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LONG-TERM IMPACT OF MACROECONOMIC VARIABLES ON FOREIGN EXCHANGE RESERVES IN THE ORGANIZATION OF ISLAMIC CORPORATION

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ABSTRACT

One of the factors that influence the country's economy is foreign exchange reserves. This study examines the long-term effect of inflation variables, Gross Domestic Product (GDP), exports, imports, and receipts of remittances in 7 countries of the Organization of Islamic Cooperation. This study uses secondary data panels in 7 countries of the Organization of Islamic Cooperation from 1990 to 2021. The method used in this analysis is the Fully Modified Ordinary Least Square (FMOLS) panel. The results of this study are the variables used are cointegrated in the long run. There are partially negative and significant effects on foreign exchange reserves in 7 countries of the Organization of Islamic Cooperation. GDP and exports have a significant positive effect on foreign exchange reserves. Imports have a negative and insignificant effect on foreign exchange reserves and receipts of remittances have a positive and insignificant effect on foreign exchange reserves in the 7 OIC countries from 1990-2021. This research is expected to contribute to the Cooperation Organization countries related to increasing foreign exchange reserves through macroeconomic control of inflation control, increasing export diversification, increasing export diversification, decreasing imports, and increasing remittances while still paying attention to people in work abroad. It is hoped that the increase in foreign exchange reserves that can improve the organization's economic level can optimize cooperation in Islamic Cooperation, namely to support international peace and security and protect the holy places of Muslims.

INTRODUCTION

Islam is one of the religions that has the second largest adherent in the world. According to the World Population Review (2022), the religion with the most adherents is Christianity, with 2.38 billion people, and second is Islam, which has more than 1.91 billion people. The size of the Islamic population and in the current era every country certainly needs other countries so that the needs of its population are met, so they carry out international cooperation. One form of international cooperation is the Organization of Islamic Corporations (OIC).

Reporting to the official website of th, OIC is the second largest organization after the United Nations (UN) which has 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 (Indonesian Ministry of Foreign Affairs, 2014). 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, and 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 from Yaumidin (2014) found that most of the OIC member countries are still in the developing and developing stages of economic deveent. The OIC member 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. This study chose a sample of countries of the Organization of Islamic Cooperation because this organization is the second largest organization after the United Nations, then to focus the research on choosing D-8 countries, because developing countries need many studies to produce the right policies, one of which is related to foreign exchange reserves.

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 very important monetary indicator in showing the strength or weakness of a country's economy (Sayoga & Tan, 2017). Research from Zhang(2021) suggests that sufficient foreign exchange reserves can make China occupy an advantageous position in international development.Foreign exchange reserves are valuable and liquid assets owned by a country and their value is accepted and recognized by the international community and can be used as legal tender for governments or countries in international transactions (Salvatore, 2017). The following is data on foreign exchange reserves in 7 OIC countries.

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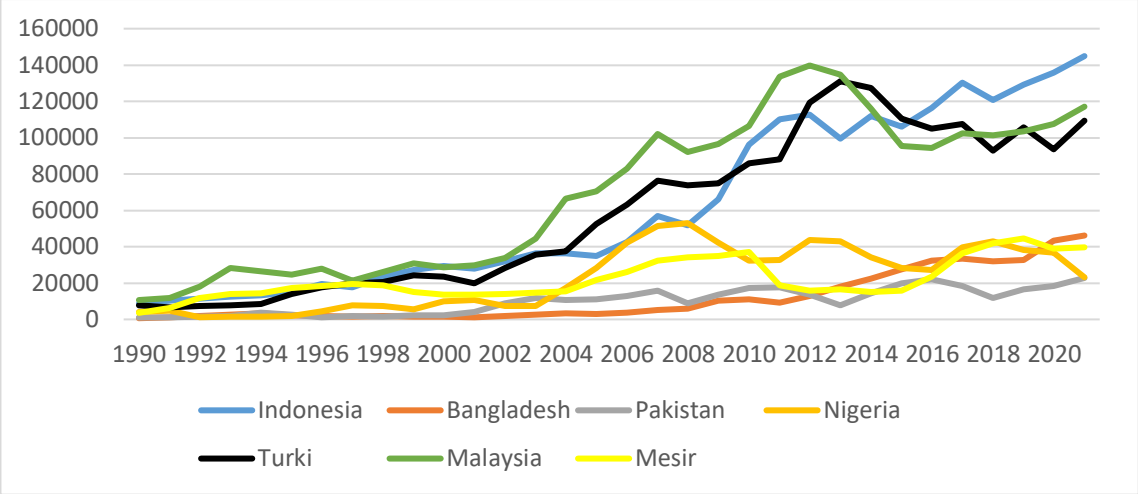

Figure 1. Foreign Exchange Reserves of 7 OIC Countries 1990-2021 (In Million USD)
Source: World Bank (2022)

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 an average foreign exchange reserve of 62084.16 million USD, the third highest foreign exchange reserve is Turkey of 59260.99 USD, then followed by Nigeria 22887.31 million USD, Egypt 21972.22 million USD, Bangladesh 11817.17 million USD, and Pakistan 9993.509 million USD. The receipt of foreign exchange reserves in each country is different, this is influenced by several factors. Research from Isramaulina & Ismaulina (2021) states that foreign exchange reserves are influenced by exports, imports, exchange rates, and the consumer price index (CPI).

In addition, research from Wahnidar (2017) factors that affect foreign exchange reserves, namely exports, inflation, and foreign debt. Inflation is a condition of increasing the general price of goods continuously during a certain period (Mishkin, 2011). Research conducted by Wahnidar (2017) found that inflation has a negative and significant effect on foreign exchange reserves. Meanwhile, research conducted by Suwarno et al., (2021) found that inflation had no significant effect on foreign exchange reserves. The difference between these studies is that this study uses the inflation variable to see its effect on foreign exchange reserves in 7 OIC countries in 1990-2021. The following is a graph of the average inflation and foreign exchange reserves in 7 OIC countries from 1990 to 2021.

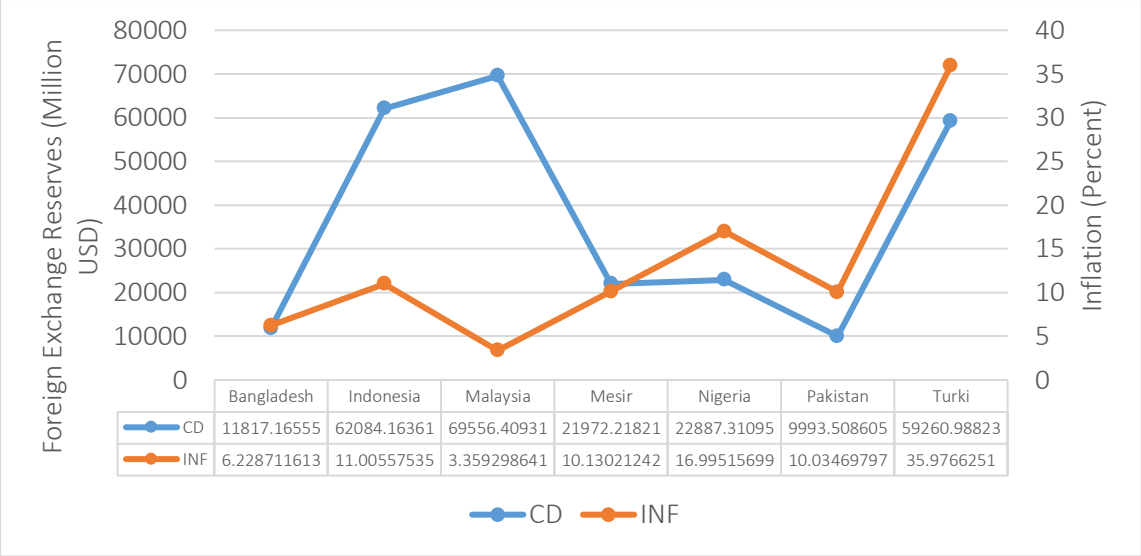

Figure 2. Average Inflation and Foreign Exchange Reserves in 7 OIC Countries 1990-2021
Source: World Bank, Processed (2022)

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 the average foreign exchange reserves owned by Turkey which occupies the third position compared to other countries. Malaysia with the lowest average inflation has the highest average foreign exchange reserves compared to 6 other countries. The phenomenon that occurs in OIC countries is inversely proportional to research conducted by Agustina and Reny (2014) and Sudjinan (2016) which found that inflation had a significant positive effect on foreign exchange reserves.

According to Russiadi & Novalina (2015) one of the macroeconomic variables that affect foreign exchange reserves is Gross Domestic Product (GDP). In a study conducted by Russiadi & Novalina (2015) found that GDP has a negative and significant effect on foreign exchange reserves. This result is in contrast to research conducted by Astuty (2020) 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 effect 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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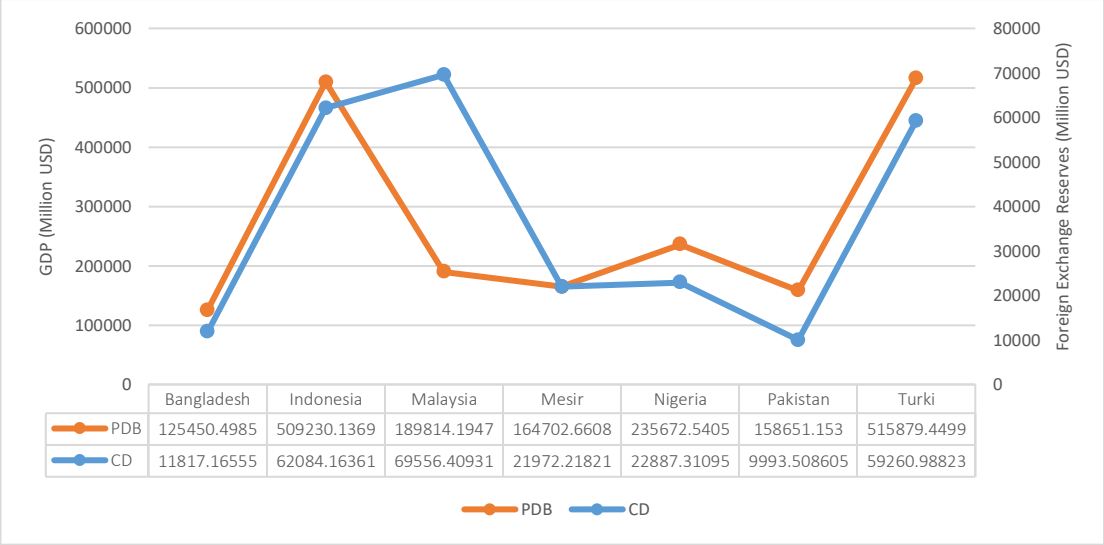
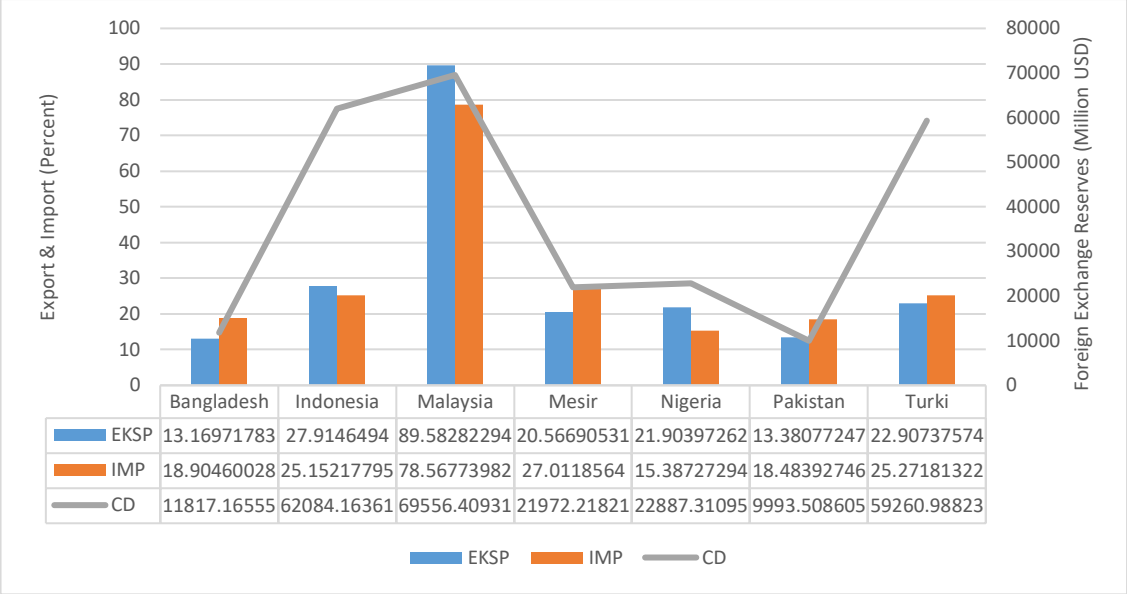


	Bangladesh	Indonesia	Malaysia	Mesir	Nigeria	Pakistan	Turki
PDB	125450.4985	509230.1369	189814.1947	164702.6608	235672.5405	158651.153	515879.4499
CD	11817.16555	62084.16361	69556.40931	21972.21821	22887.31095	9993.508605	59260.98823

Figure 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 Nor et al. (2011) which reveals that the positive relationship between GDP and foreign exchange reserves is in accordance 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. While the lowest average GDP is Bangladesh and Pakistan's foreign exchange reserves are the fifth lowest before Pakistan with the lowest foreign exchange reserves. This shows that the other factors that affect foreign exchange reserves.

International trade l export-import activities also affect foreign exchange reserves. Based on research conducted by Isramaulina & Ismaulina (2021) using export and import variables to see their effect on foreign exchange reserves. The results of research conducted by Isramaulina & Ismaulina (2021) found that exports had a significant positive effect on foreign exchange reserves while imports had a significant negative effect on foreign exchange reserves. This result is in contrast to research conducted by Juliansyah et al., (2020) which found that exports had a negative effect on foreign exchange reserves and research conducted by DW Pratama (2020) which found that imports had no effect on foreign exchange reserves. The difference in the results of previous studies so that this study includes export and import variables to see their effect on foreign exchange reserves. The following is the average of foreign exchange reserves, exports, and imports in the 7 OIC countries for 1990-2021.



	Bangladesh	Indonesia	Malaysia	Mesir	Nigeria	Pakistan	Turki
EKSP	13.16971783	27.9146494	89.58282294	20.56690531	21.90397262	13.38077247	22.90737574
IMP	18.90460028	25.15217795	78.56773982	27.0118564	15.38727294	18.48392746	25.27181322
CD	11817.16555	62084.16361	69556.40931	21972.21821	22887.31095	9993.508605	59260.98823

Figure 4.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, while Bangladesh with the lowest exports also has relatively lower foreign exchange reserves compared to other countries. The highest average import value is Malaysia and the lowest import value is Nigeria. There is an interesting phenomenon that occurs in Malaysia where Malaysia has the highest export value, import value, and foreign exchange reserves compared to 6 other OIC countries.

The next variable that affects foreign exchange reserves is the receipt of remittances. Remittance is an activity of transferring funds carried out by individuals or companies using the services of a bank or non-bank financial institution which is generally carried out without the basis of fulfilling an economic obligation imposed by Bank Indonesia (2018) . Remittances are transfers by migrant workers to families in the country of origin which are usually in the form of money and 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 (Ratha, 2003). The following is the average of remittances and foreign exchange reserves in 7 OIC countries for 1990-2021.

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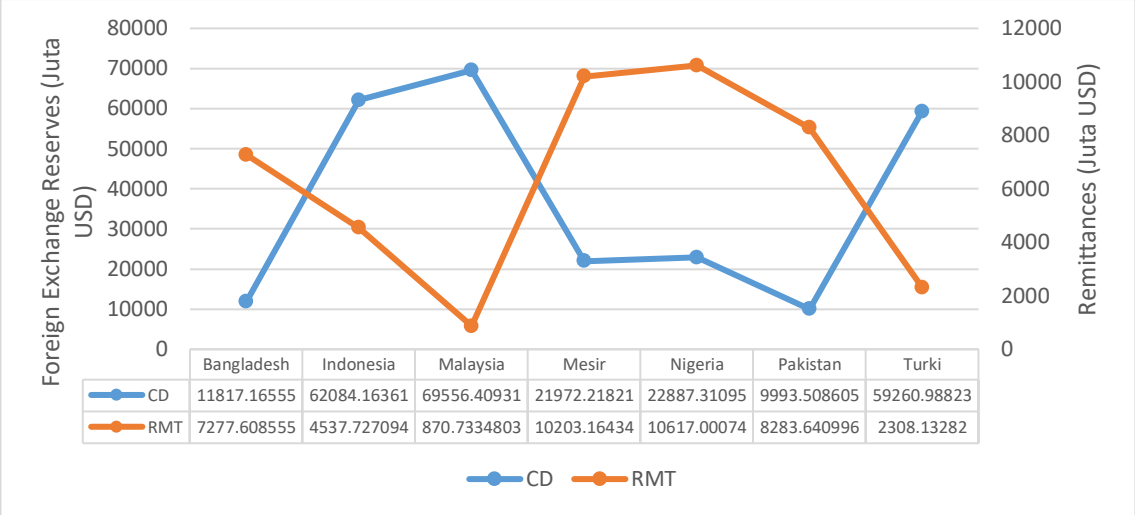

Figure 5. Average Remittance and Foreign Exchange Reserves in 7 OIC Countries 1990-2021
Source: World Bank, Processed (2022)

From Figure 4 it is known that the highest receipt of remittances is Nigeria, but unfortunately the remittances received have not been 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 Vacaflores & Kishan (2014) which found that remittances had the greatest impact on foreign exchange reserves.

Based on the background that has been described, the formulation of the research problem is whether there is a long-term relationship and the effect of inflation, GDP, exports, imports, and remittances on foreign exchange reserves in OIC countries in 1990-2021? The purpose of this study is to determine the relationship between the length and effect of inflation, GDP, exports, imports, and remittances on foreign exchange reserves in OIC countries in 1990-2021.

LITERATURE REVIEW

Monetary Approach Balance of Payment (MABP) Theory

According to (Manarung, 2016)foreign exchange reserves are a number of currencies that are stored and can be used to pay for transactions, especially in international trade. Foreign exchange reserves are a very important monetary indicator in showing the strength or weakness of a country's economy (Sayoga & Tan, 2017). As an international transaction tool, the position of a country's foreign exchange reserves is an important factor for a country in conducting international trade transactions with other countries. So it is important to know the factors that affect a country's foreign exchange reserves.

According to Nwaobi (2003) the theory of Monetary Approach Balance of Payment (MABP), was originally developed by Polak and colleagues at the International Monetary Fund (IMF) in 1950. But then this approach was developed in the early 1960s and 1970s by Mundell (1968) and Jonhson (1972). Mundell in Blejer (1995) suggests that monetary policy is more effective than fiscal policy in order to maintain external balance. This is

because monetary policy can improve both the current account and capital account in the balance of payments.

Based on the Monetary Approach Balance of Payment (MABP) theory, when there is a price increase caused by a devaluation policy, it will tend to increase inflation, which in turn will increase the demand for money. Inflation occurs due to an increase in the money supply which usually occurs due to the easing of interest rates which has an impact on increasing domestic prices. The increase in domestic prices tends to reduce the interest of foreign people to buy domestic goods and this condition is accompanied by high domestic demand for foreign goods. This has an impact on the balance of payments deficit and reduces a country's foreign exchange reserves. Research conducted by Agustina & Reny(2014) and Eulia et al.(2021) found that inflation has a negative and significant effect on foreign exchange reserves.

According to MABP theory in Kavous (2005) 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 demand for money in the community is accompanied by an increase 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 have an impact on 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 by Astuty(2020) and Rahayu & Firdayetti(2021) are in line with the MABP theory, that GDP has a positive effect on foreign exchange reserves.

Masdjojo (2010) in MABP theory reveals that if there is an increase in exports, it will result in an increase in the stock of nominal money in the country. If then the price level in the country increases, for example, because people experience an increase in income. In such a situation, a balance of payments surplus occurs and then there is an increase in foreign exchange reserves caused by changes in the country's exports with the assumption of cateris paribus.

Empirical Study

Wahnidar (2017) suggests factors that affect foreign exchange reserves, namely exports, inflation, and foreign debt. Research conducted by Wahnidar (2017) found that inflation had a negative and significant effect on foreign exchange reserves. Meanwhile, research conducted by Suwarno, Wianto Putra, and Sutapa (2021) found that inflation did not have a significant effect on foreign exchange reserves. Furthermore, one of the macroeconomic variables that affect foreign exchange reserves is the Gross Domestic Product (GDP). In research conducted by Rusiadi and Novalina (2015) found that GDP has a negative and significant effect on foreign exchange reserves. This result is in contrast to

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research conducted by Astuty (2020) which found that GDP has a significant positive effect on foreign exchange reserves.

Research from Jena and Sethi (2021) examines the determinants of Brazil's foreign exchange reserves for the period 1960-2018 using the auto-regressive distributed lag (ARDL) method based on its findings, suggesting that there is a long-term relationship between foreign exchange reserves, current account balance to GDP ratio, debt-to-GDP ratio, domestic credit to the private sector as a percentage of GDP, exchange rate, inflation, GDP per capita and real interest rate. While research from Juliansyah, Moulida, and Apridar (2020) found that exports had a negative effect on foreign exchange reserves. Based on research conducted by Anwar et al.(2019) and Rahmawati & Suriani(2022)found that exports have a positive effect on foreign exchange reserves.Export activities are in contrast to import activities. The MABP theory reveals that when there is an increase in imports, the stock of nominal domestic money will decrease (Masdjojo, 2010). With such conditions, it causes a balance of payments deficit and then results in a decrease in foreign exchange reserves. So according to the MABP theory, imports have a negative effect on foreign exchange reserves, this result is in line with research conducted by Isramaulina & Ismaulina (2021) . Different results based on research by Pratama (2020) which found that imports had no effect on foreign exchange reserves.

In addition to inflation, GDP, exports and imports there are variables that affect foreign exchange reserves. Based on research conducted by Prabowo (2018) , 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 increase in remittances will affect the current account surplus and increase foreign exchange reserves. Research conducted by Vacaflores & Kishan (2014) shows that remittances have a positive effect on foreign exchange reserves.

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

H_1 : Inflation has a negative effect on foreign exchange reserves
H_2 : GDP has a positive effect on foreign exchange reserves
H_3 : Exports have a positive effect on foreign exchange reserves
H_4 : Imports have a negative effect on foreign exchange reserves
H_5 : Remittances have a positive effect on foreign exchange reserves

RESEARCH METHODS

Types and Sources of Research Data

This research is descriptive 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 7 cross sections and time series from 1990-2021.

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 that the objects of this research are (1) Bangladesh, (2) Egypt, (3) Indonesia, (4) Malaysia, (5) Nigeria, (6) Pakistan, and (7) Turkey.

Measurement of Research Variables

The following is an explanation of the variables that are the center of the analysis in order to provide research direction.

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 holdings of assets under monetary 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 from around the world.
Remittance	World Bank	Personal remittances consisting of personal transfers and employee compensation.

Research Techniques

The method used in this research is FMOLS. FMOLS method to analyze the long-term effect between independent variables on the dependent variable Saragih et al.(2021).. FMOLS method is used for panel data which is not stationary and heterogeneous between panel members; this can lead to false regressions that have no economic significance (Pedroni, 2000). For FMOLS estimation, two conditions are needed, namely 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 test 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 hypothesis, while the estimators collected in the dimensions are not (Pedroni, 2000). The model in general can be stated as follows.

$$LNCD_{it} = \beta_{0it} + \beta_1 INF_{it} + \beta_2 LNGDP_{it} + \beta_3 EKS_{it} + \beta_4 IMP_{it} + \beta_5 LNRMT_{it} + \varepsilon_{it} \quad (1)$$

Where:

LNCD : Natural logarithm of foreign exchange reserves (Billion USD)
INF : Inflation (Percent)
LNGDP : Natural logarithm of Gross Domestic Product (Billion USD)

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EKS : Export (Percent)
IMP : Imports (Percent)
LNRMT : Logartima natural Remittance (Billion USD)
B_0 : Constanta
$\beta_{1,2,3,4,5}$: Regression coefficient
i : Cross section (7 OIC countries)
t : Time series (1990-2021)
ε : Residual

The first condition is data stationarity. The panel unit root test aims to ensure that the data used in this study is stationary data and to avoid spurious regression between the dependent variable and the independent variable (Widarjono, 2018). The test statistics used in testing the unit root panel consist of two types, namely the common unit root which consists of Levin, Lin and Chu (LLC) and Breitung's test statistics, while the individual unit root consists of Im, Pesaran and Shin (IPS) test statistics.), ADF-Fisher test and Phillips Perron (PP)-Fisher test (Gujarati, 2009). 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 if the probability value is smaller than the significance level, then it fails to reject H_a. For the second condition is the cointegration test. The concept of cointegration is basically to find out the possibility of a long-term equilibrium relationship on the variables to be observed (Sekaran et al., 2017). Johansen's test is one of the tests that can be used to determine the cointegration of a number of variables (Widarjono, 2018). This test is carried out after the stationary 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 with each other. 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 fail to reject Ha when the probability value is less than the significance level. After all the tests meet the requirements, the FMOLS estimation is carried out.

RESULT AND ANALYSIS

Research Result

Descriptive Statistical Analysis

The results of this research object, one of which explains related to descriptive statistics. Descriptive statistics used include the average, maximum value, minimum value, and standard deviation. The following is a descriptive statistical analysis table in this study.

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

EKP	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)

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. While the lowest foreign exchange reserves occurred in 1990 in Bangladesh, which amounted to 660,000,000 billion USD. For the value of the standard deviation of the foreign exchange reserve variable is 38,200,000,000.

The average value of inflation (INF) 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 the period 1990-2021 occurred in 1998 in Turkey, which amounted to 143.6397 percent. Meanwhile, the lowest inflation occurred in 2009 in Malaysia, which was -5.992202 percent. For the standard deviation value of the inflation variable is 18.62723.

The average value of GDP in the 7 OIC countries for 1990-2021 is 271,000,000,000 billion USD. Countries with above average GDP are Turkey and Indonesia while countries with below average GDP 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 the export value above the average is 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 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 the import average above the average is Malaysia. Meanwhile, 6 other countries consisting of 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 import was

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Nigeria in 1994 with only 5,90831600 percent. The standard deviation of the import variable is 21.35842.

The average value of remittances (RMT) in the 7 OIC countries for 1990-2021 is 6,300,000,000 billion USD. Countries with above-average remittances are Nigeria, Egypt, Pakistan, and Bangladesh. While 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.

Stationarity Test

To avoid spurious regression between independent and dependent variables, the data must be stationary through the unit-root panel test (Widarjono, 2018). 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.

Table 3.
Unit-Root Panel Test

		Intercept		Intercept and Trend	
		Level	1st different	Level	1st different
	LLC	0.0137*	0.0000*	0.5731	0.0000*
	Breitung	-	-	0.1928	0.0000*
LNCD	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*
	LLC	0.0046 *	0.0000*	0.0162	0.0000*
	Breitung	-	-	0.0000	0.0000*
INF	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*
	LLC	0.5944	0.0000*	0.8574	0.0000*
	Breitung	-	-	0.2805	0.0000*
LNGDP	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*
	LLC	0.2377	0.0000*	0.3933	0.0000*
	Breitung	-	-	0.4808	0.0000*
EX	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*
	LLC	0.0006 *	1.0000	1.0000	1.0000
	Breitung	-	-	1.0000	1.0000
LNRMT	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 *

Note: * Significant to 5%

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 less than = 0.05. Thus, the next test can be carried out, namely the cointegration test.

Cointegration Test

Cointegration test is used to determine the existence of a long-term equilibrium relationship on the variables used (Sekaran et al., 2017).The cointegration test used in this study is the Kao Residual Cointegration Test, the Kao cointegration test has a cross-sector-specific intercept and has a homogeneous coefficient on the first level regressor (Pedoni 2000). 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 requirements for Fully Modified-OLS (FMOLS) panel data analysis have been met. So the next step is the regression of the FMOLS model.

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.

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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 = 0.05

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

The export regression coefficient is 0.023666, meaning that if exports increase by 1 percent, the foreign exchange reserves in the 7 OIC countries in the long term will increase by 2.3666 percent, cateris paribus. The import variable has a negative impact on foreign exchange reserves and the remittance variable has a positive impact on foreign exchange reserves in the 7 OIC countries in 1990-2021.

Based on Table 5, it is known the effect of individual independent variables consisting of inflation, GDP, exports, imports, and remittances on reserves in 7 OIC countries in 1990-2021. In general, H_1, H_2, and H_3 are accepted while H_4 and H_5 are rejected because the results show insignificant. Inflation has a negative and significant effect on foreign exchange reserves in the D-8 countries, GDP has a positive effect on foreign exchange reserves, and exports have a positive effect on foreign exchange reserves. Meanwhile, imports and remittances have no effect on foreign exchange reserves.

Effect of Inflation on Foreign Exchange Reserves

Inflation variable (INF) with a t-statistic value of -1.814577 which is greater 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 in 1990-2021.

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

GDP variable (LNPDB) with a t-statistic value of 8.809923 which is greater 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 in 1990-2021.

Effect of Exports on Foreign Exchange Reserves

Export variable (EKS) with a t-statistic value of 2.510260 which is greater 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 in 1990-2021.

Effect of Imports on Foreign Exchange Reserves

Import Variable (IMP) with a t-statistic value of -0.840495 which is 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 import variable has a negative and insignificant effect on foreign exchange reserves in 7 OIC countries in 1990-2021.

Effect of Remittances on Foreign Exchange Reserves

Remittance variable (RMT) with a t-statistic value of 1.250294 which is 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.

Acceptance Coefficient (R^2)

The value of the coefficient of determination (R2) is a measure of the model's ability to explain the dependent variable. Based on the results of the regression estimation of the FMOLS model, it is known that the coefficient of determination (R2) is 0.909987 or 90.9987 percent. This means that the independent variables consisting 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.

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Discussion

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 in 1990-2021. This means that when inflation increases, foreign exchange reserves in the 7 OIC countries will decrease, and vice versa when inflation decreases, foreign exchange reserves will increase. The results of this study are in line with research conducted by Agustina & Reny (2014) in his research found that inflation has a negative and significant effect on foreign exchange reserves. This research is also in line with research conducted by (Eulia et al., 2021). Inflation is a condition in which the general price increase of funds occurs continuously. In this study, the inflation indicator used is inflation, the GDP deflator (percent), where in the economic literature, the inflation rate is equal to the nominal money growth rate minus the economic growth rate (Andriyani et al., 2020). The inflation rate of each country is certainly different. Inflation occurs due to an increase in the money supply which usually occurs due to the easing of interest rates which has an impact on increasing domestic prices. The increase in domestic prices tends to reduce the interest of foreign people to buy domestic goods and this condition is accompanied by high domestic demand for foreign goods. This has an impact on 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.

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

The results of this study show that GDP has a positive and significant impact on foreign exchange reserves in 7 OIC countries in 1990-2021. This means that when GDP increases, it is accompanied by an increase in the position of foreign exchange reserves, as well as when GDP decreases, the foreign exchange reserves of the 7 OIC countries also decrease. These results are in line with research conducted by Rahayu & Firdayetti (2021) in their research finding that GDP has a positive and significant effect on foreign exchange reserves. This research is also in line with research conducted by (Astuty 2020) 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 the overall economic output of a countryRustia(2011) , this is marked by an increase in the welfare of the population. The higher the standard of living of the population, in addition to using their income for the consumption of goods and services, the population of a country chooses to save their income in the form of time deposits or other forms of savings. Conditions like this have an impact on increasing demand for money and have an impact on increasing GDP. The increase in the demand 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 have an impact on 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.

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 in 1990-2021. This means that if exports increase, foreign exchange reserves will also 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 Anwar et al., (2019) which showed that exports had a positive and negative effect on exports. The results of this study are supported by research conducted by (Rahmawati & Suriani, 2022).

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 (Andriyani et al., 2020). The main 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 can be used by the state to finance imports and domestic economic sectors. According to Tambunan (2001) the current account balance is influenced by several factors , which are shown in the following equation.

Current transaction balance = (Exports – Imports) + Capital Flows (3)

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

Effect of Imports on Foreign Exchange Reserves

The results of the FMOLS regression method show that the import variable has a negative and insignificant impact on foreign exchange reserves in 7 OIC countries in 1990-2021. This means that an increase in imports causes an insignificant decrease in foreign exchange reserves, and vice versa when imports decrease causes an insignificant increase in foreign exchange reserves. The results of this study are in line with research conducted by (Jalunggono et al., 2020). A country carries out import activities when the country is unable to produce itself, domestic production is not able to meet domestic needs or foreign products are cheaper than domestic prices. Countries that import require a high

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amount of foreign exchange to pay for their transactions. This condition certainly causes a reduction in foreign exchange reserves owned by a country. The insignificantness of the import variable to foreign exchange reserves is due to the fact that 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 (Agustina & Reny, 2014).

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 in 1990-2021. That is, an increase in remittances causes an insignificant increase 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 have a positive impact on foreign exchange reserves. Personal remittances from emigrants to families, 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. When the rupiah appreciates, the amount of a country's foreign exchange reserves will also increase. Based on research conducted by Prabowo (2018) , 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.

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.

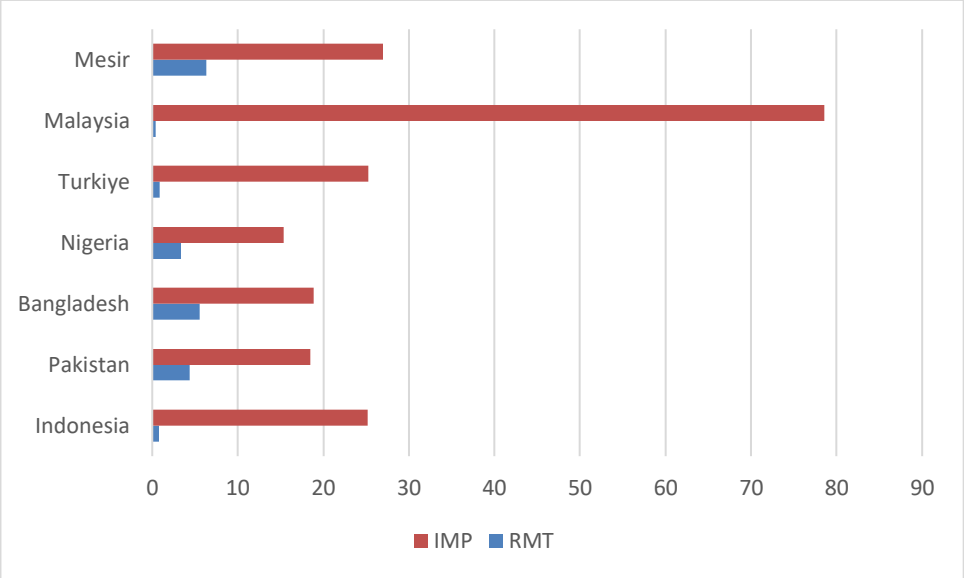

Figure 6. Remittances (% GDP) and Imports (% GDP) in 7 OIC Countries Based on Averages per Year 1990-2021

Source: World Bank, processed (2022)

Based on Figure 6, it is known that the average value of imports (% GDP) is higher than the value of remittance receipts (% GDP) in 7 OIC countries in 1990-2021. Remittances that provide additional foreign exchange reserves but are used again to pay for imported goods which are relatively higher than remittances. So remittances have a positive but not significant effect on foreign exchange reserves in the long term.

CONCLUSION

This paper aims to analyze the effect of macroeconomic variables on foreign exchange reserves because foreign exchange reserves are a very important monetary indicator in showing the strength or weakness of a country's economy. This research focuses on the countries of the Organization of Islamic Cooperation, especially the D-8 countries because developing countries need a lot of research to produce appropriate policies, one of which is related to foreign exchange reserves. The method used in this research is Fully Modified-OLS (FMOLS) to see the long-term effect of inflation, GDP, exports, imports and remittance receipts on foreign exchange reserves. Based on the results of the study, H1, H2, and H3 were accepted while H4 and H5 were rejected. Or it was found that the result of this study is that inflation has a negative and significant effect on foreign exchange reserves in the long run. GDP and export variables have a positive and significant effect on foreign exchange reserves in the long term, while imports have a negative and insignificant effect in the long term. And the receipt of remittances has a positive and insignificant effect on long-term foreign exchange reserves in 7 countries of the Organization of Islamic Cooperation. The higher average value of imports compared to receipts of remittances causes remittances to be insignificant to foreign exchange reserves in 7 OIC countries. However, the government in each OIC country should pay more attention to workers who are abroad and provide protection for them. Foreign exchange reserves are also positively affected by exports, this indicates that in each country the OIC seeks to increase product diversification and reduce imports, because import activities can reduce foreign exchange reserves. For export companies, it is better to optimize the potential and differentiation of products so that added value can increase, and strive for the provision of domestic production so that it can be a trigger for import companies to reduce imported products and use domestic products. Or in other words by creating a competitive advantage (which was developed by David Richardo). Where the company is able to create characteristics to have a higher performance than other companies in the same industry or market. The government can work with the private sector to increase export diversification. In addition, the government also stabilized the macro economy, one of which was through controlling inflation and increasing foreign exchange reserves in the 7 OIC countries.

The novelty of this study is the selection of research objects and the combination of variables used. But despite this recent, this study has limitations in terms of analysis, namely only knowing the long-term effect without taking into account the short-term influence of the variables used. It is hoped that the next research can analyze the short-term and long-term influence of determinants of foreign exchange reserves and the addition of research objects, especially how the pattern of differences in foreign exchange

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reserve receipts in developed and developing countries that are members of the Organization of Islamic Cooperation.

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