

THE EFFECT OF CHANGES IN SOURCES OF STATE REVENUE FROM EXCHANGE RESERVES: AN ANALYSIS STUDY IN INDONESIA

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Abstract

This study examines the impact of imports, exports, exchange rates, and inflation on Indonesia's foreign exchange reserves. Based on the test results of exchange rate, export, import, and inflation variables, it is known that these variables have a significant effect on foreign exchange reserves. Secondary data from the International Monetary Fund, Central Bureau of Statistics, and Bank Indonesia, time series data from 1991-2022. Variables are analyzed using Ordinary Least Square. The resulting export variable has an influence coefficient of 0.625618 which indicates that if exports increase by 1%, foreign exchange reserves will increase by 0.625618%. The import variable has an influence coefficient of -0.191346, which means that if imports increase by 1%, foreign exchange reserves will decrease by 0.191346%. The exchange rate variable has an influence coefficient of 0.004454, meaning that if the exchange rate increases by 1%, the foreign exchange reserves will increase by 0.004454%. The inflation variable has an influence coefficient of -0.883752, meaning that if inflation increases by 1%, foreign exchange reserves will decrease by 0.883752%. Based on these findings, Indonesia should increase the value of exports, reduce the value of imports, stabilize the exchange rate by buying domestic products, and refrain from importing products.

Keywords: Import, export, exchange rate, foreign exchange reserves

Introduction

Indonesia is a country that is active in international trade activities. Through international trade, each country can exchange its resources [1] [2]. Carrying out international business activities requires financing these international transactions [3]. The source of funds used to finance international transactions comes from foreign exchange reserves [4]. According to the management of foreign exchange reserves, Bank Indonesia can conduct various forex transactions & obtain loans [5]. The more foreign currency owned by the government & citizens, the stronger the ability to manage international economic and financial affairs and domestic currency [6] [7].

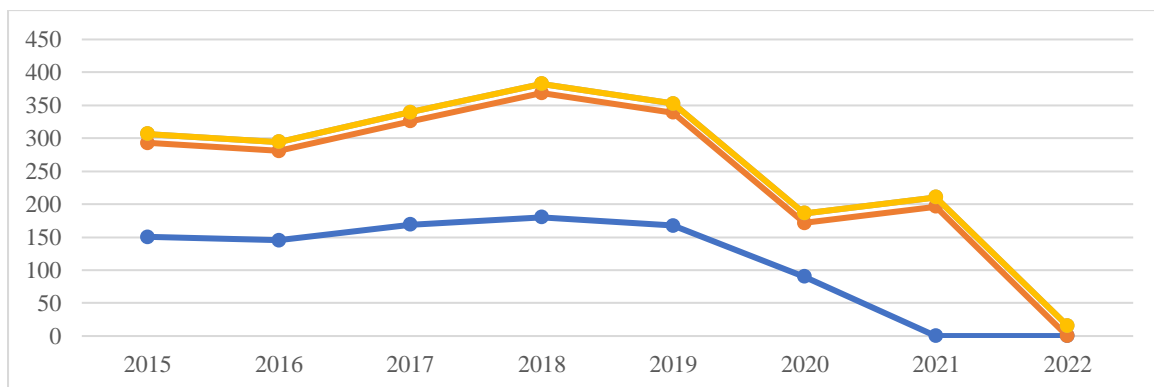


Figure 1. Development of Indonesia's Foreign Reserve (million US\$) in 2015-2022

Based on [Figure 1], it can be explained the changes in Indonesia's foreign reserves from 2015 to 2022. In developing countries, international trade drives economic growth [8]. One of the supporting efforts is the increase in export prices. Export is an economic activity that sells domestic products to foreign markets. This has a negative impact not only on exports & imports but also on foreign exchange reserves. Imports increase because the country cannot produce its domestic needs [10]. The value of the rupiah is one of the factors that determine the size of the government's foreign exchange. When a country's exchange rate rises, its trading partners' export prices fall & imports rise [11]. When inflation increases, a country's goods cannot compete in

the international market & exports decline [12]. Inflation can also stimulate speculation where excess market liquidity leads to increased national consumption, stimulating consumption & misallocation of goods [13].

Table 1. Indonesian Export, Import, Exchange Rate and Inflation in 2015-2022

Year	Export (million US\$)	Import (million US\$)	Exchange Rate (Rupiah)	Inflation (%)
2015	150.366	142.695	13.795	3,35
2016	145.186	135.653	13.436	3,02
2017	168.828	156.986	13.548	3,61
2018	180.013	188.711	13.746	3,13
2019	167.683	171.276	13.800	2,72
2020	90.090	81.368	14.653	1,54
2021	231.609,5	196.19	14.269	1,87
2022	291.904,3	237.447,1	15.731	5,51

Source: Data from the Central Bureau of Statistics and Bank Indonesia several years published

Table 1 shows the changes in inflation, exports, imports, and foreign exchange from 2015 to 2022. Imports were higher than exports in 2018 & 2019. This is due to the weak exchange rate & high inflation. And in 2015, 2016, 2017, 2020, 2021, and 2022 the export value is higher than the import value due to the strong rupiah exchange rate and low or stable inflation.

Methods

This study uses secondary data from the International Monetary Fund (IMF), the Central Bureau of Statistics and Bank Indonesia. The data is time series data from 1991-2022. The variables used in this study are export & import exchange rates & inflation of Indonesians' foreign exchange reserves. The statistical analysis used in this study is Ordinary Least Square (OLS). The model used is math:

$$\text{LnFER} = \beta_0 + \beta_1 \text{LnEXP}_t + \beta_2 \text{LnIMP}_t + \beta_3 \text{Ln ER}_t + \beta_4 \text{INF}_t + e_t \quad (i)$$

Note:

- FER : Foreign Exchange Reserves
- EXP : Export
- IMP : Import
- ER : Exchange Rate
- INF : Inflation

For a proposed regression model to show a valid correlation equation or BLUE (Best Linear Unbiased Estimator), the model must meet the expectations of the simple classical least squares basis. These assumptions are no autocorrelation multicollinearity & no heteroskedasticity. Therefore, scientific hypothesis testing should be conducted [14]. Normality test using Broach Bera autocorrelation test using Brusch-Godfrey test, Heteroscedasticity test using White test & Model specification test using Ramsey reset. The research framework can be seen visually in Figure 2.

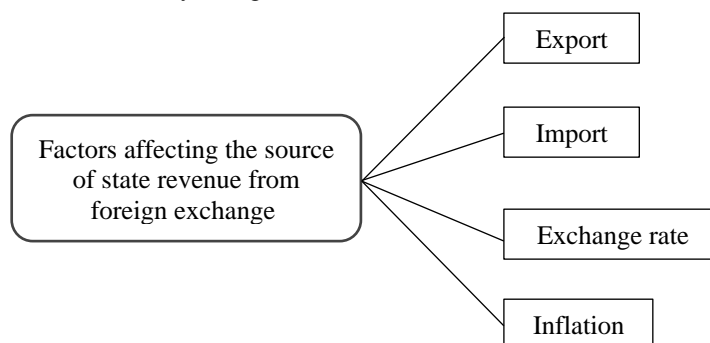


Figure 2. The Research Framework

Results and Discussion

According to the International Monetary Fund, foreign exchange reserves are assets that are externally available and controlled by the monetary authority to directly finance external payment imbalances and indirectly regulate the magnitude of such imbalances through interventions in the foreign exchange market to influence exchange rates, rates, money, and other purposes. In simple terms, foreign exchange reserves are assets held by a country's monetary authority, usually denominated in foreign currency, which is used to manage external payment imbalances and stabilize currency exchange rates (BHAKRI & VERMA, 2020; Purba et al., 2021) [22] [23]. Data on foreign exchange reserves is available from the Central Bureau of

Statistics in millions of US dollars from 1991 to 2022. The minimum foreign exchange reserve in 1991 was \$10,358 million & the maximum amount was \$144,905.38 million in 2021, according to export data from Statistics Indonesia in millions of US. Indonesia's exports fluctuated from 1991 to 2022, and export volume increased. The growth of export volume between 2016 and 2018 was relatively high. In 2016, the export volume amounted to 145186 billion USD, to 168.828 billion USD in 2017, and in 2018 it rose to 180.013 USD. The decline in exports occurred due to the sluggish global economy and falling commodity prices, reducing demand for goods from Indonesia. Indonesia's import value of 156,986 million USD in 2017 increased to 188,711 million USD in 2018 and decreased in 2019 to 171,276 million USD and 81,368 million USD in 2020. The decline in the number of imports in 2020 was due to non-traditional imports of oil and gas falling due to international market conditions that have not improved since OPEC's production cut measures. Exchange Rates are obtained from Bank Indonesia data using rupiah units. The highest exchange rate was Rp. 16,800 in 1998, which was the weakening of the rupiah exchange rate and the high inflation rate of 77.60%. Inflation data is obtained from the Central Bureau of Statistics using percentage units.

Table 2. Econometric Model Results

Dependent Variable: FER
Method: Least Squares
Date: 08/01/23 Time: 08:28
Sample: 1991 2022
Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.13342	7.370211	-2.460366	0.0206
EXPORT	0.625618	7.73E-05	8089.774	0.0000
IMP	-0.191346	0.000115	-1657.989	0.0000
ER	0.004454	0.000757	5.885534	0.0000
INF	-0.883752	0.242346	-3.646656	0.0011
R-squared	1.000000	Mean dependent var		8874.090
Adjusted R-squared	1.000000	S.D. dependent var		34692.53
S.E. of regression	16.98869	Akaike info criterion		8.645574
Sum squared resid	7792.625	Schwarz criterion		8.874596
Log likelihood	-133.3292	Hannan-Quinn criter.		8.721488
F-statistic	32318677	Durbin-Watson stat		0.819361
Prob(F-statistic)	0.000000			

Source: SPSS Processed Data

Based on Table 2 it is explained that this study uses the model:

$$\text{LnFER} = -18.13342 + 0.625618 \text{ LnEXP} - 0.191346 \text{ LnIMP} + 0.004454 \text{ LnER} - 0.883752 \text{ INF} + \text{et} \quad (\text{ii})$$

We use the F test to determine whether there are model parameters. Hypothesis formation $H_0: \beta_1 - \beta_2 - \beta_3 - \beta_4 = 0$; There is no model used & $H_0: \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$; There is a model used. The test criterion is H_0 reject if the probability or statistical significance is $F \leq \alpha$. However, H_0 was accepted if there is a probability or statistical significance of $F > \alpha$. Based on Table 2, the probability value of the F statistic is $(0.0000 \leq 0.10)$. Then H_0 is rejected which means the model used exists. The R column shows the percentage explained by the dependent variable versus independent variables that are not exposed by other variables, while the requirement for the coefficient of determination must be in the range $(0 \leq R^2 \leq 1)$. The results of R^2 $(0 \leq 1,000000 \geq 1)$ or 100.0% are obtained, which means that the variables of Exports, Imports, Exchange Rates, and inflation on Foreign Exchange Reserves have an influence of 1,000, which means that all the variables studied have a very strong effect.

The validity test measures the magnitude of the influence of the independent variable on the dependent. The hypothesis formulation is $H_0: \beta_1 = 0$; independent variable i has no significant effect on $H_A: \beta_1 \neq 0$; independent variable i is very significant. Then the test criteria are H_0 rejected if $t_i < \alpha$ and H_0 accepted if $t_i > \alpha$ statistical significance is accepted. The results of the effect validity test (t-test) can be seen in Table 3.

The Effect validity test is used to measure how much influence each independent variable has on the dependent variable.

Table 3. Influence Validity Test Results (t test)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-18.13342	7.370211	-2.460366	0.0206
EXPORT	0.625618	7.73E-05	8089.774	0.0000
IMP	-0.191346	0.000115	-1657.989	0.0000
ER	0.004454	0.000757	5.885534	0.0000
INF	-0.883752	0.242346	-3.646656	0.0011

Source: SPSS Processed Data

From the effect validity test (t-test) in Table 3, it can see that the export, import, exchange rate & inflation variables obtained significant t results, <0.05, the conclusion that the variables of exports, imports, exchange rates, and inflation have a significant effect on foreign exchange reserves. Exports have effects of 0.625618. The relationship pattern between foreign exchange reserves & exports is logarithm-logarithm. If exports increase by 1%, foreign exchange reserves will increase by 0.625618% & vice versa. If exports decrease by 1%, foreign exchange reserves will decrease by 0.625618%, the relationship between export & foreign exchange subsidies when carrying out export activities. A country earns money in foreign exchange. Earnings, commonly known as foreign exchange, are one of the sources of revenue for a country. Therefore, the decline in exports will also reduce foreign exchange reserves.

According to the ordinary least square analysis, exports have a significant effect on foreign exchange reserves. This is consistent with the fact that exports have a positive & significant effect on foreign exchange reserves [10]. Indonesia exports goods to other countries in large quantities & Indonesia earns foreign exchange from importing countries so that the more goods Indonesia exports, the more foreign exchange it generates. The increase in foreign exchange also affects the increase in national income.

Import is the purchase of goods abroad which are intended either for resale or for own use which involves trade between countries from foreign countries to domestic (Clements et al., 2020) [24]. The import variable has an influence coefficient of -0.191346. The relationship pattern between foreign exchange reserves & imports is logarithmic. This means that if imports increase by 1%, foreign exchange reserves will increase by -0.191346% & vice versa if imports decrease by 1%, foreign exchange reserves will decrease by -0.191346%. Relationship between import subsidies & foreign exchange The Indonesian government will use foreign exchange subsidies to offset those imports when carrying out import activities. Indonesia's foreign exchange reserves will be lower as more imports increase.

Based on ordinary least squares analysis imports affect foreign exchange reserves. research results are inversely proportional research findings that imply that foreign exchange reserves have no effect [10]. Rising import values are often caused by high public demand for goods and services (Tuzzahara Alkaf, 2020) [21]. Indonesia has a condition where natural resources are abundant so that raw materials can be obtained cheaply followed by cheap labor costs. This situation can attract investors to invest in Indonesia.

The exchange rate variable has an influence coefficient of 0.004454. The relationship pattern between foreign exchange reserves & the exchange rate is logarithm-logarithm. This means that if the exchange rate increases by 1%, foreign exchange reserves will increase by 0.004454% & vice versa if the exchange rate decreases by 1%, foreign exchange reserves will decrease by 0.004454%. The relationship between the exchange rate & foreign exchange reserves, the stronger the currency's value the higher the exchange rate travels. This situation is the result of the countries great ability to undertake international economic & financial affairs. Additionally strong currency exchange trading indicates that the country's economy is strengthening & thus earning more foreign exchange.

From the Analysis of Ordinary Least Squares, the exchange rate has a positive and significant effect on foreign exchange reserves. The results of this study are the same as a study conducted in 2018 [15] which argued that the exchange rate affects foreign exchange reserves. A stable exchange rate can strengthen economic conditions by increasing foreign exchange reserves. This occurred after there was encouragement from investors who were interested in investing in the domestic market which would become a current account surplus so that foreign exchange reserves would also increase. In addition, the exchange rate is a dominant yardstick for determining the correct allocation of resources. Converting foreign prices to domestic prices is a dominant external criterion for resource allocation. In addition, exchange rates affect foreign trade and thus directly affect a country's economic growth (Azwali, 2020; Revindo et al., n.d.) [16] [19]. The impact of the exchange rate can be said to be negative in the future if it is not offset by an increase in the value of exports (Sumiyati, 2020) [17]

The inflation variable has an effect coefficient of -0.883752, and the relationship pattern between foreign exchange reserves and inflation is logarithmic-linear. If inflation rises by 1%, foreign exchange reserves will decrease by 0.883752%, and vice versa. If inflation decreases by 1%, foreign exchange reserves will increase

by 0.883752%. If the price of goods and services rises the ratio of inflation to foreign exchange reserves will hinder economic activity in the country. Obviously, a country needs more foreign currency to conduct overseas transactions. Therefore, the money supply must be adjusted as necessary to keep the exchange rate stable and prevent further increases in inflation.

Inflation has a negative and significant effect on foreign exchange reserves based on ordinary least squares analysis. The results show that inflation has a negative and significant effect on foreign exchange reserves [10] and is also caused by worsening inflation expectations and excessive monetary growth (Matthews & Ong, 2022) [20]. Changes in the value of these currencies affect the demand for deposits and foreign exchange reserves for commercial banks. An increase in the value of a currency due to rising prices for goods and services can increase the inflation rate.

Conclusions

Based on the test results on the variables of exchange rates, exports, imports & inflation, these variables have a significant effect on foreign exchange reserves. The export variable has a coefficient of influence of 0.625618 significantly that if exports increase by 1%, foreign exchange reserves will increase by 0.625618%. The import variable has an effect coefficient of -0.191346, that if imports increase by 1%, foreign exchange reserves will decrease by 0.191346%. The exchange rate variable has an influence coefficient of 0.004454 significantly that if the exchange rate increases by 1%, foreign exchange reserves will increase by 0.004454%. The inflation variable has an influence coefficient of -0.883752, which means that if inflation increases by 1%, foreign exchange reserves will decrease by 0.883752%. Based on these findings, Indonesia is required to increase the value of its exports, reduce the value of imports, stabilize the exchange rate by buying domestic products and refraining from imported products (Rodrik & Kennedy, 2006) [18].

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