Analysis of Export Import Exchange Rate Inflation and Foreign Debt on Indonesia's Foreign Exchange Reserves in 1985 – 2022

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Abstract. Foreign exchange reserves are crucial components of a nation's economic framework. Their magnitude can be influenced by variables such as exports, imports, and other factors. This study aims to examine how export, import, inflation, exchange rates, and foreign debt impact foreign exchange reserves. Additionally, it explores the cointegration relationships among these variables in relation to foreign exchange reserves. The research utilizes secondary data in the form of time series spanning from 1985 to 2022. The analysis employs Autoregressive Distributed Lag (ARDL) methodology using Eviews 12. The findings indicate that exports, imports, exchange rates, and foreign debt significantly influence foreign exchange reserves.

Keywords: Export, Import, Inflation, Exchange Rate, Foreign Debt, Foreign Exchange Reserves.

1. Introduction

The state can be said to be successful if the state is able to realize a fair, prosperous and peaceful state, there is one indicator to support the success of the state in realizing this is by improving development in the economic sector. The development of the national economy can be carried out if there are indicators in supporting development so that it can be maximally realized. The basis for this development can originate domestically through taxes and domestic investments, while internationally, it comes in the form of foreign exchange reserves.

Foreign exchange reserves are certainly related to international trade, economic globalization which results in open economic trade between countries, brings an impact on the creation of an international economy. The country's financial sector will grow in facilitating technological innovation by having a reserve fund for projects that innovate [1]. The demand of countries around the world is largely met through international trade. Foreign exchange is required for international trade. According to [2]. Trade between countries is referred to as international

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trade, and includes imports and exports. Every country's economy relies on international trade to improve the living standards of its citizens.

The creation of international trade arises from a country's need for commodities that the country is still unable to produce. Trade between countries is referred to as international trade, and includes both imports and exports. Every country's economy relies on international trade to improve the standard of living of its citizens. Since a country cannot fulfill all its needs on its own, trading with other countries is essential. To ensure that there is no surplus or shortage of resources anywhere in the world, international trade allows all countries to exchange the resources they have with each other. Due to limited resources and production processes, Indonesia is one of the countries that conducts international trade.

For Indonesia to engage in international trade activities, it is essential to maintain adequate foreign exchange reserves to serve as financing sources for conducting transactions on the global stage. The level of a country's ability to conduct international trade is indicated by its foreign exchange reserves, which are also used as a barometer to assess the strength and weakness of a country's economic fundamentals [3]. According to Salvantore in [4] A country's liquid and valuable assets that are accepted as legal tender for use in cross-border transactions and payments are known as international reserves Limited foreign exchange reserves can pose challenges to a country's economy [5].

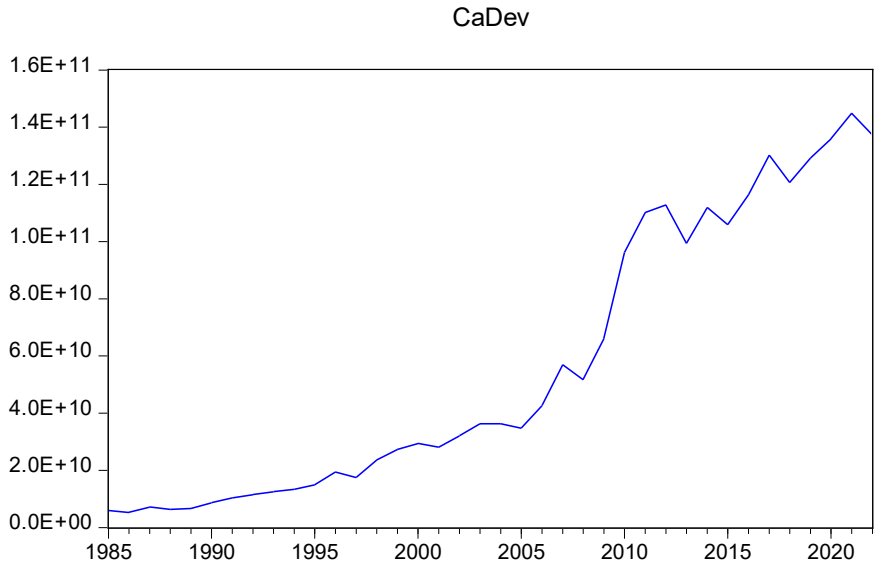

Figure 1. Graph of Foreign Exchange Reserves 1985-2022

Source: World Bank (processed), 1985-2022)

The development of foreign exchange reserves in 1985-2023 experienced significant growth, but the average economic growth of Indonesia experienced instability where in 1998 to 1999

Indonesia's foreign exchange reserves fell by -77.52% due to the country's economy which was in a monetary crisis and inflation which reached 77.53%, this was classified as severe inflation. The development of foreign exchange reserves did not experience extreme fluctuations until 2006. In 2008, foreign exchange reserves again experienced a drastic decline, this time worth -52.81% due to the global crisis that hit the United States and other affected countries, including Indonesia. This condition causes foreign exchange reserves to only be able to cover foreign debt and finance imports for 4.4 months compared to 6.79 months previously. Research conducted by [6] stated that the decline in residential prices due to the impact of the global crisis reduced the purchasing power of the community, which was reflected in the drastic decline in the inflation rate in 2006-2008. The growth of foreign exchange reserves experienced a significant increase between 2009 and 2011. In 2010, there was the largest growth in foreign exchange reserves, which amounted to 45.54%. The growth of foreign exchange reserves again experienced a reduction in 2012 to reach -133.81%. This was caused by a decrease in current account receipts.

The growth of foreign exchange reserves increased in 2013 thanks to bond receipts which are almost equivalent in value to foreign currency. Thus, foreign exchange reserve receipts depend not only on the current account but also on bond receipts. After experiencing a surplus of USD 0.02 billion in the previous year, foreign exchange reserves decreased again in 2014 and ended with a deficit of USD 0.42 billion The declining non-oil and gas trade balance caused the decline. Data from 2018 to 2020 shows a decline in foreign exchange reserves by a monthly average of US$ 2 billion in 2018. this condition is caused by the high cost of imports and funding the repayment of government foreign debt. Economic growth declined further in 2020, reaching -2.07%. This is due to the Covid-19 pandemic and social constraints that have limited Indonesia's economic activity. The 2020 crisis also caused inflation to be at its lowest point, there was a sizable gap between price increases and the speed of inflation [6] In 2022, Indonesia's economic growth rate is expected to increase by 5.31%, greater than the growth rate in 2021 which was only 3.70%. The growth is due to an increase in the proportion of exports to imports. Indonesia's economic development is increasingly showing its integration with the global economy even though it is still classified as a developing country[7].

Foreign exchange reserves are vital for evaluating a country's economic fundamentals and act as a safeguard against domestic economic and financial crises. Maintaining adequate foreign exchange reserves is crucial to promoting macroeconomic and monetary stability in a country. [4] In addition to encouraging international trade activities, foreign exchange reserves also serve to maintain the resilience of the currency value of the country's wealth [8] Because of the ongoing instability reduction in Indonesia's foreign exchange reserves, the nation's economy own slowed down, and the value of the rupiah has depreciated further. As a result of diminished foreign exchange availability, there will be a notable rise in imports to meet domestic demands. The development of the Indonesian economy is increasingly not integrated with the global economy even though it is still classified as a developing country, so in this case it can encourage sustainable economic growth.

One method of acquiring foreign exchange reserves is through exports. Should imports surpass exports, foreign exchange reserves will decrease. The aggregate of a nation's foreign exchange reserves is generally shaped by capital movements and trade dynamics, which include both imports and exports. The possibility of a country conducting international trade with other countries increases with the size of the country's foreign exchange reserves [9]. One of the primary means by which a country can increase its foreign exchange reserves is through exporting goods and services. Therefore, the objectives of Indonesia's foreign exchange reserves policy are to maintain strong economic conditions, encourage exports, limit imports, and improve market stability and foreign exchange rates [10].

Exports and foreign exchange reserves are closely interconnected. When a country engages in exporting goods and services, it earns foreign currency, which becomes a significant source of income. The connection between exports and foreign exchange reserves is rooted in the reality that exports generate revenue for the country through the acquisition of foreign currency. If exports decline, foreign exchange reserves will be affected accordingly, whereas an increase in exports will lead to growth in foreign exchange reserves [11]. Indonesia's exports were the lowest in 2020 at U$D 163,91.8 million due to the COVID-19 pandemic. When exports decline, international sales transactions decrease, leading to a corresponding reduction in incoming foreign exchange reserves. This observation aligns with findings from research [12] states that exports affect foreign exchange reserves positively and significantly.

In addition to exports, foreign exchange reserves are also influenced by other factors, namely imports. Foreign exchange reserves are crucial for facilitating imports, as substantial amounts of foreign currency are necessary to conduct import transactions, therefore this relationship is very important for import activities to occur. A country's insufficient domestic production necessitates importing goods and services from other nations, thereby resulting in imports. In paying for a good or service, one uses foreign money that comes from foreign exchange reserves [13].

In 2020 to 2021 there was an increase in imports of goods. Whereas previously there was a decrease in imports from 2018 to 2020. The highest number of imports occurred in 2021, which amounted to U$ 196,190. research conducted by [14] states that imports of goods in the short term have a negative effect and in the long term have a positive effect.

Another factor that can affect foreign exchange reserves is inflation. The price of a country's products and services will increase with high inflation [5]. Inflation within a country causes an increase in the prices of goods and services domestically. This phenomenon can cause delays in economic activity in a country because prices in the country are higher than prices abroad. So the country will need more foreign exchange to conduct economic transactions with other countries [15].

According to [16] Prices of domestic goods and services will rise as a result of the high inflation rate, thereby hindering economic progress. Therefore, to maintain exchange rate stability and slow down the rate of inflation, the amount of money in circulation must match demand. The resulting trade balance will cause the country's foreign exchange reserves to decrease. In a study conducted by [17] The results show that inflation has a positive and significant effect on foreign exchange reserves.

In addition to exports and imports, inflation according to [39] The condition of a country's exchange rate is greatly influenced by its foreign exchange reserves. The greater the availability, the more capable a country is of conducting financial and economic operations on a global scale, thus strengthening the value of its currency. According to [5] A country's economy becomes stronger and has the potential to generate more foreign exchange when its currency exchange rate is higher. A country's foreign exchange reserves will decrease if the value of the rupiah continues to fall. Due to import-related operations in Indonesia, when the rupiah exchange rate weakens, more foreign currenvy out international transactions. If a country's currency exchange rate rises, the price of imported goos will rise and the price of exported goods will fall. A country's economy is stronger and thus can earn larger foreign exchange reserves when its exchange rate rises. High foreign exchange reserves are a sign of a country's ability to conduct financial and economic transactions on a global scale [18].

According to [19] In the short term, fluctuations in the rupiah exchange rate directly influence foreign exchange reserves: a decrease in the rupiah exchange rate leads to a corresponding decrease in reserves. Over the long term, the rupiah exchange rate has a substantial positive impact on foreign exchange reserves [20] examined the causality between foreign exchange reserves and the rupiah exchange rate, stating that the causality relationship runs in the same direction.

Foreign debt is an additional factor that can affect foreign exchange reserves. It represents external financing utilized to bolster the national currency and facilitate the accumulation of foreign exchange and savings [21]. Most foreign loans are used to foster foreign exchange reserves, even foreign exchange is also obtained from foreign loans in order to be able to carry out development, repayment of installments and interest on foreign loans is the source of foreign exchange reserves. Indonesia had the most external debt in 2020, amounting to US$ 417.5 billion or IDR 5,845 trillion. The public sector, which includes the government and central bank, has a debt of US$ 209.2 billion, while the private sector, including state-owned enterprises, has a debt of US$ 208.3 billion. The increase is in line with foreign loan obligations made to assist the National Economic Recovery (PEN) program and the handling of the Covid-19 pandemic.

Based on the explanation of the above phenomena, the authors are interested in conducting research with the title "Analysis of Export Import Inflation Exchange Rate and Foreign Debt Against Indonesia's Foreign Exchange Reserves 1985-2022". This research was conducted by building a model and reinvestigating the relationship and influence between export import

exchange rate inflation and foreign debt on the country's foreign exchange reserves. The selection of these factors is because one of the causes of the ups and downs of the Indonesian economy is foreign exchange reserves. The need for the country to increase foreign exchange reserves continuously, aims to make this developing country a more developed country. According to [4] Countries that have sufficient foreign exchange reserves are guaranteed to have macroeconomic and monetary stability.

2. Literature Review

Foreign Exchange Reserce

Foreign exchange reserves are deposits of state wealth in the form of foreign exchange or foreign currency rates held by the monetary authorities of each country. In addition, reserves held by a country's central bank or other responsible monetary authority are known as foreign exchange reserves, or FX reserves. These reserves can take the form of foreign cash, bonds, or deposits. So foreign exchange reserves are defined as a tool used for transactions in interstate activities in the form of dollar-valued exchange rates and are held by local central banks and other monetary authorities and are usually recorded in the country's asset transactions or balance of payments (Balance of Payment) in order to keep the country in handling monetary stability, paying off debts and financing imports and also as savings held by the country.[16].

Export

According to [21] One way to obtain foreign exchange reserves is through exports. According to [22] Export is an activity by selling products from one country to another by crossing the outer borders of a country, or customs territory to sell them to other countries. This is done in order to generate the required foreign exchange, collect export tax revenues and other sources, and maintain the balance of the movement of money and goods in the country. Export is a form of effort to carry out or sell domestic product commodities to other countries in accordance with government laws and regulations with the aim of obtaining results in the form of foreign exchange, and cooperating with other countries [2].

The production of exported goods has an important contribution to the growth of national welfare, improving people's living standards, and economic development [23] It can be concluded that exports are a source of foreign exchange plus the expansion of trade areas for the production of domestic goods and expansion in the field of services or labor.

Import

Imports are the purchase and entry of goods from abroad into an economy. According to [24] Import is a purchase of goods and services from abroad into the country, and there is a bilateral association agreement between the countries concerned. According to the Keynes approach in

[37] believe that an increase in imports can increase the demand for foreign exchange and be used in financing the imports themselves, it causes the rupiah to appreciate. According to [20] The higher the imports, the greater the demand for US dollars, so the rupiah will depreciate. Trade that involves the entry of goods into Indonesian customs from abroad based on rules set by existing laws and regulations is called an import transaction.

Inflation

In general, inflation occurs when prices rise and lasts for a long time, according to the opinion [38], Price increases or inflation are generally triggered by factors such as the money supply, the acceleration of money circulation, and the volume of goods to be traded. Inflation is a state of rising general commodity prices in an economy. According to [25] Inflation is the phenomenon where the overall price level of goods experiences a rise. Meanwhile, according to the statement Madura which cited by [40] in a change in inflation will cause the demand and supply of a currency and will also have an effect on the exchange rate. If the country's inflation increases, the demand for currency decreases because exports also decrease (due to high prices).

Exchange Rate

The state of a country's exchange rate is strongly influenced by its foreign exchange reserves. The rupiah exchange rate appreciates with the increase in balance of payments reserves. The exchange rate is a comparison of the value/price of a commodity or the exchange of different currencies. According to [26] The price of a currency against another currency, such as the value of the rupiah when converted into US dollars, is called the exchange rate. Meanwhile, according to experts' opinions, it can be seen that exchange rates are changes in the currencies of various countries. According to [27] The exchange rate is the price of a currency in relation to the currency of another country. The exchange rate can occur in two situations, namely an increase or appreciation and a decrease or depreciation. Appreciation means an increase in the value of a nation's money in relation to foreign money, while depreciation means a decrease in the value and price of a nation's money in relation to another nation's money.

Foreign debt

The portion of a country's overall debt that comes from creditors outside the country is known as external debt. Governments, companies and citizens can all be recipients of external debt. Foreign loans are any state revenue in the form of goods and services obtained from foreign lenders whose repayment is subject to certain conditions, or in the form of foreign exchange converted into rupiah, Foreign debt plays an important role in economic development because it allows the government to build infrastructure, especially regional infrastructure, which indirectly facilitates the community to move economically. People acquire land for economic purposes, which can stimulate the economic growth of Indonesian society and have an impact on the economy. [5]

3. Research Methods

The type of research conducted is research using a quantitative approach and descriptive analysis. Research with a quantitative approach is carried out to test the validity of the theory or hypothesis that is built so that it can be used to strengthen or reject a previous theory and hypothesis. As for the descriptive analysis, it aims to explain an indication of the current problem, namely by providing a valid and relevant and systematic interpretation of the response between the phenomena under study, the focus of this research is to determine the magnitude of the influence between the research variables studied, with the background as well as the formulation of the problem described in analysing exports (X1), imports (X2), inflation (X3), exchange rates (X4), and foreign debt (X4), on foreign exchange reserves (Y) in Indonesia in the 1981-2022 range. The data used is secondary data which is time series data obtained from official websites including the Central Bureau of Statistics (BPS) and the World Bank.

Operational Variable

Table 1. Operational Definition

Variable	Variable definition	Notation	Scale
Export	It is the value of all goods classified as non-oil and gas (such as office equipment, chemicals, fertilisers, sugar paper, coconut, rubber, coffee, copra, plywood, confectionery, coconut, and palm oil) and oil and gas (such as kerosene, petrol, diesel, and LPG) that are exported. World Bank data for 1985-2022 on Palm oil, office supplies, fish, shrimp, shellfish, gold, nickel, and copper ore exported overseas in Indonesia are measured in US dollars.	EKP	Ratio (US$ million)
Import	All goods made from oil and gas, such as crude oil, oil products, as well as non-oil and gas goods, such as plastics, electrical appliances, and machinery and mechanical equipment, are considered imports. and products made from plastics, automobiles, organic chemicals, fertilisers, oily grains, arms and ammunition, fruits, and vegetables) imported from abroad and worth millions of US dollars originating from Indonesia based on World Bank data, 1985-2022.	IMP	Ratio (US$ Million)

Variable	Variable definition	Notation	Scale
Inflation	It is a value at which the general price level of goods and services has increased. In this study, the inflation used is data percentage of the consumer index and in this study the data used is annual data (in %) sourced from the World Bank for the period 1981-2022. annual data (in units of %) sourced from the World Bank for the period 1981-2022.	INF	Ratio (%)
Exchange Rate	The exchange rate between two countries that the people of the two countries agree to trade with each other is called the exchange rate. trade with each other is commonly referred to as the exchange rate. The nominal exchange rate and the real exchange rate are two forms of agreed exchange rates. The amount by which one converts money from one country to another is known as the nominal exchange rate. The real exchange rate is the rate that is actually applied in the exchange of goods and services between countries. The exchange rate data applied in this study is the exchange rate of the rupiah against the dollar obtained from the World Bank period. against the dollar obtained from the World Bank for the period 1981-2022.	NT	Ratio (US$ Million)
Foreign debt	Any financing through debt obtained by the government from foreign lenders bound by a loan agreement and not in the form of state securities that must be paid back under certain conditions. The foreign debt data used in this study with units of billions of rupiah, data obtained from the World Bank for the period 1981-2022.	UTLN	Ratio (US$ million)
Foreign Exchange Reserves	Foreign exchange reserves are assets held by a central bank or monetary authority to fulfill financial obligations due to international transactions. Foreign exchange reserves can consist of various foreign currencies such as the US dollar, euro, pound sterling, Japanese yen, and so on.	CADEV	Ratio (US$ million)

Note :
Cadev : Foreign Exchange Reserves (Point)
Ekp : Export
Imp : Import

Infl : Inflation
NT : Exchange Rate
Utln : Foreign debt

Data Analysis Techniques

In the analysis method, a quantitative approach is used based on the Autoregressive Distributed Lag (ARDL) model using the eviews 12 application. The Autoregressive Distrubuted Lag (ARDL) method is used as a data analysis method. The use of the ARDL method provides advantages, including that it does not emphasize the stationary level of data at the same order, the use of ARDL is also able to provide differences related to the long-term and short-term effects of the variables to be tested.

1. Data Stationarity test (Unit Root Test)

Test stationarityused to determine whether or not there is a problem with the unit root of each variable using the Augmented Key Fuller (ADF) unit root test. It is the first step in analyzing the idea that data is in a stationary state and tends to provide very important results when studying time series data. the average number and how it fluctuates over time. Pseudo- or dummy regressions can result from the estimation process if the data used is not stationary. If all regressions are interpreted, the findings of the analysis will be wrong, which will lead to wrong decisions, which in turn will lead to wrong conclusions. The tested data will be stationary if the ADF absolute value < the statistical value. If the tested data ADF value > statistical value then it can be said that the data is not stationary. [28] states that if a variable is integrated and stationary at the second1(2), the F statistic cannot be interpreted.

2. Classical Assumption test

in the application of the ardl model in general only requires or must pass at least three classical assumption tests, as follows.

The purpose of the normality test is to determine whether the dependent variable and the independent variable in the model are normally distributed or not. A normal distribution is a distribution on data that is spread normally. If the results are not spread normally, the results will be biased, but not efficient. In this study using the histogram test to determine the normality of the variables.

Autocorrelation is a condition where there is a problem in the relationship between independent or self-correlated variables. Self-correlation is defined by correlation between variables or correlation between time periods. To find out whether there is an autocorrelation problem, the autocorrelation test can use the Breusch-Godfrey test or the LM Test. The Breusch-Godfrey test or LM Test is by looking at the Chi-Square probability value. If the Chi-Square value is greater than alpha 5% or 0.05 then there is no autocorrelation problem, otherwise if the Chi-Square value is smaller than alpha 5% or 0.05 then there is an autocorrelation problem.

The heteroscedasticity test is carried out with the aim of testing whether there is a similarity in variance or residuals (homoscedasticity). If the residual variants are different, it is called heteroscedasticity. Heteroscedasticity can cause the estimation of regression coefficients to be inefficient which has an impact on inappropriate analysis results. In testing heteroscedasticity, you can use the White and Breusch-Pagan-Godfrey tests, namely by looking at the Chi-Square probability value. If the Chi-Square value is greater than alpha 5% or 0.05 then there is no heteroscedasticity problem, otherwise if the Chi-Square value is smaller than alpha 5% or 0.05 then there is a heteroscedasticity problem.

The ARDL test model is a combination of AR (Auto Regressive) and DL (Distributed Lag). Data stationarity can experience differences if there is the use of the ARDL test model. In estimating the ARDL model used in this study, the independent variables are EXPORT, IMPORT, INFLATION, EXCHANGE VALUE, FOREIGN DEBT. While CADEV is the dependent variable. In an ARDL model, the testing steps are data stationarity, cointegration test, and ARDL model estimation. The following ARDL equation is used in this study:

> CADEV = C(1)*CADEV(-1) + C(2)*CADEV(-2) + C(3)*CADEV(-3) + C4*EKPR +C(5)*EKPR(-1) + C(6)EKS(-2) + C(7)IMPR(-1) + C(8)IMP(-2) + C(9)INF(-1) + C(10) KURS(-1) + C(11)KURS (-2) + C(12)IMP(-1) + C(13)IMP(2) + C(14)INF(-1) + C(15)KURS (-3) + C(16)UTLN(-3)

Knowing whether there is a short-run or long-run relationship between the dependent and independent variables in the ARDL model is the purpose of the dependent test cointegration test. After the lagoptimal test is the cointegration test. In this study, the results of statistical values with limit values above 1 (0) and above 1 (1). The following is the hypothesis used in this test
H0 = There is no cointegration problem
H1 = There is a cointegration problem

4. Results and Discussion

Data Stationarity test

To prevent direct regression, a stationarity test is conducted to ensure that the data does not contain a unit root. The ADF (Augmented Dikey Fuller) test model was used for the stationarity test in this investigation. The table 2 provides an explanation of the unit root test results

Table 2. Unit Root Test Results at Level

Variable	Augmented Dickey-Fuller		Remark
	Prob.	**Stationary value**	
CADEV	0.373016	0.9790	Not-Stationary
EKS	2.930636	1.0000	Not-Stationery
IMP	-1.775534	0.3862	Not-Stationary
INF	-4.723409	0.0005	Stationary
KURS	-0.831337	0.7983	Not-Stationary
UTLN	3.595568	1.0000	Not-Stationary

source: data processed, 2024

Table 2 shows the use of the unit model (Augmented Dickey Fuller) to determine the results of the unit root test. It can be seen at an alpha value of 0.05 that the probability value has not been all stationary variables. The only variable that is declared stationary at the level is inflation. The variables of foreign exchange reserves, exports, imports, exchange rates and foreign debt are not stationary at the level because the probability value is > 0.05.

Table 3. Unit Root Test at Results First Difference

Variable	Augmented Dickey-Fuller		Remark
	Prob.	**Stationary value**	
LNCADEV	-5.677505	0.0000	Stationary
LNEKS	-4.536350	0.0009	Stationary
IMP	-4.407615	0.0013	Stationary
INF	-7.429647	0.0000	Stationary
LNKURS	-7.327533	0.0000	Stationary
LNUTLN	-2.678972	0.0875	Not-Stationary

source: data processed, 2024

Table 3 shows the use of the Augmented Dickey-Fuller unit model to determine the unit root test results. It can be seen at an alpha value of 0.05 that the probability value has not been all stationary variables. The variable that is not stationary is foreign debt because the probability value is > 0.0875.

Table 4. Unit Root Test at Results 2Difference

Variable	Augmented Dickey-Fuller		Description
	Prob.	**Stationary value**	
LNCADEV	-4.154456	0.0030	Stationary
LNEKS	-4.230754	0.0029	Stationary
IMP	-7.492589	0.0000	Stationary

Variable	Augmented Dickey-Fuller		Description
INF	-5.941389	0.0000	Stationary
LNKURS	-7.327533	0.0000	Stationary
LNUTLN	-2.432453	0.1415	Not-Stationary

***source**: data processed, 2024*

Because each variable has a different level of stationarity, it is concluded that this study uses the ARDL model with ADF (Augmented Dikey Fuller) units and can proceed to the classical assumption test.

Normality Test

Table 5. Normality test results

Jarque-Berra	Prob
0.234807	*0.889227*

source: data processed, 2024

Table 5 above shows the results of the normality test which states that the probability number obtained is 0.889227> 0.05, which means that the model is normally distributed.

Autocorrelation Test

Table 6. Autocorrelation test results

Test	***Obs R-Squared***	***Prob Chi-Square***
Breusch-Godfrey Serial Correlation LM Test	*1.780221*	*0.4106*

source: data processed, 2024

Based on table 6 shows the results of the autocorrelation test obtained, with a Prob value. Chi-squared value 0.4106> 0.05 which means there is no autocorrelation problem.

Heteroscedasticity Test

Table 7. Heteroscedasticity test results

Test	***Obs R-Squared***	***Prob Chi-Square***
Breusch-Pagan-Godfrey	*18.11994*	*0.5144*

source: data processed, 2024

Based on Table 5, the heteroscedasticity test results show a Prob.Chi-squared value of 0.5144 > 0.05, which means that the model does not have heteroscedasticity issues.

Multicollinearity test

Table 8. Multicollinearity test results

Variable	***VIF***
LNCADEV(-1)	*0.027214*
LNCADEV(-2)	*0.029537*
LNCADEV(-3)	*0.024423*
LNEKS	*0.044840*
LNEKS(-1)	*0.062063*
LNEKS(-2)	*0.031561*
IMP	*8,90E-05*
IMP(-1)	*0.000110*
IMP(-2)	*8.01E-05*
INF	*2.98E-05*
INF(-1)	*5.24E-05*
LNKURS	*0.058816*
LNKURS(-1)	*0.105255*
LNKURS(-2)	*0.026416*
LNKURS(-3)	*0.023042*
LNUTLN	*0.168604*
LNUTLN(-1)	*0.145588*
LNUTLN(-2)	*0.188831*
LNUTLN(-3)	*0.125699*
C	*5.410619*

source: data processed, 2024

Table 8 shows the results of the multicollinearity test on the VIF value not exceeding 10, meaning that there is no multicollinearity problem or this model has a relationship between variables.

Test Lag Optimum

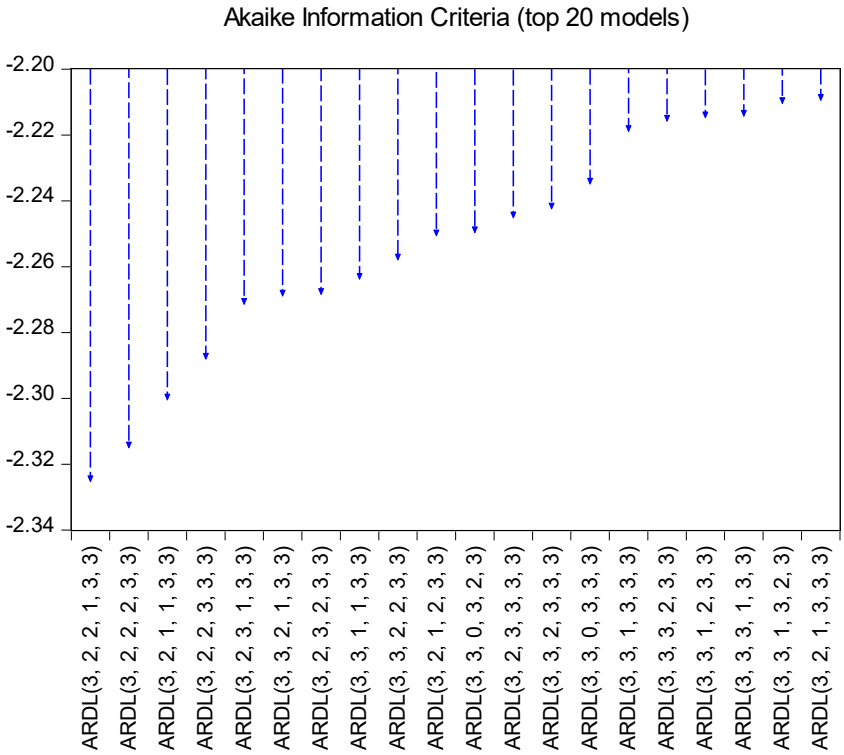

Figure 2. Test Lag Optimum

source: data processed, 2024

Based on Figure 2 shows that the optimum lag test results in the ARDL experiment obtained are (3,2,2,1,3,3) which has the smallest error results when compared to other models.

ARDL model estimation test

Table 9. ARDL model test results

Variable	Coefficient	Std. Error	Prob.*
LNCADEV(-1)	0.186785	0.164966	0.2753
LNCADEV(-2)	-0.414976	0.171863	0.0290
LNCADEV(-3)	0.594372	0.156279	**0.0017**
LNEKS	0.478760	0.211754	0.0391
LNEKS(-1)	-0.059994	0.249124	0.8130
LNEKS(-2)	0.492027	0.177654	**0.0143**
IMP	-0.019769	0.009432	0.0535
IMP(-1)	-0.007114	0.010504	0.5086

Variable	Coefficient	Std. Error	Prob.*
IMP(-2)	-0.010129	0.008949	**0.2755**
INF	0.011583	0.005455	0.0508
INF(-1)	0.020091	0.007239	**0.0141**
LNKURS	0.079028	0.242521	0.7490
LNKURS(-1)	-0.611572	0.324430	0.0789
LNKURS(-2)	0.766228	0.162530	0.0003
LNKURS(-3)	0.456693	0.151796	**0.0088**
LNUTLN	-0.139112	0.410614	0.7395
LNUTLN(-1)	0.010543	0.381560	0.9783
LNUTLN(-2)	0.840144	0.434547	0.0723
LNUTLN(-3)	-1.407485	0.354540	**0.0012**
C	4.871684	2.326074	0.0536

source: data processed, 2024

Table 9 shows the results of the best ARDL model selection, namely (3,2,2,1,3,3) which means that the LNCADEV variable is on lag 3, the LNEKS variable is on lag 2, the IMP variable is on lag 2, the INF variable is on lag 1, the LNKURS variable is on lag 3, the LNUTLN variable is on lag 3.

Cointegration test (Bound test)

Table 10. Cointegration test (Bound test) result

F-Statistic	13.40250	
Sig	1(0)	1(1)
1%	3.06	4.15
2.5%	2.7	3.73
5%	**2.39**	**3.38**
10%	2.08	3

source: data processed, 2024

From table 10, it shows that the F-statistics value for the bound test is 13.40250, meaning it is higher than the upper limit of 1(0) at alpha 0.05, namely 2.39 and the lower limit of 1(1) 3.38 so that it is convincing for each independent variable tested, namely the number of exports, imports , exchange rate, inflation and foreign debt are cointegrated in the long term or can also be stated as variables that move together in the long term.

Short Run and Long Run test

Table 11. Test results short run

Variable	Coefficients	Probability	Description
D(LNCADEV(-2))	-0.594372	0.0017	Significant
D(LNEKS(-1))	0.492027	0.0143	Significant
D(IMP(-1))	-0.010129	0.2755	Not Significant
D(INF)	0.011583	0.0508	Not-Significant
D(LNKURS(-2))	-0.456693	0.0088	Significant
D(LNUTLN(-2))	1.407485	0.0012	Significant
CointEq (-1)*	-0.633820	0.0000	Significant

Note: Significant at : *10, **5 and ***1 percent levels

Based on the results of processing the ARDL model, it can be seen that the ECT coefficient shows a negative and significant value so that the specific model in this research is valid and has a significant influence in the short and long term. The ECT coefficient shows a value of -0.633820, identifying short-term balance fluctuations of 63.38% which will be corrected towards the long term with the adjustment process occurring in the first year and the remaining 36.62% will be adjusted in the following year.

The export variable has a positive and significant effect on foreign exchange reserves with a coefficient value of 0.492027 with a probability of 0.0143 < 0.05. means that if exports increase by 1%, foreign exchange reserves will increase by 0.49%. The findings of this research are consistent with the premise which states that exports have a positive impact on foreign exchange reserves. The findings of this study are consistent with research conducted by [10], [12] [29] [18] emphasized that the high level of exports of a country is a sign that the country is getting more and more foreign exchange or currency. Indonesia will receive foreign exchange from importing countries if it exports goods to other countries regularly. So, the more commodities that are exported, the more foreign exchange they receive.

The import variable has a negative and insignificant effect on Indonesia's foreign exchange reserves with a coefficient value of -0.010129, probability 0.2755>0.05. This can mean that even though there are imports, the impact on foreign exchange reserves is not that big or does not significantly damage the stability of these reserves. In the short term, various economic mechanisms, government policies, and foreign exchange reserve management strategies can reduce or delay the negative impact of imports on foreign exchange reserves. Therefore, although imports have the potential to reduce foreign exchange reserves, the effect may not be significant in the short term due to various compensating factors and effective management. These results are in line with research conducted by [30] [19] [31] states that imports have a negative but not significant effect on changes in the value of the country's foreign exchange reserves, this could be caused by several reasons, firstly the proportion of imports is controlled,

if imports are not too large compared to existing foreign exchange reserves, the impact on foreign exchange reserves may not be significant, because import spending is still within limits that can be managed by existing foreign exchange reserves.

Another variable that has no effect on short-term foreign exchange reserves is inflation, with a coefficient value of 0.011583 and a significance value of 0.0508 > 0.05. In line with previous research by [3] [10] [30] [8] which shows that inflation does not show a significant influence on foreign exchange reserves, due to the increase or depreciation of the value of the rupiah causing a decrease in export commodity prices and an impact on Indonesia's foreign exchange reserves. In the short term, inflation is not yet high enough to significantly influence the prices of export and import goods, and its influence on the competitiveness of exports and imports may still be limited. Slow price adjustments due to inflation often take time to impact trading and investment decisions. In the short term companies and consumers may not yet fully adjust their behavior. Short-term government monetary and fiscal policies often take steps to stabilize the economy, such as raising interest rates or reducing government spending, which can help control the impact of inflation on foreign exchange reserves.

Another variable that has an influence on Indonesia's foreign exchange reserves is the exchange rate, with a coefficient value of -0.456693 and a probability of 0.0088 < 0.05, the exchange rate variable has a negative influence in the short term. This means that an increase in the exchange rate of 1% will result in a decrease in foreign exchange reserves of 0.45%. The results of this research are in accordance with research from [19] [16] indicates that the value of the rupiah is weakening or the exchange rate is weakening, resulting in a decrease in foreign exchange reserves. This also shows that the amount of rupiah traded for every 1 USD is depreciating or weakening.

Apart from that, the foreign debt variable also has an influence on foreign exchange reserves, with a positive coefficient value of 1.407485 with a significance level of 0.0012 <0.05, meaning that foreign exchange reserves increase by 1.40% for every 1% growth in foreign debt. In accordance with the findings of the hypothesis that has been formulated, foreign debt has a positive influence on foreign exchange reserves. In line with research conducted by [16] Because foreign debt is included in the country's capital balance and thus increases foreign exchange reserves, this shows that Indonesia's foreign debt has a positive and significant influence on foreign exchange reserves.

Table 12. Test results long run

Variable	Coefficient	Prob	Remark
LNEKS	1.436991	0.0027	Significant
IMP	-0.058395	0.0373	Significant
INF	0.049972	0.1076	Not-Significant

Variable	Coefficient	Prob	Remark
LNKURS	1.089232	0.0012	Significant
LNUTLN	-1.097963	0.0999	Not-Significant
C	7.686231	0.1463	

source: data processed, 2024

From the table of long-term test results of the ARDL model above, it can be concluded that the variables that have an influence or relationship in the long term are export, import and exchange rate variables. In the long term, inflation and foreign debt have no influence on foreign exchange reserves. The criteria for determining each independent variable are using a significance level of alpha 5% or 0.05.

The export variable has an influence on Indonesia's foreign exchange reserves in the long term. This result is the same as the short term in that exports have a positive and significant effect, with a coefficient of 1.436991 and a probability of 0.0027 < 0.05 where exports have a profitable and large impact on foreign exchange reserves. In the long term, a 1% increase in exports will result in an increase in foreign exchange reserves of 1.43%. The more commodities that are exported, the more foreign exchange they receive. Moreover, the number is increasing. These results are in accordance with research conducted by [32] states that exports have a positive influence on Indonesia's bilateral trade, where if Indonesia exports a lot of goods in Indonesia's international trade with other countries it will be able to increase the exchange rate and foreign exchange reserves entering Indonesia will also increase. The increasing value of exports indicates that foreign revenues are becoming an increasingly important source of state revenue for the nation. The large number of exports creates a large increase in state income, where income will have an impact on the demand for money, which can illustrate that people's welfare is increasing [33]

The import variable has a significant negative influence on Indonesia's foreign exchange reserves in the long term, with a coefficient value of -0.058395 and a significance of 0.0373 < 0.05, which means that when imports increase by 1% it will reduce foreign exchange reserves by 0.05%, for every 1 million increase in imports. US$ then foreign exchange reserves also fell by 58.3 billion US$. This is because import financing will have an impact on reducing Indonesia's foreign exchange reserves in the long term. The findings of this research are in accordance with research conducted by [18] If imports become a leak to national income, then exports become a component of injecting increased regional income. Foreign currency reserves obtained from exports are used to pay for imports. in line with research conducted by [10] and [13] When importing, the Indonesian government will use its foreign exchange reserves to finance these imports, meaning that if imports increase, the value of these reserves will decrease. The findings of this research support the assumption that imports have a negative impact on foreign exchange reserves.

The inflation variable has no influence on foreign exchange reserves because the probability value of 0.1076 > 0.05 is not significant, the result is the same that in the short and long term inflation does not have a significant influence on Indonesia's foreign exchange reserves. In the long term the market tends to adjust to the level of inflation. For example, currency exchange rates might adjust to reflect inflation differences between countries, which could rebalance export and import prices. Economic diversification in the long term is seen from a country that has succeeded in diversifying its economy and can reduce dependence on only a few sectors, so that inflation in one sector does not have a major impact on the overall economy and foreign exchange reserves. Good economic policies, including managing inflation, can help maintain economic stability in the long term. Inflation has a positive influence because an increase in inflation will increase investment [34] Governments that are able to manage inflation well tend to have more stable foreign exchange reserves.

The exchange rate variable has a positive and significant effect on Indonesia's foreign exchange reserves with a coefficient value of 1.089232 and a probability of 0.0012 < 0.05, so the exchange rate variable also has a significant positive effect in the long term. This shows that long-term foreign exchange reserves will increase by 1.08% for every 1% increase in the exchange rate. Mishkin [39] shows that a country's foreign exchange reserves have an important role in determining its exchange rate; An increase in balance of payments reserves can be a catalyst for strengthening the rupiah exchange rate. Therefore, it can be concluded that there is a strong relationship between foreign exchange reserves and the exchange rate. The findings of this research are in line with previous research conducted by [15], [35] [19] stated that fluctuations in the rupiah exchange rate had a significant impact on the country's foreign exchange reserves. The positive rupiah exchange rate parameters can be explained by the fact that foreign exchange reserves play a major role in a country's exchange rate position, and an increase in balance of payments reserves is a catalyst for rupiah appreciation.

Another variable that does not have a significant influence on foreign exchange reserves in the long term is foreign debt with a coefficient value of -1.097963 and a significance level of 0.0999 > 0.05 that does not have a long-term influence on foreign exchange reserves. Therefore, Indonesia's foreign exchange reserves can be said to be unaffected in the long term by its foreign debt. In line with research conducted by [3] states that if the percentage of Indonesia's foreign debt increases, it will not significantly affect changes in the value of foreign exchange reserves. One of the reasons underlying the ineffectiveness of foreign debt is the ineffectiveness of its use and the lack of accuracy in having sources of debt. Inaccurate use of debt in developing countries is suspected to indicate the occurrence of capital flight, meaning that some of the debt is transferred back abroad [36]

Stability test results

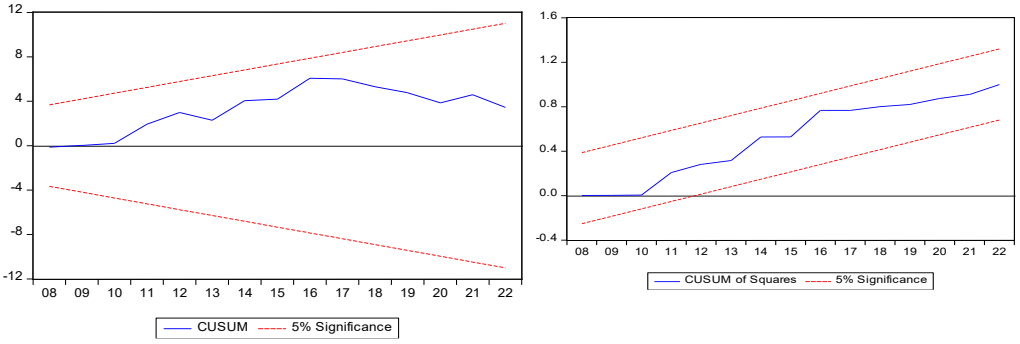

Figure 3. Stability Test Result

From the results of Figure 3 above, it shows that if the blue curve does not cross the red dotted line at the significance level a (alpha) = 5%, it means that it can be concluded that the data we have is stable.

Hypothesis Test

The F test aims to determine the overall effect of independent variables, namely exports, imports, inflation, exchange rates, foreign debt on the dependent variable Foreign Exchange Reserves.

Table 13.F test results

F-statistic	Prob. (F-statistic)
	0.000000

source: data processed, 2024

From table 13 above, it states that the prob result (F-statistic) is 0.000000 < 0.05, so it can be concluded that exports, imports, inflation, the exchange rate or exchange rate and national debt simultaneously have a significant effect on foreign exchange reserves.

Determination test results (R^2)

Table 14. Results determination test (R^2)

Test	**Prob.**
R-squared	0.998105

source: data processed, 2024

Based on table 14, the Adjusted R-squared results show a result of 0.998105 or 99.9% of foreign exchange reserves variables are influenced by independent variables, namely exports, imports, inflation, exchange rates, and foreign debt. While 1% is affected by variables outside the model.

5. Conclusion

From the analysis conducted on the impact of Exports, Imports, Inflation, Exchange Rates, and Foreign Debt on Indonesia's Foreign Exchange Reserves between 1985 and 2022, the following conclusions can be drawn:

The export factor exerts a positive and substantial impact on foreign exchange reserves over both the short and long run. The coefficient in the short term is 0.492027 (significant at α = 0.05) and in the long term is 1.436991 (significant at α = 0.05). This means that export growth of 1% will increase foreign exchange reserves by 0.91% in the short term and 1.43% in the long term. Exports contribute significant foreign exchange to the country and can increase foreign exchange reserves directly.

The import variable has a negative influence on foreign exchange reserves, although it is not significant in the short term (coefficient -0.010129, prob. 0.2755 > 0.05). However, in the long run, the effect is negatively significant (coefficient -0.058395, significance 0.0373 < 0.05). This indicates that an uptick in imports could diminish Indonesia's foreign exchange reserves, as it heightens the demand for foreign currency to fund the imports.

Inflation has a positive influence on foreign exchange reserves, but it is not significant in both the short and long run. This suggests that slightly higher inflation does not significantly affect foreign exchange reserves directly.

The exchange rate has an opposite effect in the short term and long term. In the short term, the exchange rate has a significant negative effect (coefficient -0.456693, significance 0.0088 < 0.05), Over the long term, the exchange rate exhibits a positive and noteworthy effect (coefficient 1.089232, significance 0.0012 < 0.05). This implies that over time, a higher exchange rate can augment foreign exchange reserves, whereas short-term fluctuations in the exchange rate may have adverse consequences.

The foreign debt variable has different effects in the short period and long term. In the short term, external debt has a significant positive impact on foreign exchange reserves (coefficient 1.407485, significance 0.0012 < 0.05). However, in the long run, external debt hes an insignificant negative impact on foreign exchange reserves (coefficient -1.097963, significance 0.0999 > 0.05). This suggests that an increase in external debt may provide a brief boost to foreign exchange reserves, but risks causing a decline in foreign exchange reserves in the long run due to the burden of principal and interest payments.

Thus, this analysis illustrates in complexity of the interaction between key economic variables and Indonesia's foreign exchange reserves, which is important to consider in the formulation of sustainable economic policies.

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