The Determinant Analysis of the Indonesia's Foreign Exchange Reserves in 2008 – 2018

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ABSTRACT

This study aims to analyze the effect of exports, imports, rupiah/US Dollar exchange rates, direct foreign investment, foreign debt and inflation on the Indonesia's foreign exchange reserves in 2008 – 2018. The method used in this study is the ARCH/GARCH, with the GARCH model (2.1) selected, stationary tests, co-integration tests, statistical tests. The results show exports, foreign direct investment, and foreign debt have a significant positive effect on Indonesia's foreign exchange reserves. However, imports have a negative and insignificant effect, while the exchange rates negatively and significantly effect and inflation has an insignificant negative effect on foreign exchange reserves.

Keywords: *Exports, Rupiah/US Dollar Exchange Rates, Foreign Direct Investment, Foreign Exchange Reserves*

1. INTRODUCTION

Foreign exchange reserves from 2008 to 2018 are volatile. In 2013 decreased by USD 99.387 million due to Bank Indonesia's decision meet the high dollar requirements for maturing foreign debt payments and also to avoid weakening the exchange rates. In 2014 foreign exchange reserves increased by USD 111.862 million. In 2015, the financial markets decreased again by USD 105.931 million. While foreign exchange reserves from 2016 rose to USD 116.362 million, followed by 2017 amounted to 130.196 million USD. Foreign exchange receipts, and international bond issuance, as well as overseas withdrawals such as taxes and export foreign exchange. In 2018, foreign exchange reserves decreased by USD 120.654 million due to foreign debt repayment and maintained exchange rate stabilization.

Exports are the activity of selling goods and services to be shipped abroad for profit. Based on Statistical Central Agency (BPS) and Bank of Indonesia (BI) data during the research period from 2008 to 2018, active exports. In 2013, the same decrease was $182.57 million, down 3.92 percent. The value of Exports in 2014 reached USD 176.29 million decreased 3.43 percent compared to the same period in 2013 as in 2015 total exports decreased to USD 150.25 million or decreased 14.62 percent. In 2016, USD 144.43 million decreased by 3.95. In 2017, exports reached USD 168.73 million or increased 16.22 percent followed by non-oil and gas

exports increased, in 2018 exports continued to increase to USD 180.06 million or increased 6.65 percent, it is expected that exports can continue to increase so that foreign exchange reserves remain stable [8].

The relationship between exports and foreign exchange reserves, while exports activity increase, then foreign exchange reserves are increasing as state income. Imports are the activity of purchasing and importing goods from abroad into the country to meet the needs of certain products whose raw materials are not owned in the country. The value of imports owned by Indonesia based on data from BPS and Bank Indonesia fluctuated, from 2008 to 2018. In 2013, it dropped to USD186.62 million. In 2014, 178.18 million USD in 2015 amounted to 142.37 million USD, and in 2016 imports decreased by USD 135.86 million compared to the same period in 2015. In 2017, imports increased by USD 156.89 million, and in 2018, imports were recorded at USD 173.3 million, due to imports of raw materials in infrastructure and oil fuel imports. The relationship between imports and foreign exchange reserves is that imports activities greatly affect international trade due to the lack of raw materials that are owned therefore if imports higher than exports will reduce foreign exchange reserves.

Although in theory, imports negatively affect foreign exchange reserves but imports also have a positive impact, namely being able to acquire goods, services that cannot be produced on their own, as well as acquiring new technologies. So, if imports slow down then

economic activity becomes hampered. The exchange rate is the price of the value of one currency with another, resulting in a comparison. Based on data from the World Bank, Organization for Economic Cooperation and Development (OECD), Ministry of Finance and various other sources. The exchange rate in Indonesia fluctuates every year. In 2008 the rupiah exchange rate was Rp 9,258 to 9,698 per USD. In 2014, the average was in the range of 11,865 per USD. In 2015, (BI) issued a statement that the exchange rate was at 13,000-13,389 per USD, in 2016, it is estimated to be at 13,000-13,400 per USD, according to Bank Indonesia [16] (Warjiyo & Juhro, 2019) exchange rate movements due to the strengthening of the American currency against all other currencies and also due to the quantitative of European easing and the condition of the Greek economy. In 2018, the rupiah weakened at 14.385 per USD. The rupiah was under pressure in October 2018, around the level of Rp 15,300. This is due to the war trade between China and the United States that led to the depreciation of the exchange rate [16].

The relationship between exchange rates and foreign exchange reserves is that the more foreign exchange the country conducts transactions and the stronger the exchange rates, the higher the exchange rate indicates that a country's economy is safe and controlled.

Foreign investment as one of the important roles to support the economy, therefore increasing investment will encourage an increase in the country's foreign exchange reserves [15]. In 2010, it was targeted to be around Rp 160 trillion. In 2012, the value reached Rp 221 trillion. Larger than Rp 175.3 trillion in 2011. In 2013, foreign investment amounted to Rp 272.6 trillion, an increase of 22.4 percent compared to 2012. In 2014, foreign direct investment amounted to Rp 97.3 trillion. In 2015, also increased by Rp 365.9 trillion. The realization of foreign direct investment in 2016 rose to Rp 396.6 trillion and exceeded the target of realization of foreign investment. In 2018 investment of Rp 392.7 trillion decreased by 8.8 percent due to barriers in the external sector. Investment in 2018 is dominated by infrastructure, roads and telecommunications upgrades. Foreign debt is an aid obtained from another country which is one alternative to cover the lack of funds and also to increase the growth of a country.

The Central Agency of Statistics and LKPP (Central Government Financial Report), foreign debt rose steadily in 2008 to USD 155.088 billion. In 2018, foreign debt amounted USD 376 billion grew approximately 6.9 percent (year on year) this increase was sourced from government and private [9].

Inflation is a phenomenon of rising prices of goods as a whole. This not only reduces people's purchasing power for their daily needs but can also have an impact on capital markets. The reason is that investor interest in buying shares has also declined. Based on 2018 inflation data of 11.06 makes inflation the largest, while in 2013 it recorded the highest 8.39 percent since the 2008 crisis

which reached 11.06 percent. In 2014, it fell slightly to 8.36 per cent in 2015, falling by 3.35 per cent and falling again to 3.02 per cent in 2016 due to relatively subdued commodity prices, the year 2017 inflation again rose to 3.61 per cent, some commodities led to a rise in inflation in 2017 while inflation in 2018 was stable at 3.13 per cent. If inflation occurs, then goods and services will rise. This will lead to changes in the value of the currency, and affect foreign exchange reserves and lead to rising food and oil prices, causing inequality in demand and supply, namely the value of imports increasing and the value of exports reduced. In the end, it will lead to a deficit of the trade balance resulting in a decrease in foreign exchange reserves. In order to maintain the level of foreign exchange of reserve need to know what affects it. In this study, exports, imports, exchange rates, foreign investment, foreign debt and inflation became the focus to see if there is a relationship with foreign exchange reserves.

After we explain background of this study and based on the problem that has been stated above, this study aims to simultaneously and partially analyze the effect of exports, imports, the rupiah exchange rates, foreign investment, foreign debt and inflation on Indonesia's foreign reserves in 2008-2018. The rest of paper consist of literature review, method, empirical result, and conclusion. The formulation of this issue, the authors looked at the overall and partially effect of exports, imports, exchange rate, foreign investment, foreign debt and inflation on foreign exchange reserves in 2008-2018.

2. LITERATURE OVERVIEW

The basis of the theory in this study is Exports, Imports, Exchange Rates, Foreign Direct Investment, External Debt, Inflation and Foreign Exchange Reserves. Exports are an activity carried out with the intention of selling goods abroad. Export destinations can increase profit and better selling price, open exports market for manufacturers, take advantage of existing advantages (production or raw materials), and motivated to compete with international markets.

Imports are an activity carried out by business people by entering goods from abroad for domestic needs that have not been sufficient in accordance with the prevailing rules. Import activities have a positive impact, namely to reduce the dependence of goods from abroad, to strengthen the position of the trade balance, and to fostering domestic products.

The exchange rates are the price of a country's currency to another country. Because it is very important that stable exchange rates growth will show the country in a controlled and stable condition [13]. Conversely, if the exchange rates fall or decrease it will be a problem for a country's economy. The comparison between the exchange rates are determined by the purchasing power of the money (goods and services) in a country.

Foreign investment is an international capital where the investment is used by a company to establish and

expand its company [4]. Foreign investment is divided into two namely: first, direct investment in which investors participate in the company's activities and profit from the invested capital. Second, investment portfolio or indirect investment is the purchase of shares with the aim of getting the proceeds from being invested. Foreign debt is the total government loan and is obliged to pay back either in the form of foreign currencies or rupiah, included in the sense of foreign debt is securities issued domestically that give rise to the obligation to pay back to foreign parties or non-residents.

Inflation is a situation where goods increase widely and continuously and affect others. High inflation is associated with unstable economic conditions where demand for products exceeds product supply so that prices become soaring. If it continues to happen it will result in a decrease in foreign exchange reserves as it impacts the exchange rate and the other [5]. According to [6], foreign exchange reserves are currency deposits held by the central bank of each country and used for international transactions. While foreign exchange reserves i.e. payments used can be money, gold and other bills.

Theoretically that is an asset that has met the criteria and is controlled by Bank Indonesia as a monetary authority. Foreign exchange reserves may include monetary gold or monetary gold, special drawing rights or special withdrawal rights and other claims.

3. METHOD

This research is quantitative and in the form of time series data. The data was obtained from Bank of Indonesia, the Central Agency of Statistics, CEIC (Global Economic Data, Indicators & Forecasts*)* and Organization for Economic Cooperation and Development (OECD).

The stationarity test is intended to see if the data on the variable is stationary. Granger Causality Test is to find out if independent variable has an effect on dependent variables. Co-integration Test looks at the relationship and long-term relationship between economic variables according to existing theories. The classical assumption tests used in this study are multicollinearity, heteroscedasticity, autocorrelation and normality.

4. RESULT

This analysis uses secondary data with the regression model on independent variables are exports, imports, exchange rates, foreign investment, foreign investment, foreign exchange and inflation on foreign exchange reserves. Hypothetical testing was conducted by ARCH-GARCH method with the preferred GARCH (2.1) with the help of EViews 6 software. Based on the results of the analysis, GARCH equation (2.1):

CaD=1.641738+0.418402X–0.198169M–

(1.364761)(3.855992)***(-4.146602)***

0.656551ER+0.033095FDI+1.089402ED-

(-5.291889)***(1.877463)*(12.05835)***

0.004869INF + 0.504949 AR(1) + e

(-0.837901)   (2.561897) ***

R^2=0,977; R=0,969; DW=1,84; Ftest=120,44

CaD = Foreign Exchange Reserves
X = Exports
M = Imports
ER = Rupiah/USD exchange Rates
FDI = Foreign Direct Investment
ED = External Debt
INF = Inflation

Description:
(***) Significant on α = 1 percent
(**) Significant on α = 5 percent
(*) Significant on α = 10 percent

4.1 Statistical Test

The GARCH model (2.1) can be seen in the Fisher test, Studentized test, and Determination Coefficient. In the GARCH model (2.1) can be seen F test > F table which is 120.4378 > 2.36 on α = 5 percent, thus it can be concluded H_0 is rejected and H_1 is accepted. Together, the variables are statistically tested to dependent variable (the Indonesia's foreign exchange reserves) and to six independent variables (exports, imports, exchange rates, foreign investment, foreign debt and inflation).

4.1.1. Studentized Test (T-Test)

It can be concluded that the exports have a t-statistic > t-table, i.e. 3.855992 > 1.68709 and a probability value of 0.0001 on α = 5 percent, H_0 rejected and H_a is accepted, thus exports have a significant positive effect on foreign exchange reserves. Imports have a value of t-statistic > t-table. -4.146602 > 1.68709 and the probability value is 0.0000 at α = 5 percent. It can be concluded H_0 rejected H_a accepted, thus, imports have a partially significant effect on foreign exchange reserves. The exchange rates have a t-statistic > t-table value of -5.291889 > 1.68709 with a probability value of 0.0000 at α = 5 percent, thus, it can be concluded that H_0 is rejected and H_a is accepted, which means the exchange rates negatively and significantly affect the foreign exchange reserves. The confidence level of α = 5 percent, foreign investment has a statistics value of > t table of 1.877463 > 1.68709 with a probability value of 0.0605, thus, it can be concluded that H_0 is rejected and H_a is accepted, which means that foreign investment has a positive and partially significant effect on foreign exchange reserve variables.

External debt has a t-statistic value > t-table of 12.05835 > 1.68709 with a probability value of 0.0000 foreign exchange at α = 5 percent, thus H_0 is rejected and H_a is accepted, meaning that foreign debt has a significant positive effect on foreign exchange reserves.

The inflation variable has a t-statistic < t-table value of -0.837901 < 1.68709 with a probability value of 0.4021 at α = 5 percent, which means inflation negatively and insignificantly affects Indonesia's foreign exchange reserves.

Inflation has a negative and insignificant effect on foreign exchange reserves. While AR(1) has a t-*statistic* > t-table of 2.561897 > 1.68709 with a probability value of 0.0104, which means AR(1) has a significant effect on the α = 5 percent.

4.1.2. Determination Coefficient

Based on the regression of the GARCH model (2.1) obtained a value of R^2 of 0.977136 or 97.71 percent. It means that 97.71 percent variation of foreign exchange reserves explained by exports, imports, rupiah exchange rates, foreign investment, and foreign debt and 2.29 percent is explained by other variables outside the model.

4.1.3. Classic Assumption Test

4.1.3.1. Multicollinearity test

The multicollinearity test is known that the matrix value between independent variables owned < 0.90. It can be concluded that in the model used as an independent variable there is no correlation between other independent variables, i.e., between exports, imports, exchange rates, foreign investment, foreign debt and inflation.

4.1.3.2. Heteroscedasticity Test

In this study, the value of Chi-Square was 0.9514 with a probability of 0.9528 i.e. α > 5 percent, statistically insignificant, so, it can be concluded the GARCH model (2.1) had no heteroscedastic problems.

4.1.3.3. Auto correlation test

The result of table D-W values with n = 44 and k (independent variables) of 6, then obtained d_L value =1.2269, d_U =1.8378. In sum result $4 - d_U$ = 2.1622 and $4 - d_L$ =2.7731. In the D-W table, it is confirmed that the D-W *statistic* value is 1.839904. D-W value 1.839904 > d_L and d_U < 4 – d_U and 4 - d_L. With the proof of using the D-W table, it means that in GARCH 2.1 there is no auto correlation problem.

4.1.3.4. Normality test

The Jarque-Bera statistic is 0.651072 > 0.05 with a probability of 0.722140, so it can be concluded that the residuals on the GARCH model (2.1) are distributed normally.

4.2. Discussion

4.2.1. The Effect of Exports on the Indonesia's Foreign Exchange Reserves

Using the GARCH model (2.1), it can be seen that exports (X_1) have a positive relationship and influence on foreign exchange reserves with a significant 5 percent

coefficient value of 3.855992 > 1.68709 with a probability of 0.0001 meaning that if export rises by 1 unit, it will result in foreign exchange reserves increasing by USD 3.855992 million from their original value. Exports are very closely related to foreign exchange reserves, in accordance with EViews results that prove exports have a positive effect on foreign exchange reserves.

In accordance with David Hume's theory of export > import, so that the trade balance will be surplus. Similarly, the theory of mercantilism of the number of exports should be greater than imports. This result is in line with the research of [1] and [2].

4.2.2. Import Effect on the Indonesia's Foreign Exchange Reserves

Based on the partial test results of import has significant effect on the Indonesia's foreign exchange reserves, which indicated by the coefficient value of (-4.146602) < 1.68709. It means that if the import increases 1 unit, it will result in the foreign exchange reserves diminution of USD (-4.146602) million from its original value. This result indicates that the import has a significant and negative effect on the foreign exchange reserves, in accordance with the theories of the mercantilism, especially Hume's theory.

The results of this study are in line with [1] and [2] research which stated that import has a negative and significant effect on foreign exchange reserves, because if import increases then foreign exchange reserves will be reduced.

4.2.3 The Effect of Rupiah Exchange Rates on the Indonesia's Foreign Exchange Reserves

The rupiah exchange rates had negatively and significantly effect on the Indonesia's foreign exchange reserves with a coefficient value of (-5.291889) < 1.68709 with a probability of 0.0000 at α = 5 percent. That is explained, if the exchange rates rise by 1 unit, then foreign exchange reserves will decrease by USD (-5.291889) million from their original value.

The results of this study are in line with the results of [1]. If the rupiah strengthens supported by stable economic conditions, then followed by stable foreign exchange reserves, this is due to investors' ability to invest in domestic financial markets which will result in a surplus on the current balance sheet so that foreign exchange reserves will also increase. The relationship of exchange rates and foreign exchange reserves can be explained through the phenomenon which shows that the more foreign exchange owned by the government and the population of a country means that the greater the ability of the country to transact in the international economy with the stronger the exchange rate will lead to more foreign exchange.

The weakening exchange rate will lower foreign exchange reserves are also impaired, the results of this study are in line with [12] where the results say the

exchange rate also has a negative and significant effect on foreign exchange reserves. According to [3], the better the exchange rates of a country then the better the economy because it can encourage investment, both foreign and domestic investment.

4.2.4. *The Effect of Foreign Investment on the Indonesia's Foreign Exchange Reserves*

Foreign investment has a positive and significant effect with a coefficient value of 1.877463 > 1.68709 and probability 0.0605. α = 5 percent. Where if it rises 1 unit then the foreign exchange reserves will increase by USD 1.877463 million. Foreign investment is very important for the wheels of the economy because it can fill the foreign exchange.

This is in line with research from [7] where the result is that foreign investment has a positive and significant effect on foreign exchange. Therefore, incoming investment can encourage the increase of foreign exchange reserves if managed properly. Meanwhile, according to [11], foreign investment has a negative and significant impact on the Indonesia's foreign exchange reserves.

4.2.5. *The Effect of Foreign Debt on the Indonesia's Foreign Exchange Reserves*

This is indicated by a coefficient value of 12.05835 > 1.68709 with a probability of 0.0000 at α = 5 percent. Where foreign debt is positive and significant, if foreign debt is the increase in foreign exchange reserves has been boosted by foreign debt. Foreign debt is a loan or grant as well as the purpose of debt to build and cover underfunding to encourage foreign exchange growth.

This is in line with the research of [11] and [14] whose research said foreign debt has a significant positive effect on foreign exchange reserves because the greater the foreign debt then the balance of capital increases and impacts the balance of payments.

4.2.6. *Effect of Inflation on the Indonesia's Foreign Exchange Reserves*

Inflation in this study had a negative and insignificant effect on the Indonesia's foreign exchange reserves indicated by a coefficient value of (-0.837901) < 1.68709 means that if inflation increases then the foreign exchange reserves increase by -0.837901 percent.

Inflation can affects foreign exchange reserves because if the price of goods rises it will cause changes in the exchange rate because it can cause a gap between supply and demand, in addition to inflation can also lead to a rise in the price of food and fuel oil, if it happens continuously will result in a decrease in foreign exchange reserves.

These results are in line with the research of [10] where if inflation is high it will cause changes in the exchange rate and affect foreign exchange reserves.

5. CONCLUSION

The estimated result with the GARCH model (2.1) can be concluded that simultaneously exports, imports, exchange rates, direct foreign investment, foreign debt and inflation have a significant impact on Indonesia's foreign exchange reserves. In addition, it can be concluded that partially the exports have a significant positive effect on Indonesia's foreign exchange reserves, imports have a significant negative effect on the Indonesia's foreign exchange reserves, the exchange rates have a significant and negative effect on the Indonesia's foreign exchange reserves, foreign direct investment has a positive effect on the Indonesia's foreign exchange reserves, foreign debt has a significant positive effect on the Indonesia's foreign exchange reserves, and finally, inflation negatively and insignificantly affects the Indonesia's foreign exchange reserves.

In overcoming Indonesia's economic problem in this regard, the government is expected to continue to take attention to the position Indonesia's foreign exchange reserves, by increasing exports, and reducing imports, and maintaining the stability of the rupiah/USD exchange rates. It is hoped that Bank of Indonesia as the Central Bank will always maintain the condition of the Indonesia's foreign exchange reserves so that international transaction can take place in a stable manner. This is because the position of the Indonesia's foreign exchange reserves is said to be safe if it is sufficient for import needs for a period of at least three months of import. Foreign investment is not only able to fill the domestic investment gap but also to fill the foreign exchange void. Concern about the adverse effects of investment will be lessened if there is clear monitoring and objective of the incoming foreign investment. Foreign debt must really be able allocated or used for productive activities so that it will increase the high foreign return. For the future researchers, it suggested to added other research variables in addition to variables in the model that can affect the Indonesia's foreign exchange reserves and increase the observation period by following the development of the observations.

AUTHORS' CONTRIBUTIONS

Author's contributions in this research can explain that exports have a positive relationship and influence foreign exchange reserves. The exchange rates affect a negatively and significantly on Indonesia's foreign exchange reserves. Foreign investment has a positive and significant effect, and foreign debts have positive and significant effect on foreign exchange reserves.

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REFERENCES

[1] Agustina, R. Pengaruh ekspor, impor, nilai tukar rupiah, dan tingkat inflasi terhadap cadangan devisa indonesia. *Jurnal Wira Ekonomi Mikroskil*, *04*(02), pp. 61–70. 2014.

[2] Benny, J. Ekspor Dan Impor Pengaruhnya Terhadap Posisi Cadangan Devisa Di Indonesia. *Jurnal Riset Ekonomi, Manajemen, Bisnis Dan Akuntansi*, *1*(4), 1406–1415. 2013.

[3] Frederic S. Mishkin. *The Economics of Money, Banking, and Financial Markets* (Eight). Pearson Education, Inc. 2008.

[4] Krugman, Paul R. & Obstfeld, Maurice, Melitz, M. J. *International Economics: Theory and Policy* (Nine). Pearson Education, Inc. 2012.

[5] Kuswantoro, M. Analisis Pengaruh Inflasi, Kurs, Utang Luar Negeri Dan Ekspor Terhadap Cadangan Devisa Indonesia. *Tirtayasa Ekonomika*, *12*(1), 146. 2017.

[6] Lipsey, Richard G, Steiner, Peter O, Purvis, Douglas D, Courant, P. N. *Economics* (Ninth). Harper & Row. 1990.

[7] Murni, Lestari, L., & Swara, W. Pengaruh Penanaman Modal Asing Terhadap Cadangan Devisa Indonesia Studi Kasus Sebalum Dan Sesudah Krisis Global. *E-Jurnal Ekonomi Pembangunan Universitas Udayana*, *5*(5), 631–651. 2016.

[8] https://www.bi.go.id

[9] https://bps.go.id

[10] Putra, I. B. P. P., & Indrajaya, I. G. Pengaruh Tingkat Inflasi, Utang Luar Negeri Dan Suku Bunga Kredit Terhadap Cadangan Devisa Indonesia Tahun 1996-2011. *E-Jurnal EP Unud*, *2*(11), 533–538. 2013.

[11] Putri, H., Indrawati, T., & Widayatsari, A. Pengaruh Ekspor, Penanaman Modal Asing, Dan Utang Luar Negeri Terhadap Cadangan Devisa Di Indonesia. *Jurnal Online Mahasiswa Fakultas Ekonomi Universitas Riau*, *4*(1), 240–252. 2017.

[12] S, D. D., & Zuhroh, I. Analisa Cadangan Devisa Indonesia Tahun 1990-2016. *Jurnal Ilmu Ekonomi*, *2*(1), 119–131. 2018.

[13] Salvator D. *International Economics Theory and Policy*. Wiley John and Sons. 2014.

[14] Sayoga, P., & Tan, S. Analisis cadangan devisa Indonesia dan faktor-faktor yang mempengaruhinya. *Jurnal Paradigma Ekonomika*, *12*(1), 25–30. 2017.

[15] Tambunan, T. 70-Article Text-198-1-10-20160811.pdf. In *Ekonomi dan Pembangunan* Vol. 18, Issue 1, pp. 21–35. 2010.

[16] Warjiyo, Perry & Juhro, S. M.. *Central Bank Policy Theory and Policy* (First). Emerald Publishing Limited. 2019.