate, but positively by foreign debt and export value.[10] According to the results of the studies that have been done, interest rates, inflation, and exports have little bearing on foreign exchange reserves. Nonetheless, foreign exchange reserves are significantly impacted by partial external debt[11]. Inflation has a significant positive effect, foreign debt has a significant positive effect, GDP has an insignificant negative effect, remittances have an insignificant negative effect, and exchange rates have a significant negative impact on Indonesia's foreign exchange reserves.

Foreign exchange reserves and foreign debt are related. In the short term, foreign loans—both public and private—may boost the supply of foreign currency; however, in the long run, the need to pay off debt and interest in foreign currencies can deplete foreign exchange reserves. As a result, maintaining the stability of foreign exchange reserves requires careful consideration of foreign debt management. Research based on this study's findings [1], demonstrates how the BI Rate and foreign debt have an impact on foreign exchange reserves. The amount of money circulating in the economy can affect foreign exchange reserves through its

impact on inflation and the exchange rate. An increase in the amount of money circulating that is not balanced by economic growth can cause inflationary pressures that have the potential to weaken the exchange rate and reduce foreign exchange reserves. Inflation is another factor that can affect foreign exchange reserves. High inflation rates can reduce export competitiveness, increase import costs, and reduce investor confidence in economic stability, which in turn can reduce foreign exchange inflows to Indonesia. The study's findings (Firmansyah & safrizal, 2018) assert that foreign exchange reserves are impacted by inflation. When [12], The study's findings indicate that foreign debt has a negative and significant impact on economic growth both in the short and long term, while foreign exchange reserves have a short-term positive effect that is negligible but has a long-term positive impact. Meanwhile, foreign investment has no effect on Indonesia's economic growth either in the short or long term. The impact of these factors on Indonesia's foreign exchange reserves from 2004 to 2024 will be examined in this study. It is anticipated that this analysis would help policymakers develop suitable plans to preserve the sustainability and stability of Indonesia's foreign exchange reserves.

3. METHOD

This study uses an econometric methodology and is quantitative in nature. The purpose of this study is to examine how Indonesia's foreign exchange reserves were affected by exchange rates, foreign investment (PMA), export value, foreign debt, money supply, and inflation between 2004 and 2024. The Central Statistics Agency (BPS), Bank Indonesia (BI), the Ministry of Finance, and other economic periodicals are among the official sources from which this study draws its secondary data. The data used is annual data from 2004 to 2024. The variables of this research consist of dependent variables, namely Indonesia's Foreign Exchange Reserves (billion USD) and Independent Variables: Rupiah Exchange Rate against the US Dollar (IDR/USD) Foreign Direct Investment (PMA): Domestic foreign investment (billion IDR) Export Value (NE): Total Indonesian exports (billion USD) Foreign Debt (ULN): Total Indonesian foreign debt (billion USD) Money Supply (JUB): Total money supply in the economy (billion IDR) and Inflation (INF): Percentage change in the consumer price index (CPI).

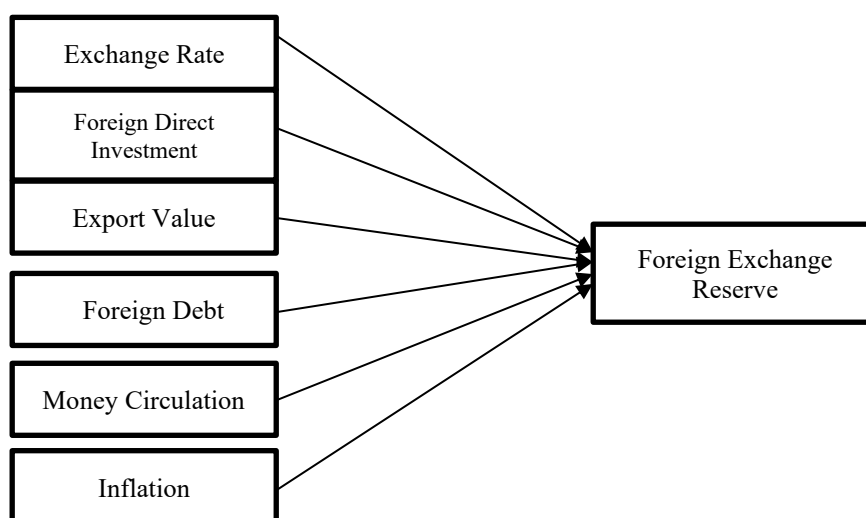


Figure 3. Diagram Flow Framework of Thinking

Hypothesis

H₀: The exchange rate, PMA, export value, foreign debt, money supply, and inflation have no discernible effects on Indonesia's foreign currency reserves between 2004 and 2024.

H₁: The exchange rate, PMA, export value, foreign debt, money supply, and inflation all have a big impact on Indonesia's foreign currency reserves between 2004 and 2024.

Data analysis method utilizing Ordinary Least Squares (OLS) and multiple linear regression analysis. [13]To test the validity of the regression model, several statistical tests were conducted F-test: To determine whether the model as a whole is significant. T-test: To determine whether each independent variable is significant. Classical Assumption Test: To make sure the model satisfies the OLS assumptions, multicollinearity, heteroscedasticity, autocorrelation, and normality tests are performed. The data will be processed using Eviews 10 statistical software to conduct regression analysis and classical assumption tests to ensure the accuracy of the research model [14]. The results of the analysis will be interpreted based on the regression coefficient value, statistical significance, and determination coefficient (R-squared) to see the extent to which the independent variables are able to explain variations in Indonesia's foreign exchange reserves.

Conclusions will be drawn based on the results of the analysis and compared with previous theories and research.

4. RESULTS AND DISCUSSION

Time series data spanning 20 years (2004–2024) were employed in this investigation. The study's secondary data sources are reports from the Central Statistics Agency (BPS) and Bank Indonesia (BI). Exports, inflation, foreign investment, currency rates, and foreign debt are the independent factors in this study, whilst foreign exchange reserves are the dependent variables.

Table 1. Data Analysis

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	80.54323	115.2637	6.698774	0.0461
INFLATION	-0.822592	0.658861	-1.248507	0.2323
AMOUNT_OF_MONEY_IN_CIRCULATION	1.53E-05	3.23E-05	0.473190	0.6434
EXPORT_VALUE	-0.184695	0.096411	-1.915717	0.0761
EXCHANGE RATE	-0.013673	0.003128	-4.370546	0.0006
PMA	0.000232	0.000475	0.487694	0.6333
FOREIGN DEBT	1.794994	1.118480	1.604850	0.1308
R-squared	0.974626	Mean dependent variable		101.8905
Adjusted R-squared	0.963752	SD dependent var		39.21102
SE of regression	7.465386	Akaike information criterion		7.119633
Sum squared residual	780.2477	Black criterion		7.467807
Log likelihood	-67.75614	Hannan-Quinn criter .		7.195195
F-statistic	89.62487	Durbin-Watson stat		1.807430
Prob(F-statistic)	0.000000			

Source : data process

3.1. Coefficient Correlation

The constant's coefficient is 80.54323. This demonstrates that foreign exchange reserves are predicted to be 80.54323 if all other independent variables (such as inflation, money supply, export value, exchange rate, foreign direct investment, and external debt) are zero. Because the probability value (0.049) is less than 0.05, this value is significant. The coefficient of -0.013673 indicates that every one unit change in the exchange rate will cause a decrease in foreign exchange reserves by 0.013673. Its very small probability value (0.0006) indicates that this variable has a significant effect on foreign exchange reserves. According to the coefficient of 0.000232, foreign exchange reserves will rise by 0.000232 for every unit growth in foreign investment. There is no discernible impact of PMA on foreign exchange reserves, according to the likelihood value of 0.6333. The coefficient of -0.184695 indicates that a one-unit increase in export value is associated with a decrease in foreign exchange reserves of 0.184695. The probability value of 0.0761 is slightly greater than 0.05, indicating that although not very significant, there is a possibility of a negative relationship between export value and foreign exchange reserves. According to the coefficient of 1.794994, foreign exchange reserves will rise by 1.794994 for every unit increase in foreign debt. Foreign debt has no discernible impact on foreign exchange reserves, according to the likelihood value of 0.1308. According to the coefficient 1.53E-05, foreign exchange reserves will rise by 1.53E-05 for every unit increase in the money supply. However, this variable has no discernible impact on foreign exchange reserves because the probability value (0.6434) is higher than 0.05. According to the coefficient of -0.822592, foreign exchange reserves fall by 0.822592 units for every unit increase in inflation. Foreign exchange reserves are not significantly impacted by inflation, nevertheless, as the likelihood value of 0.2323, which is higher than 0.05, indicates.

3.2. Coefficient Determination

The exchange rate, PMA, export value, foreign debt, money supply, and inflation all have a big impact on Indonesia's foreign currency reserves between 2004 and 2024. Based on the independent variables employed, this model can account for approximately 97.46% of the variation in foreign exchange reserves, according to the R-squared value of 0.974626. our demonstrates the high predictive potential of our model. Despite changes for the number of independent variables, the model is still good, according to the Adjusted R-squared value of 0.963752. The total model is very significant and able to explain the variability in the data, as indicated by the F-statistic value of 89.62487 with a probability of 0.000000 (significant at the 1% level). There are no significant issues with autocorrelation in the model residuals, according to the Durbin-Watson score of

1.807430. The exchange rate has a considerable impact on foreign exchange reserves, as evidenced by its extremely low probability value (0.0006). Since their probability values are higher than 0.05, other variables—like inflation, the money supply, foreign debt, and foreign investment—are not significant. This regression model shows good power in explaining the variation in foreign exchange reserves, with a high R-squared (97.46%). Although some variables are not significant, the very high F-statistic value indicates that the model is quite good overall. Overall, this model provides a solid understanding of the factors influencing foreign exchange reserves, with the exchange rate being the most significant variable in the model.

3.3. Variance Inflation Factors

Variance Inflation Factor (VIF) is used to measure the extent to which multicollinearity (a strong linear relationship between independent variables) affects the coefficient estimates in a regression model. [15] High multicollinearity can cause instability in coefficient estimates and reduce the reliability of the analysis results.

Table 2. VIF data

Variable	Coefficient Variance	Uncentered VIF	Centered VIF
C	13285.72	5006.104	NA
INFLATION	0.434097	6.596785	2.103114
AMOUNT_OF_MONEY_IN_CIRCULATION	1.04E-09	4634.321	536.8994
EXPORT_VALUE	0.009295	111.9878	10.75802
EXCHANGE RATE	9.79E-06	529.0182	22.96698
PMA	2.26E-07	69.00184	14.40783
FOREIGN DEBT	1.250998	15704.82	432.0987

Source : Data Process

VIF Inflation: 2.103114 This is a reasonable VIF value (below 10), indicating that there is no significant multicollinearity problem with the inflation variable. [16] Some variables in this model show very high multicollinearity (such as money supply, exchange rate, and external debt), which may disrupt the stability of the regression model. This may lead to errors in the interpretation of the coefficients, as some independent variables are strongly correlated. It is advisable to consider reducing the number of variables or merging highly correlated variables.

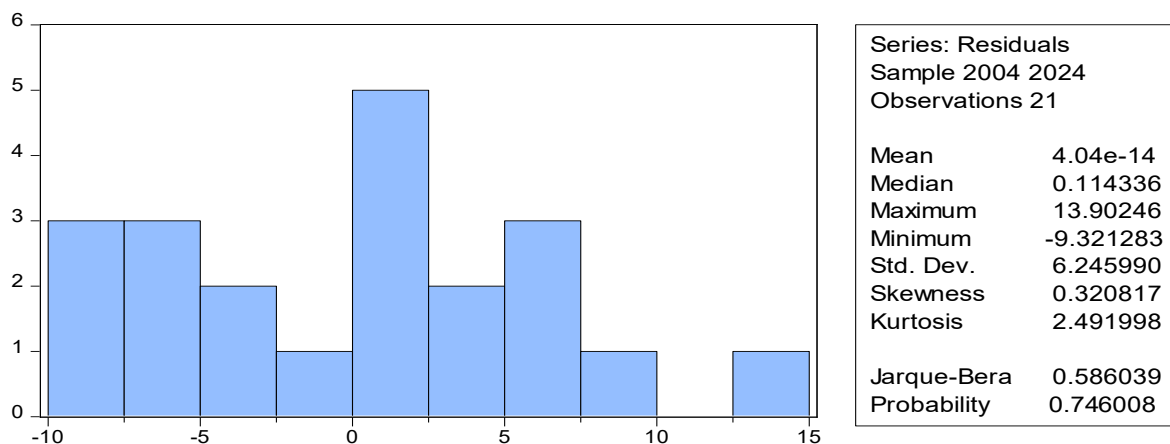


Figure 3. Variance Inflation Factors (Source : Data Process)

When the residual variance (model error) varies along the range of the independent variables, this is known as heteroskedasticity [17]. A regression model's heteroskedasticity can be checked using the Breusch-Pagan-Godfrey test.

Table 3. Breusch Pagan Godfrey test

F-statistic	0.089983 Prob. F(6,14)	0.9964
Obs *R-squared	0.779778 Square Prob. (6)	0.9926
Scaled explained SS	0.258539 Square Prob. (6)	0.9997

Source : Data Process

F-statistic: 0.089983 with Prob. F(6,14) = 0.9964 The very high probability value (0.9964) indicates that there is no significant heteroscedasticity problem in this model. That is, the residual variance can be considered

constant across the data range, indicating that the assumption of homoscedasticity (constant variance) is met. Obs*R-squared: 0.779778 with Prob. Chi-Square(6) = 0.9926 The probability value of 0.9926 indicates that the chi-square test also found no evidence of heteroscedasticity. Scaled explained SS: 0.258539 with Prob. Chi-Square(6) = 0.9997 these results also support the conclusion that there is no heteroskedasticity problem. Based on the test result, this model does not show any heteroscedasticity, which means that the residual variance can be considered constant, and the assumption of homoscedasticity in this regression model is not violated.

Table 4. Breusch Godfrey Correlation LM test

F-statistic	1.092126Prob. F(2,12)	0.3666
Obs *R-squared	3.233818Square Prob. (2)	0.1985

Source : Data Process

Godfrey-Breusch Autocorrelation (serial correlation) in a regression model is tested using the Serial Correlation LM Test [18]. Autocorrelation occurs when the residuals (errors) of a regression model are not independent, that is, the residuals in one period are related to the residuals in the previous period. Autocorrelation can indicate problems in the model, which can affect the accuracy of predictions and the significance of the coefficients. F-statistic: 1.092126 with Prob. F(2,12) = 0.3666 The probability value of 0.3666 is greater than 0.05, which indicates that there is no strong evidence of autocorrelation in the residuals of this model. In other words, there is no significant autocorrelation problem at the 5% significance level.

The absence of troublesome autocorrelation patterns in the model is shown by a bigger probability and a smaller F-statistic [13]. Prob. Chi-Square(2) = 0.1985 with Obs*R-squared = 3.233818 According to the chi-square test, there is no indication of autocorrelation in this model because the probability value of 0.1985 is higher than 0.05. Stated differently, this finding lends credence to the idea that the model does not have a serious autocorrelation issue. According to the Breusch-Godfrey test results, this regression model does not have an autocorrelation issue because the chi-square and F-statistic probability values are both higher than 0.05. As a result, we can say that the residuals in this model are independent and that the regression model's premise that there is no autocorrelation is not broken.

5. CONCLUSION

The purpose of this study is to examine how different macroeconomic variables have affected Indonesia's foreign currency reserves from 2004 and 2024. The final model, which was created using the Least Squares regression method, demonstrates that some variables significantly affect foreign exchange reserves while others have little statistical impact. The exchange rate has a considerable impact on foreign exchange reserves other variables like inflation, the money supply, foreign debt, and foreign investment—are not significant. Not same with [11]. Indonesia's foreign exchange reserves are significantly impacted negatively by exchange rates, with negligible negative effects from remittances, significant positive effects from foreign debt, significant positive effects from inflation, and negligible negative effects from GDP. These are the conclusions drawn from the analysis of the variables influencing Indonesia's foreign exchange reserves. Same with [10] According to the results of the studies that have been done, interest rates, inflation, and exports have little bearing on foreign exchange reserves. Nonetheless, foreign exchange reserves are significantly impacted by partial external debt.

With a coefficient of -0.013673 and a significance level of 0.0006, the regression findings demonstrate that the exchange rate significantly affects foreign currency reserves. This suggests that Indonesia's foreign exchange reserves will decline if the value of the rupiah relative to other currencies rises. According to economic theory, currency depreciation can raise import prices, which lowers foreign exchange reserves. This is consistent with this hypothesis as all factors by determination test The exchange rate, PMA, export value, foreign debt, money supply, and inflation all have a big impact on Indonesia's foreign currency reserves between 2004 and 2024. With a significance level of 0.0761 and a negative coefficient of -0.184695, the export value variable is nearly at the 10% threshold. This demonstrates how a rise in exports may lead to a fall in foreign exchange reserves, which is probably the result of a greater capital flight than an increase in export-derived foreign exchange profits. On the other hand, with probability values above 0.05, the variables of inflation, money supply, foreign debt, and foreign investment (PMA) do not significantly affect foreign exchange reserves. Despite having a positive coefficient of 1.794994, foreign debt's influence is too weak to draw statistical conclusions, as indicated by the significance level of 0.1308.

The model has very excellent explanatory power, as evidenced by its R-squared value of 0.974626 and Adjusted R-squared of 0.963752, which show that it can account for roughly 97% of the variation in foreign

currency reserves. Furthermore, the overall significance of this regression model in explaining the fluctuation in foreign exchange reserves is indicated by the F-statistic value of 89.62487 with a probability of 0.000000.

The results of the diagnostic test indicated that there was no autocorrelation issue based on the Breusch-Godfrey Serial Correlation LM Test and no heteroscedasticity issue based on the Breusch-Pagan-Godfrey test. Based on these data, it can be argued that policies that maintain exchange rate stability will considerably affect foreign exchange reserves. In addition, although exports are the main source of foreign exchange earnings, their impact on foreign exchange reserves needs to be further analyzed by considering other factors such as foreign debt payments and capital outflows. Therefore, economic policies that focus on exchange rate stabilization and more strategic export management can help maintain optimal foreign exchange reserves for the Indonesian economy.

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