# Long-Term Impact of Inflation and Macroeconomic Variables on Foreign Exchange Reserves in the Organization of Islamic Corporation

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*Abstract: -* This study examines the long-term influence of inflation variables, Gross Domestic Product (GDP), exports, imports, and remittance receipts in 7 countries of the Organization of Islamic Cooperation (OIC). This research is expected to contribute to OIC countries related to increasing foreign exchange reserves through inflation control, increasing export diversification, decreasing imports, and increasing remittances while still paying attention to people working abroad. Thus, it can improve the economic level of the OIC country and support international peace and security and protect the holy places of Muslims.

## 1 Introduction

Islam is one of the religions with the second most prominent adherents globally. According to [1], the religion with the most followers is Christianity, with 2.38 billion people; the second is Islam, with more than 1.91 billion people. The size of the Islamic population, and in the current, every country certainly needs other countries so that the needs of its population are met, so they carry out international cooperation. The Organization of Islamic Corporations (OIC) is one form of international cooperation.

According to the official website, the OIC is the second largest organization after the United Nations (UN), with 57 members. The formation of the OIC was motivated by the concerns of Islamic countries or the majority of the Muslim population with the problems faced by Muslims, especially the Zionists who burned part of the holy Al-Aqsa mosque in 1969, [2]. So that the purpose of the OIC is to increase Islamic solidarity among member countries, coordinate cooperation between member countries, support international peace and security, protect Islamic holy places, and help the struggle for independence of the Palestinian state. In addition to aiming in terms of politics, OIC is currently a forum for establishing cooperation in the economic, social, cultural, and scientific fields.

Research, [3], found that most OIC member countries are still in the developing stages of economics. Oeconomicsr countries formed the Developing Eight (D-8) to gather the strengths of Islamic countries to improve the welfare of the people of their member countries through economic and social development. The D-8 members are Bangladesh, Iran, Indonesia, Egypt, Malaysia, Nigeria, Pakistan, and Turkey.

One of the efforts that can be made to increase economic development is to pay attention to the balance of payments related to foreign exchange reserves owned by a country. Foreign exchange reserves are a significant monetary indicator in showing the strength or weakness of a country's economy, [4]. Foreign exchange reserves are

valuable and liquid assets owned by a nation, and their value is accepted and recognized by the international community. It can be used as legal tender for governments or countries in international transactions, [5]. The following is data on foreign exchange reserves in 7 OIC countries.
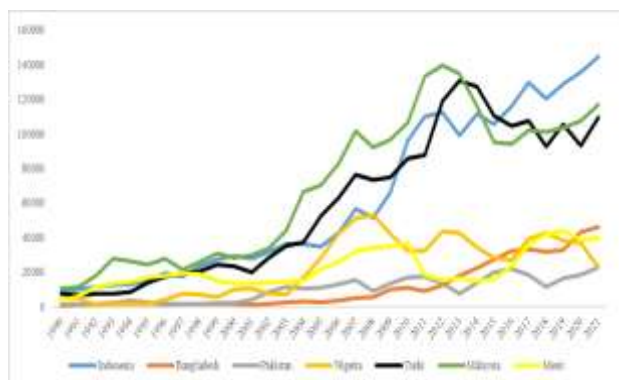


Fig. 1: Foreign Exchange Reserves of 7 OIC Countries 1990-2021 (In Million USD)
*Source: World Bank (2022)*

Based on Figure 1, it can be seen that the foreign exchange reserves in the 7 OIC countries fluctuated throughout the year. The country with the highest relative foreign exchange reserves compared to 6 other countries is Malaysia, with an average foreign exchange reserve of 69556.41 million USD. Next is Indonesia, with a moderate foreign exchange reserve of 62084.16 million USD. The third highest foreign exchange reserve is Turkey at 59260.99 USD, followed by Nigeria at 22887.31 million USD, Egypt at 21972.22 million USD, Bangladesh at 11817.17 million USD, and Pakistan at 9993.509 million USD. The receipt of foreign exchange reserves in each country differs in several factors influencing this actor. Research from [6], states that foreign exchange reserves are affected by exports, imports, exchange rates, and the consumer price index (CPI).

In addition, [7], factors affects foreign exchange reserves: exports, inflation, and foreign debt. Inflation is a condition of continuously increasing the general price of goods during a specific period, [8]. Research conducted by, [9], found that inflation negatively and significantly affects foreign exchange reserves. Meanwhile, [10], research found that inflation did not affect substantially impact accounts. The difference between these studies is that they used the unseeable see its effect impact foreign exchange impact nerves in 7 OIC countries from 1990-2021. The entire follow from graph of the average inflation and foreign exchange reserves in 7 OIC countries from 1990 to 2021.



Fig. 2: Average Inflation and Foreign Exchange Reserves in 7 OIC Countries 1990-2021
*Source: World Bank, Processed (2022)*

Graphically, based on Figure 2, it is known that inflation and foreign exchange reserves are negatively related. It is known that Turkey has the highest average inflation rate. This condition is contrary to Turkey's average foreign exchange reserves, which occupy the third position compared to other countries. With the lowest average inflation, Malaysia has the highest average foreign exchange reserves compared to 6 differentr countries. The phenomenon in OIC countries is inversely proportional to research conducted by [11], which found that inflation significantly positively affected foreign exchange reserves. The inflation rate has a positive effect on foreign exchange reserves. If the prices of goods and the service sector tend to increase or are called inflation, it will cause a hampering of economic activity in the country concerned. So, the country needs more foreign exchange to transact outside the country.

According to [12] and [13], one macroeconomic variable affecting foreign exchange reserves is Gross Domestic Product (GDP). Study, [14], found that GDP negatively and significantly affects foreign exchange reserves. This result is in contrast to [15], research which found that GDP had a significant positive effect on foreign exchange reserves. Based on the differences in the results of these studies, this study uses the GDP variable to see its impact on foreign exchange reserves in 7 OIC countries. The following is the average GDP and foreign exchange reserves in the 7 OIC countries for 1990-2021.
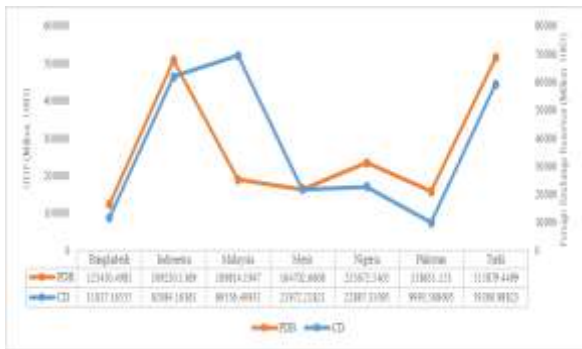
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Fig. 3: Average GDP and Foreign Exchange Reserves in 7 OIC Countries 1990-2021
*Source: World Bank, Processed (2022)*

Based on Figure 3, it is known that the highest GDP compared to other countries is Turkey, at 51.5879.4499 million USD. This is accompanied by the high average foreign exchange reserves owned by Turkey. This condition is in line with research conducted by [16], which reveals that the positive relationship between GDP and foreign exchange reserves stays with the Monetary Approach Balance of Payment (MABP) theory, where GDP will affect the balance of the domestic market through changes in domestic money demand. At the same time, Bangladesh's lowest average GDP and Pakistan's foreign exchange reserves are the fifth lowest before Pakistan, with the most insufficient foreign exchange reserves. Shows the other factors that affect foreign exchange reserves.

International trade l export-import activities also affect foreign exchange reserves. Based on research conducted by [6], using export and import variables to see their effect on foreign exchange reserves. The study restudies, [6], found that exports had a significant positive effect on foreign exchange reserves while imports had a significant adverse impact on foreign exchange reserves. This result is in contrast to research conducted by [17], which found that exports hurt foreign exchange reserves, and research conducted by [18], which found that imports did not affect foreign exchange reserves. The difference in the results of previous studies so that this study includes export and import variables to see their impact on foreign exchange reserves. The following are the average foreign exchange reserves, exports, and imports in the 7 OIC countries for 1990-2021.



Fig. 1: Average Foreign Exchange Reserves, Exports, and Imports in 7 OIC Countries 1990-2021
*Source: World Bank, Processed (2022)*

Based on Figure 4, it is known that the highest export value is Malaysia, and the lowest value is Bangladesh. The high export value in Malaysia is in line with the high foreign exchange reserves in Malaysia. At the same time, Bangladesh, with the lowest exports, has relatively lower foreign exchange reserves than other countries. Malaysia has the highest average import, and Nigeria has the lowest import value Nigeria. An interesting phenomenon occurs in Malaysia, where Malaysia has the highest export value, import value, and foreign exchange reserves compared to 6 other OIC countries.

The following variable that affects foreign exchange reserves is the receipt of remittances. Remittance is transferring funds carried out by individuals or companies using the services of a bank or non-bank financial institution, generally carried out without the basis of fulfilling a financial obligation imposed. Remittances are transfers by migrant workers to families in the country of origin, usually in t, usually goods. Remintasni has become an alternative source of foreign exchange used for external financing in addition to government loans and private investment in many developing countries, [19], [20]. The followings are the average remittances and foreign exchange reserves in 7 OIC countries for 1990-2021.
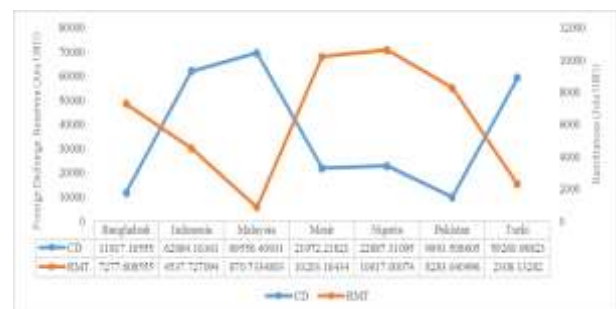


Fig. 5: Average Remittance and Foreign Exchange Reserves in 7 OIC Countries 1990-2021
*Source: World Bank, Processed (2022)*

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Figure 5 shows that the highest receipt of remittances is Nigeria, but unfortunately, the remittances received have yet to be able to increase foreign exchange reserves. This can be seen from Nigeria's foreign exchange reserves which are below the average. This existing phenomenon is inversely proportional to the research conducted by [21], which found that remittances had the most significant impact on foreign exchange reserves.

Based on the background that has been described where there is a research gap between previous research and phenomena in the countries of the Organization of Islamic Cooperation, the formulation of the problem of this research is whether there is a long-term relationship and the influence of inflation, GDP, exports, imports, and remittances on foreign exchange reserves in OIC countries in 1990-2021? This study aims to determine the long relationship and the effect of inflation, GDP, exports, imports, and remittances on foreign exchange reserves in OIC countries in 1990-2021. Based on the purpose of this study, the Fully Modified Least Squares (FMOLS) method was used. So the novelty of this study is a combination of variables used to see the influence of foreign exchange reserves, research objects, and the year of analysis compared to previous studies. This research is likely helpful for policymakers in making decisions related to increasing foreign exchange reserves.

## 2 Literature Review

According to [22], foreign exchange reserves are several currencies stored and used to pay for transactions, especially in international trade. Foreign exchange reserves are a significant monetary indicator in showing the strength or weakness of a country's economy, [23]. As a means of international transactions, the position of a country's foreign exchange reserves is vital in international trade transactions with other countries. So it is essential to know the factors that affect a country's foreign exchange reserves.

Based on the Monetary Approach Balance of Payment (MABP) theory, when a devaluation policy causes a price increase, it will tend to increase inflation, increasing the demand for money. Inflation occurs due to the rise in the money supply, usually due to the easing of interest rates, which impacts rising domestic prices. The increase in domestic prices tends to reduce the foreign people's interest in household buying domains, which comes painted by high domestic demand for foreign goods.

This impacts the balance of payments deficit and reduces a country's foreign exchange reserves. Research conducted by [24], found that inflation negatively and significantly affects foreign exchange reserves.

MABP theory, [25], suggests that Gross Domestic Product (GDP) affects the balance of the domestic money market through changes in domestic money demand. When the increase in the need for money in the community is accompanied by the rise in interest rates so that the money supply does not increase and minimize inflation when the interest rate is raised, domestic credit will decrease, and this is accompanied by the interest of foreign investors to hunt for the domestic currency. This condition will increase the inflow of foreign currency into the country and impact the balance of payments surplus marked by an increase in foreign exchange reserves. Thus, according to MABP theory, the relationship between GDP and foreign exchange reserves is positive. The results of research conducted, [15] align MABP theory that GDP positively affects foreign exchange reserves.

[26], in MABP theory, reveals that an increase in exports will increase the stock of nominal money in the country. If then the price level in the country rises, for example, because people experience an increase in income, [27]. In such a situation, a balance of payments surplus occurs. Then, there is an increase in foreign exchange reserves caused by changes in the country's exports with the assumption of ceteris paribus. Based on research conducted by [27], [28], found that exports positively affect foreign exchange reserves. Export activities are in contrast to import activities. The MABP theory reveals that when imports increase, the stock of nominal domestic money will decrease, [26]. With such conditions, it causes a balance of payments deficit and results, resulting in foreign exchange reserves. So, according to the MABP theory, imports hurt foreign exchange reserves. This result is in line with research conducted by.

In addition to inflation, GDP, exports, and imports, some variables affect foreign exchange reserves. Based on research conducted, it is stated that foreign exchange reserves are needed to pay import bills, and remittances can provide an alternative to reduce the problem of shortages of foreign exchange reserves in developing countries. Thus, the remittances are recorded in the balance of payments. So any remittance increase will affect the current account surplus and increase foreign exchange reserves. [21], research that remittances positively affect budgets.

Based on the explanation above, the hypotheses in this study are:

$H_1$ : Inflation hurts foreign exchange reserves.

$H_2$ : GDP has a positive impact on foreign exchange reserves

$H_3$ : Exports have a positive effect on foreign exchange reserves.

$H_4$ : Imports hurt foreign exchange reserves.

$H_5$ : Remittances have a positive impact on foreign exchange reserves.

# 3 Problem Solution

## 3.1 Types and Sources of Research Data
This research is descriptive and quantitative. This research data is secondary data obtained from the official website of the World Bank. This study uses five independent variables, namely inflation, GDP, exports, imports, and remittances, and the dependent variable in this study is foreign exchange reserves. This study uses panel data with seven cross-sections and time series from 1990-2021.

## 3.2 Population and Sample
This study uses OIC state objects that are joined in D-8. These countries are Bangladesh, Egypt, Iran, Indonesia, Malaysia, Nigeria, Pakistan, and Turkey. However, the lack of availability of Iranian data was not included in this study, so the objects of this research are (1) Bangladesh, (2) Egypt, (3) Indonesia, (4) Malaysia, (5) Nigeria, (6) Pakistan, and (7) Turkey.

## 3.3 Measurement of Research Variables
The following explains the variables that are the center of the analysis to provide research direction in Table 1.

Table 1. Variable Operational Definition

| Variable | Source | Measuring Scale |
|---|---|---|
| Foreign exchange reserves | World Bank | Total reserves consist of monetary gold holdings, special ownership rights, reserves of IMF members held by the IMF, and assets under financial control. |
| Inflation | World Bank | The ratio of GDP in current local currency to GDP in constant currency. |
| Gross Domestic Product (GDP) | World Bank | The total value of final goods and services produced by a country. |
| Export | World Bank | The total value of other market goods and services rendered worldwide. |
| Import | World Bank | The total value of other market goods and services received worldwide. |
| Remittance | World Bank | Personal remittances consist of private transfers and employee compensation. |

## 3.4 Research Techniques

The method used in this study was FMOLS. This method was chosen because it is the purpose of this study, namely to determine the long-term effect of inflation, GDP, exports, imports, and remittances on foreign exchange reserves in countries of Islamic cooperation organizations. FMOLS method to analyze the long-term impact between independent variables on the dependent variable, [29]. FMOLS method is used for panel data that is not stationary and heterogeneous between panel members; this can lead to false regressions with no economic significance, [30]. For FMOLS estimation, two conditions are needed: the dependent variable and the independent variable, which is not stationary at the level and must have a cointegration relationship between variables. After that, the FMOLS test can be performed. FMOLS provides a consistent examination of the general value for the cointegration vector under the null hypothesis to the value of the cointegration vector that is not necessarily common under the alternative view, while the estimators collected in the dimensions are not, [30]. The model, in general, can be stated as follows.

$$LNCD_{it} = \begin{array}{l} -\beta_1 INF_{it} + \beta_2 LNGDP_{it} + \beta_3 EKS_{it} - \\ \beta_4 IMP_{it} + \beta_5 LNRMT_{it} + \varepsilon_{it} \end{array} \quad (1)$$

Where:

| | | |
|---|---|---|
| LNCD | : | Natural logarithm of foreign exchange reserves (Billion USD) |
| INF | : | Inflation (Percent) |
| LNGDP | : | Natural logarithm of Gross Domestic Product (Billion USD) |
| EKS | : | Export (Percent) |
| IMP | : | Imports (Percent) |
| LNRMT | : | Logarithm natural Remittance (Billion USD) |
| $\beta_{1,2,3,4,5}$ | : | Regression coefficient |
| i | : | Cross section (7 OIC countries) |
| t | : | Time series (1990-2021) |
| $\varepsilon$ | : | Residual |

The first condition is data stationarity. The panel unit root test aims to ensure that the data used in this study is stationary and to avoid spurious regression between the dependent and independent variables, [31]. The test statistics used in testing the unit root panel consist of two types: the standard unit root, which consists of Levin, Lin, and Chu (LLC), and Breitung's test statistics. In contrast, the individual unit root consists of lm, Pesaran, and Shin (IPS) test statistics, ADF-Fisher test, and Phillips Perron (PP)-Fisher test, [32], for the hypothesis is.

$H_0: \alpha_i = 0$     (there is a unit root, it is not stationary)
$H_a: \alpha_i \neq 0$     (no unit root, stationary)

The decision is that if the probability value is smaller than the significance level, it accepts $H_a$. The second condition is the cointegration test. The concept of cointegration determines the possibility of a long-term equilibrium relationship between the variables to be observed, [33]. Johansen's trial is one of the tests that can evaluate the cointegration of several variables, [31]. This test is carried out after the static test because the variables to be observed need to be tested for cointegration to see whether there is a long-term relationship between variables or integrated.

The hypothesis developed for the cointegration test is as follows:
$H_0$ : There are no cointegration variables
$H_a$ : Variables have cointegration

The decision is to accept Ha when the probability value is less than the significance level. After all the tests meet the requirements, the FMOLS estimation is carried out.

# 4 Results and Analysis

## 4.1 Research Result

### 4.1.1 Descriptive Statistical Analysis

The results of this research object, one of which explains related to descriptive statistics. Descriptive statistics include the average, maximum, minimum, and standard deviation. Based on Table 2, the average value of foreign exchange reserves (CD) in the 7 OIC countries in 1990-2021 is 36,800,000,000 billion USD. Countries that have above-average foreign exchange reserves are Malaysia, Indonesia, and Turkey. Meanwhile, countries with below-average foreign exchange reserves are Nigeria, Egypt, Bangladesh, and Pakistan. The maximum value of foreign exchange reserves during the period 1990-2021 occurs in 2021 in Indonesia, which is 145,000,000,000 billion USD. At the same time, the lowest foreign exchange reserves occurred in 1990 in Bangladesh, which amounted to 660,000,000 billion USD. The value of the standard deviation of the foreign exchange reserve variable is 38,200,000,000.

The average inflation (INF) value in the 7 OIC countries for 1990-2021 is 13.39004 percent. Countries that have inflation values above the average are Turkey and Nigeria. Meanwhile, countries with below-average inflation are Indonesia, Egypt, Pakistan, Bangladesh, and Malaysia. The highest inflation during 1990-2021 occurred in 1998 in Turkey, which amounted to 143.6397 percent. Meanwhile, Malaysia's lowest inflation occurred in 2009 at -5.992202 percent. The standard deviation value of the inflation variable is 18.62723.

The average GDP value in the 7 OIC countries for 1990-2021 is 271,000,000,000 billion USD. Countries with above-average GDPs are Turkey and Indonesia, while countries with below-average GDPs are Nigeria, Malaysia, Egypt, Pakistan, and Bangladesh. The country with the highest GDP value during the 1990-2021 range occurred in 2021 in Indonesia, which was 1,190,000,000 billion USD, while the country with the lowest GDP value occurred in 1993 in Nigeria. The standard deviation value of the GDO variable is 262,000,000,000.

The average value of exports (EKS) in the 7 OIC countries in 1990-2021 is 29,91803 percent—the country with an export value above the average in Malaysia. Meanwhile, countries with below-average export values are Indonesia, Turkey, Nigeria, Egypt, Pakistan, and Bangladesh. The country with the highest export value during the

1990-2021 period was Malaysia in 1999, which amounted to 121.3114 percent, while the country with the lowest export was Bangladesh in 1990 at 5,90831600. The standard deviation of the export variable is 26.30355.

The average import value (IMP) in the 7 OIC countries from 1990-2021 is 29.82563 percent—the country with an import average above the average in Malaysia. Meanwhile, six other countries, Egypt, Turkey, Indonesia, Bangladesh, Pakistan, and Nigeria, have an average import value below the average. The country with the highest import was Malaysia in 2000, reaching 29,82563 percent, while the country with the lowest essence was Nigeria in 1994 with only 5,90831600 percent. The standard deviation of the imported variable is 21.35842.

The average value of remittances (RMT) is 6,300,000,000 billion USD. Countries with above-average remittances are Nigeria, Egypt, Pakistan, and Bangladesh. At the same time, the remittance countries below the average are Indonesia, Turkey, and Malaysia. The country with the highest remittance recipient was Egypt in 2020 at 29,600,000,000 billion USD, while the country with the lowest remittance recipient was Nigeria at 10,008,540 billion USD in 1990. The standard deviation of the remittance variable was 7,190,000,000.

Table 2. Descriptive Statistical Analysis

| Variable | Mean | Maximum | Minimum | Std. Dev. | Observations |
|---|---|---|---|---|---|
| CD | 36,800,000,000 | 145,000,000,000 | 660,000,000 | 38,200,000,000 | 224 |
| INF | 13.39004 | 143.6397000000 | -5.99220200 | 18.62723 | 224 |
| GDP | 271,000,000,000 | 1,190,000,000,000 | 27,800,000,000 | 262,000,000,000 | 224 |
| EKS | 29.91803 | 121.3114000000 | 5.90831600 | 26.30355 | 224 |
| IMP | 29.82563 | 100.5971000000 | 9.50999000 | 21.35842 | 224 |
| RMT | 6,300,000,000 | 29,600,000,000 | 10,008,540 | 7,190,000,000 | 224 |

*Source: EViews (2022)*

Table 3. Unit-Root Panel Test

| | | Intercept | | Intercept and Trend | |
|---|---|---|---|---|---|
| | | Level | 1st different | Level | 1st different |
| LNCD | LLC | 0.0137* | 0.0000* | 0.5731 | 0.0000* |
| | Breitung | - | - | 0.1928 | 0.0000* |
| | IPS | 0.4727 | 0.0000* | 0.5893 | 0.0000* |
| | ADF-Fisher | 0.5191 | 0.0000* | 0.5941 | 0.0000* |
| | PP-Fisher | 0.4066 | 0.0000* | 0.8023 | 0.0000* |
| INF | LLC | 0.0046* | 0.0000* | 0.0162 | 0.0000* |
| | Breitung | - | - | 0.0000 | 0.0000* |
| | IPS | 0.0000* | 0.0000* | 0.0000 | 0.0000* |
| | ADF-Fisher | 0.0000* | 0.0000* | 0.0000 | 0.0000* |
| | PP-Fisher | 0.0000* | 0.0000* | 0.0000 | 0.0000* |
| LNGDP | LLC | 0.5944 | 0.0000* | 0.8574 | 0.0000* |
| | Breitung | - | - | 0.2805 | 0.0000* |
| | IPS | 0.9949 | 0.0000* | 0.8081 | 0.0000* |
| | ADF-Fisher | 0.9969 | 0.0000* | 0.8338 | 0.0000* |
| | PP-Fisher | 0.9987 | 0.0000* | 0.9635 | 0.0000* |
| EX | LLC | 0.2377 | 0.0000* | 0.3933 | 0.0000* |
| | Breitung | - | - | 0.4808 | 0.0000* |
| | IPS | 0.3546 | 0.0000* | 0.3981 | 0.0000* |
| | ADF-Fisher | 0.5274 | 0.0000* | 0.4282 | 0.0000* |
| | PP-Fisher | 0.3025 | 0.0000* | 0.0917 | 0.0000* |
| IMP | LLC | 0.2454 | 0.0000* | 0.1707 | 0.0000* |
| | Breitung | - | - | 0.0391 | 0.0000* |
| | IPS | 0.0580 | 0.0000* | 0.0492 | 0.0000* |
| | ADF-Fisher | 0.0631 | 0.0000* | 0.0546 | 0.0000* |
| | PP-Fisher | 0.0205 * | 0.0000* | 0.0018 | 0.0000* |
| LNRMT | LLC | 0.0006 * | 1.0000 | 1.0000 | 1.0000 |
| | Breitung | - | - | 1.0000 | 1.0000 |
| | IPS | 0.1154 | 0.0024 * | 0.9998 | 0.0504 |
| | ADF-Fisher | 0.1736 | 0.0076 * | 0.9863 | 0.0843 |
| | PP-Fisher | 0.3440 | 0.0000 * | 0.9764 | 0.0000 * |

*Source: EViews (2022)*
*Note: * Significant to 5%*

### 4.1.2 Stationarity Test

To avoid spurious regression between independent and dependent variables, the data must be stationary through the unit-root panel test, [31]. In this study, the unit-root panel test used was an individual unit root test using the Augmented Dickey-Fuller (ADF) method. The following is a test table for the unit-root panel test using the ADF method.

Based on Table 3, it is known that all variables are stationary at the first different level. This can be seen from the probability value of less than $\alpha = 0.05$.

Thus, the next test can be carried out, namely the cointegration test.

### 4.1.3 Cointegration Test

The cointegration test is used to determine the existence of a long-term equilibrium relationship between the variables used, [33]. The cointegration test used in this study is the Kao Residual Cointegration Test. The Kao cointegration test has a cross-sector-specific intercept and a homogeneous coefficient on the first-level regressor, [30]. The

following are the results of the cointegration test using the Kao method.

Table 4. Kao Method Cointegration Test

|  | t-Statistic | Prob. |
|---|---|---|
| ADF | -3.722119 | 0.0001 |

*Source: EViews 10*

Based on Table 4, it is known that the probability value of 0.0001 is smaller than the value of which is 0.05. Thus, based on this value, it can be concluded that all variables have a long-term relationship. Both Fully Modified-OLS (FMOLS) panel data analysis requirements have been met. So the next step is the regression of the FMOLS model.

### 4.1.4 Fully Modified-OLS (FMOLS) Test

FMOLS panel analysis can be used to determine the long-term impact of the influence of inflation, GDP, exports, imports, and remittances variables on foreign exchange reserves. The following is the output of the FMOLS regression results.

Table 5. FMOLS Method Regression Results

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| INF | -0.006037 | 0.003327 | -1.814577 | 0.0711 |
| LNPDB | 1.014681 | 0.115175 | 8.809923 | 0.0000 |
| EX | 0.023666 | 0.009428 | 2.510260 | 0.0128 |
| IMP | -0.010145 | 0.012070 | -0.840495 | 0.4016 |
| LNRMT | 0.085241 | 0.068177 | 1.250294 | 0.2126 |
| R-squared | 0.909987 | Mean dependent var | | 23,73617 |
| Adjusted R-squared | 0.905158 | SD dependent var | | 1.264148 |
| SE of regression | 0.389313 | Sum squared resid | | 31.07082 |
| Long-run variance | 0.365497 | | | |

*Source: EViews 10*

Based on Table 5, the following equation results are obtained:

$$LNCD_{it} = -0.006037INF_{it}* +1.014681LNGDP_{it}* + 0.023666EKS_{it}* - 0.010145IMP_{it} + 0.085241LNRMT_{it} \quad (2)$$

Note: * is significant at $\alpha = 0.05$

The inflation regression coefficient is -0.006037, meaning that if inflation increases by 1 percent, then foreign exchange reserves in the 7 OIC countries, in the long run, will decrease by 0.6037 percent, ceteris paribus. The GDP regression coefficient is 1.014681, meaning that if GDP increases by 1 percent, then foreign exchange reserves in 7 OIC countries, in the long run, will increase by 1.014681 percent, ceteris paribus.

The export regression coefficient is 0.023666, meaning that if exports increase by 1 percent, then foreign exchange reserves in 7 OIC countries, in the long run, will increase by 2.3666 percent, ceteris paribus. The import variable hurt foreign exchange reserves, and the remittance variable positively

impacted foreign exchange reserves in 7 OIC countries from 1990-2021.

The following is a t-test to see the effect of each free variable on the bound variables.

Table 6. t-test results

| Variable | t-statistics | t-table | Information |
|---|---|---|---|
| INF | -1.814577 | 1.652107 | Significant |
| LNPDB | 8.809923 | 1.652107 | Significant |
| EX | 2.510260 | 1.652107 | Significant |
| IMP | -0.840495 | 1.652107 | Not significant |
| LNRMT | 1.250294 | 1.652107 | Not significant |

*Source: EViews (2022)*

Table 6 shows the influence of individual free variables: inflation, GDP, exports, imports, and remittances on reserves in 7 OIC countries from 1990-2021.

Inflation variable (INF) with a t-statistic value of -1.814577, more significant than the t-table value of 1.652107. Based on the comparison of t-statistical and t-table values, it is concluded that the inflation variable has a negative and significant effect on foreign exchange reserves in 7 OIC countries from 1990-2021.

GDP variable (LNPDB) with a t-statistic value of 8.809923, more significant than the t-table value of 1.652107. Based on the comparison of t-statistical and t-table values, it is concluded that the GDP variable has a positive and significant effect on foreign exchange reserves in 7 OIC countries from 1990-2021.

Export variable (EKS) with a t-statistic value of 2.510260, more significant than the t-table value of 1.652107. Based on the comparison of t-statistics and t-table values, it is concluded that the export variable has a positive and significant effect on foreign exchange reserves in 7 OIC countries from 1990-2021.

Import Variable (IMP) with a t-statistic value of -0.840495, smaller than the t-table value of 1.652107. Based on the comparison of t-statistical and t-table values, it is concluded that the imported variable has a negative and insignificant effect on foreign exchange reserves in 7 OIC countries from 1990-2021.

The remittance variable (RMT) has a t-statistic value of 1.250294, smaller than the t-table value of 1.652107. Based on the comparison of t -statistical and t-table values, it is concluded that the remittance variable has a positive and insignificant effect on foreign exchange reserves in 7 OIC countries in 1990-2021.

The value of the coefficient of determination ($R^2$) is a measure of the model's ability to explain the dependent variable. Based on the FMOLS model's regression estimation results, the coefficient of determination ($R^2$) is 0.909987 or 90.9987 percent. This means that the independent variables of inflation, GDP, exports, imports, and remittances affect the foreign exchange reserves in the 7 OIC countries in 1990-2021 by 90.9987 percent, and the remaining 9.00013 percent is explained by other variables not included in the model.

## 4.2 Discussion

### 4.2.1 Effect of Inflation on Foreign Exchange Reserves

The results of this study indicate that inflation has a negative and significant effect on foreign exchange reserves in 7 OIC countries from 1990-2021. Foreign exchange reserves in the 7 OIC countries will decrease when inflation increases, and vice versa. When inflation decreases, foreign exchange reserves will increase. This study's results align with research conducted by [27], which found that inflation has a negative and significant effect on foreign exchange reserves. This research is also in line with research conducted by [24].

Inflation is a condition in which the general price increase of funds occurs continuously. This study's inflation indicator is the GDP deflator (percent). In the economic literature, the inflation rate equals the nominal money growth rate minus the economic growth rate, [34]. The inflation rate of each country is undoubtedly different. Inflation occurs due to an increase in the money supply, usually due to the easing of interest rates, which impacts increasing domestic prices. The increase in domestic prices tends to reduce foreign people's interest in buying domestic goods, accompanied by high demand for foreign goods. This impacts the balance of payments deficit and reduces a country's foreign exchange reserves. So, the long-term effect of inflation in 7 OIC countries is negative.

### 4.2.2 Effect of Gross Domestic Product (GDP) on Foreign Exchange Reserves

The results of this study show that GDP had a positive and significant impact on foreign exchange reserves in 7 OIC countries from 1990-2021. This means that when GDP increases, it is accompanied by an increase in foreign exchange reserves position. When GDP decreases, the foreign exchange reserves of the 7 OIC countries also decrease. These results align with, [35], research finding that GDP has a positive and significant

effect on foreign exchange reserves. This research also aligns with, [15].

This finding is also in line with the MABP theory, which is a condition where gross domestic product affects the balance of the domestic market with changes in the demand for domestic money. GDP is one indicator of a country's overall economic output; an increase in the population's welfare marks this. The higher the standard of living of the population, in addition to using their income for the consumption of goods and services, the people of a country choose to save their income in the form of time deposits or other forms of savings. Conditions like this impact the increasing demand for money and the growing GDP. The need for money in the community will be accompanied by an increase in interest rates so that the money supply does not increase and minimize inflation. This condition will increase the inflow of foreign currency into the country and impact the balance of payments surplus marked by an increase in foreign exchange reserves. Thus, there is a positive and significant relationship between GDP and foreign exchange reserves in the 7 OIC countries.

### 4.2.3 Effect of Exports on Foreign Exchange Reserves

The results of this study show that the export variable has a positive and significant effect on foreign exchange reserves in 7 OIC countries from 1990-2021. Foreign exchange reserves will increase if exports increase, and vice versa. If exports decrease, foreign exchange reserves will also decrease. The results of this study are in line with research conducted by [36], [37], [38], which shows that exports have a positive and significant influence on foreign exchange reserves. The results of this study are supported by [4].

Export is an international trade activity where domestic products are traded abroad. The relationship between exports and foreign exchange reserves is that exports generate a portion of foreign exchange, [10]. The purpose of export activities is, of course, to make a profit. Profits are obtained from foreign exchange and are included in the balance of payments. Export activities bring in foreign exchange, which the state can use to finance imports and domestic economic sectors. According to [39], the current account balance is influenced by several factors, shown in the following equation.

Current account balance  =  (Exports–Imports) +(Net income abroad +Net current transfers)          (3)

Equation (3) above shows the condition of foreign exchange reserves that can measure exports, imports, and capital flows. The increase in exports occurs when the terms of payment can help consumers from abroad and the increase in goods that come out. Export activities can stimulate local demand and help develop large industrial units to compete with countries with more advanced industries. Thus there is a positive influence between exports and foreign exchange reserves.

### 4.2.4 Effect of Imports on Foreign Exchange Reserves

The results of the FMOLS regression method show that the imported variable had a negative and insignificant impact on foreign exchange reserves in 7 OIC countries from 1990-2021. This means that an increase in imports causes a negligible decrease in foreign exchange reserves and vice versa. When imports decrease causes an insignificant rise in foreign exchange reserves, this study's results align with, [40]. A country carries out import activities when the government cannot produce itself. Domestic production cannot meet domestic needs, or foreign products are cheaper than domestic prices. Countries that import require high foreign exchange to pay for their transactions. This condition certainly causes a reduction in foreign exchange reserves owned by a government. The insignificant news of the imported variable to foreign exchange reserves is because OIC countries tend to import luxury goods, such as luxury cars. Thus, it can generate tax rates on imported luxury goods. The existence of luxury goods import tax fees paid by importers can add foreign exchange reserves, [41].

### 4.2.5 Effect of Remittances on Foreign Exchange Reserves

Based on the research results, the remittance variable has a positive and insignificant impact on foreign exchange reserves in 7 OIC countries from 1990-2021. An increase in remittances causes a negligible rise in foreign exchange reserves and vice versa. When remittances decrease causes an insignificant decrease in foreign exchange reserves.

Remittances from abroad to within the country positively impact foreign exchange reserves. Personal remittances from emigrants to families and fluctuating commodity prices arising from changes in world demand caused the flow of foreign currency to increase foreign exchange reserves. This condition is closely related to the exchange rate. A country's foreign exchange reserves will also increase when the rupiah appreciates. Research

states that foreign exchange reserves are needed to pay import bills, and remittances can provide an alternative to reduce the problem of shortages of foreign exchange reserves in developing countries.

The insignificance of the remittance variable to foreign exchange reserves is due to the value of imports owned by 7 OIC countries during the 1990-2021 range, which is still dominated by the high value of imports. As depicted in the following graph.
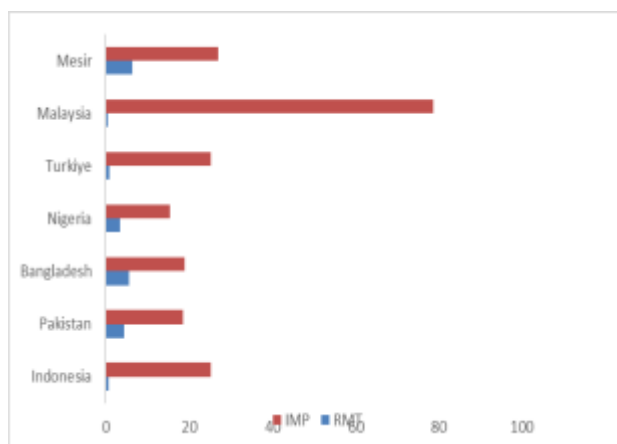


Fig. 6: Remittances (% GDP) and Imports (% GDP) in 7 OIC Countries Based on Averages per the Year 1990-2021
*Source: World Bank, processed (2022)*

Figure 6 shows that the average value of imports (% GDP) is higher than that of remittance receipts (% GDP) in 7 OIC countries from 1990-2021. Remittances provide additional foreign exchange reserves but are used again to pay for imported goods relatively higher than remittances. So remittances have a positive but insignificant effect on foreign exchange reserves in the long term.

## 5 Conclusion

The result of this study is that inflation has a negative and significant effect on foreign exchange reserves in the long term. The variables of GDP and exports have a positive and significant impact on foreign exchange reserves, as imports have an adverse and insignificant effect in the long term. And the receipt of remittances has positive and negligible long-term results on foreign exchange reserves in the seven countries of the Organization of Islamic Cooperation. The higher average value of imports than remittance receipts led to insignificant remittances to foreign exchange reserves in 7 OIC countries.

However, governments in all OIC countries should pay more attention to and protect workers

abroad. Exports also positively affect foreign exchange reserves; this indicates that each OIC country seeks to increase product diversification. The government can work with the private sector to boost export diversification. They are growing exports by paying attention to superior products improving quality and reducing production costs to attract foreign people to buy these products. The government should also strive to meet the needs of the domestic community optimally; this is done to reduce imports. In addition, the government can stabilize the macroeconomics through inflation control; this is done to maintain people's purchasing power to increase people's income.

This research can be developed for literature, especially by adding research objects. In this study using 7 OIC countries, there are 57 OIC member countries. This research for subsequent research can increase the number of research objects of OIC countries. In addition, it is also related to the method used. Further research can use techniques to see the short-term and long-term influence of inflation, GDP, exports, imports, and remittances on foreign exchange reserves to produce a more in-depth study.

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-I Wayan Suparta: Investigation, Data curation, Supervision, and Writing- Reviewing.

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**Conflicts of Interest**

The authors have no conflicts of interest to declare that are relevant to the content of this article.