

## Testing The Marshall-Lerner Condition on Indonesia's Trade Balance with The Five Biggest Trading Partners

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### Abstract

*The Marshall-Lerner Condition is a theory that a trade balance deficit can be eliminated through currency depreciation, if in the long term the absolute number of long-term export and import demand elasticities is greater than one. Initially, exchange rate depreciation will have a negative impact on trade through two methods, namely changes in volume and changes in value. This study aims to test whether the Marshall-Lerner Condition fulfilled in Indonesia's bilateral trade balance with the five largest trading partners using the Ordinary Least Squares method and in the observation period 2010.1-2022.12. The results of the Marshall-Lerner Condition study that one of Indonesia's five largest trading partners, namely China, the Marshall-Lerner Condition is met. While for Indonesia's other four largest trading partners, namely Japan, the US, the European Union and Singapore, Indonesia's largest trading partners are uncertain whether they meet the Marshall-Lerner Condition or not.*

**Keywords** *Marshall-Lerner Condition, Export, Import, Real Exchange Rates, Elasticity, and Trade Balance*

### INTRODUCTION

Exchange rates have a significant impact on international trade by influencing the prices of goods and services traded between countries. Changes in exchange rates can lead to currency appreciation or depreciation, depending on the balance between supply and demand for a particular currency. When a currency depreciates, the cost of imports rises, and exports become cheaper for foreign buyers, which can theoretically improve a country's trade balance over time. This dynamic is particularly important in developing economies like Indonesia, where trade is a key driver of economic growth.

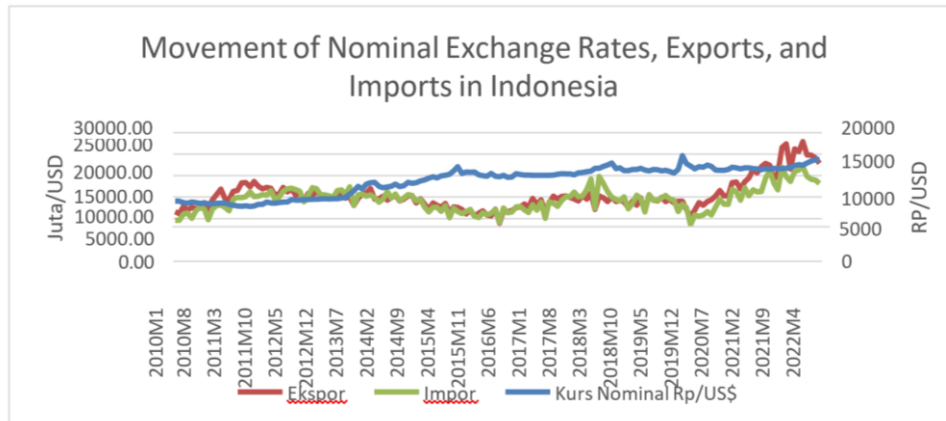
The Marshall-Lerner Condition provides a theoretical framework for understanding this relationship. It states that a depreciation of a country's currency will improve its trade balance if the sum of the absolute values of the long-term elasticities of export and import demand is greater than one. Initially, however, currency depreciation may have a negative impact on the trade balance due to the J-curve effect, where the trade balance worsens before improving. This study aims to test the Marshall-Lerner Condition in the context of Indonesia's bilateral trade with its five largest trading partners: China, Japan, the United States, the European Union, and Singapore, using data from the period 2010 to 2022.

Previous studies have shown mixed results regarding the applicability of the Marshall-Lerner Condition in various countries. For instance, research conducted by Siklar and Celik (2018) found that the condition holds true in Turkey, where long-term currency depreciation improved the trade balance. In contrast, Wijaya (2020) found that in the case of Indonesia's bilateral trade with China and Japan, the Marshall-Lerner Condition was not met, whereas it was satisfied in trade with Singapore. These conflicting results underscore



the need for further investigation, especially in the Indonesian context, where exchange rate fluctuations are frequent, and the trade balance is highly sensitive to global market conditions.

**Figure 1. Movement of Nominal Exchange Rates and Trade Balance in Indonesia**



Source: Bank Indonesia and International Monetary Funds, 2023

Given the importance of Indonesia's trade relationships with these five countries, this research is critical in understanding whether exchange rate policies, particularly those affecting the real exchange rate, are effective in improving the trade balance. The research employs the Ordinary Least Squares (OLS) method to estimate the demand elasticity of exports and imports in relation to the real exchange rate. By focusing on Indonesia's five largest trading partners, this study provides a comprehensive analysis of whether the Marshall-Lerner Condition holds in different bilateral trade scenarios, offering valuable insights for policymakers in Indonesia.

## LITERATURE REVIEW

The relationship between exchange rates and the trade balance has been widely studied in economic literature. The Marshall-Lerner Condition, first introduced by Abba P. Lerner and extended by Alfred Marshall, provides a theoretical framework for analyzing the effects of exchange rate movements on trade balances. The condition posits that a depreciation of a country's currency will improve its trade balance if the sum of the absolute values of the elasticities of demand for exports and imports is greater than one. This implies that, over time, the volume effect of cheaper exports and more expensive imports will outweigh the price effect, leading to an improved trade balance.

A seminal study by Magee (1973) discussed the J-curve phenomenon, which suggests that the short-term effects of depreciation often lead to a worsening trade balance before it improves. This occurs because contracts and trade agreements in place at the time of depreciation do not immediately respond to changes in prices, causing a temporary deficit. Only after a period of adjustment, during which importers seek alternatives and exporters gain new market access, does the trade balance begin to improve.

Subsequent research has produced mixed results regarding the empirical validity of

the Marshall-Lerner Condition across different countries. For instance, Bahmani-Oskooee and Ratha (2004) examined the effects of exchange rate changes on the trade balances of 30 developing countries, finding that the Marshall-Lerner Condition was satisfied in only a few cases. Similarly, Musila and Newark (2003) analyzed the trade balance of Kenya and found that currency depreciation led to an initial worsening of the trade balance before long-term improvement occurred, aligning with the J-curve effect.

In the context of Indonesia, previous studies have yielded divergent results. Husman (2007) conducted an analysis of Indonesia's trade with its major partners and found that the Marshall-Lerner Condition was satisfied with China but not with other countries. This was attributed to China's high demand for Indonesian exports such as raw materials and manufactured goods. However, Wijaya (2020) examined Indonesia's trade with China and Japan and found that the Marshall-Lerner Condition was not satisfied in either case, suggesting that exchange rate movements did not have a significant impact on trade balances with these countries.

The mixed results in the literature indicate that the effect of exchange rate movements on trade balances can vary significantly across different countries and time periods. Factors such as the structure of the economy, the nature of traded goods, and the responsiveness of trade flows to price changes all play a role in determining whether the Marshall-Lerner Condition is satisfied. Therefore, it is important to conduct country-specific analyses to understand the nuances of exchange rate effects on trade.

This study contributes to the existing literature by focusing on Indonesia's five largest trading partners: China, Japan, the United States, the European Union, and Singapore. By analyzing bilateral trade data from 2010 to 2022, this research aims to provide a clearer picture of whether Indonesia's exchange rate policies are effective in improving its trade balance, particularly in the context of the Marshall-Lerner Condition.

## **METHOD**

### **Type, Period and Data Source**

The data used in this study are secondary data for export, import, real exchange rates, real GDP. Data in the form of time series from January 2010 - December 2022. The data used is monthly, where export and import are respectively obtained from export value & import value, and also real GDP are obtained from dividing nominal GDP by a GDP deflator as well as real exchange rates are obtained from nominal exchange rates and consumer price index.

### **Variable Operational Definition**

Export volume is the number of goods or services exported by producers/companies from one country to another country. Meanwhile, import volume is the number of goods or services imported by producers/companies to other countries.

In determining the rate of economic growth from year to year, real GDP is used because real GDP reflects GDP per quantity. Without real GDP, it would be difficult to identify just by examining nominal GDP whether production is actually increasing or



whether it is simply a factor in rising prices per unit in the economy. The projected data is also in monthly form for 2010-2022. This GDP data was produced through interpolation of quarterly GDP data into monthly GDP data using the Quadratic-Sum method. In this research, to determine GDP in a monthly period, use interpolation of GDP data in a quarterly period in Eviews 10 using the Quadratic Match Sum method. This was done because monthly GDP data was not available, so the author had to interpolate the data to compensate for the unavailability of monthly GDP data on the official International Financial Statistics (IMF) website.

Real exchange rates are the relative prices of goods between two countries. Real Exchange Rates state that the rate at which we can trade goods from one country for goods from another country. RER attempts to measure the value of one country's goods relative to the goods of another country, group of countries, or the rest of the world, at the prevailing nominal exchange rate. In this research, Real Exchange Rates uses data from RER Indonesia with Indonesia's 5 largest trading partners. Real Exchange Rates consist of nominal exchange rates (sourced from Bank Indonesia) and domestic and foreign consumer price indices (sourced from the International Monetary Fund). This data concept is presented in monthly form for the years 2010 – 2022.

### Data Analysis Techniques

This research uses the OLS (Ordinary Least Squares) method to answer the main problem, namely knowing whether the Marshall-Lerner Condition occurs or not in Indonesia's bilateral trade balance with each of Indonesia's five largest trading partners and is also aimed at finding out how the independent variables are related. on the dependent variable in the long term.

To determine the long-term influence of the independent variables on the dependent variable, this research uses the ordinary least squares method which is aimed at analyzing proof of the Marshall-Lerner Condition regarding whether or not it occurs in Indonesia's bilateral trade balance with each of Indonesia's five largest trading countries. The long-term export and import demand model is as follows:

$$\Delta \ln X_t = \alpha_0 + \alpha_1 \Delta \ln Y_{ft} + \alpha_2 \Delta \ln RER_t + \varepsilon_t$$

$$\Delta \ln M_t = \beta_0 + \beta_1 \Delta \ln Y_{dt} + \beta_2 \Delta \ln RER_t + \varepsilon_t$$

Information:

- $\alpha_0$  : Export Demand Regression Constant
- $\alpha_1, \alpha_2, \alpha_2$  : Export Demand Regression Coefficients
- $\beta_0$  : Import Demand Regression Constant
- $\beta_1, \beta_2, \beta_3$  : Import Demand Regression Coefficients
- X : Export Volume
- M : Import Volume
- Yd : Real Domestic GDP
- Yf : Real Foreign GDP

RER : Real Exchange Rates  
 $\varepsilon$  : Error Term  
 t : Period

To answer whether the Marshall-Lerner Condition occurs or not in Indonesia's bilateral trade balance with each of Indonesia's five largest trading partners, there are decision-making criteria, namely as follows:

$\hat{\alpha} + \hat{\beta} > 21 \rightarrow$  Marshall-Lerner Condition occurs

$\hat{\alpha} + \hat{\beta} < 21 \rightarrow$  Marshall-Lerner Condition doesn't occur

Then, to see the elasticity of income (exports) and income (imports), the coefficients of foreign real GDP (YF) and domestic real GDP (YD) are used respectively. Income elasticity has income in a positive form, so it is said that export/import commodities are normal goods. Meanwhile, income elasticity has negative income, so it is said that export/import commodities are inferior goods.

## RESULT AND DISCUSSION

The results of this study focus on determining whether the Marshall-Lerner Condition is satisfied in Indonesia's trade with its five largest trading partners: China, Japan, the United States, the European Union, and Singapore. The analysis uses the Ordinary Least Squares (OLS) method to estimate the long-term elasticities of export and import demand in relation to real exchange rates and real GDP for each bilateral trade relationship. The key findings, along with the results of diagnostic tests, are presented below.

### Estimation Results of Export and Import Models

The results of the OLS regression models for exports and imports between Indonesia and its five largest trading partners are summarized in Table 1 and Table 2. These tables show the coefficients for real GDP and real exchange rates, along with their respective t-statistics and p-values.

**Table 1. Estimation Results of Indonesian Export Models (2010–2022)**

Trading Partner	Coefficient (Y)	t-Stat	Description	Coefficient (RER)	t-Stat	Description
China	13.4116	1.9755	Significant	6.2876	1.6548	Significant
Japan	3.9983	1.9755	Significant	-1.0615	1.6548	No Significant
United States	3.1494	1.9755	Significant	-2.9603	1.6548	No Significant
European Union	0.4419	1.9755	No Significant	-0.3225	1.6548	No Significant
Singapore	-6.3221	1.9755	Significant	-1.4409	1.6548	No Significant



**Table 2. Estimation Results of Indonesian Import Models (2010–2022)**

Trading Partner	Coefficient (Y)	t-Stat	Description	Coefficient (RER)	t-Stat	Description
China	7.4762	1.9755	Significant	-8.0209	1.6548	Significant
Japan	6.7782	1.9755	Significant	-7.4999	1.6548	Significant
United States	3.4328	1.9755	Significant	10.5756	1.6548	No Significant
European Union	4.1186	1.9755	Significant	1.9047	1.6548	No Significant
Singapore	1.3930	1.9755	No Significant	4.2094	1.6548	No Significant

\*Statistically significant at 95% confidence level.

### Testing the Marshall-Lerner Condition

To determine whether the Marshall-Lerner Condition is satisfied, the elasticity of export and import demand for the real exchange rate is summed for each trading partner where both elasticities are seen from the real exchange rate coefficients on exports and imports. If the sum exceeds 1, the Marshall-Lerner Condition is satisfied, indicating that currency depreciation improves the trade balance. Table 3 summarizes the results of the Marshall-Lerner Condition analysis.

**Table 3. Marshall-Lerner Condition Analysis**

Trading Partner	Real Exchange Rates Coefficient of Export	Real Exchange Rates Coefficient of Import	Sum	Condition Met?
China	1.7256	-1.1915	2.9171	Yes
Japan	-0.4241	-1.5583	-	Uncertain
United States	-0.5780	1.5017	-	Uncertain
European Union	-0.0703	0.4562	-	Uncertain
Singapore	-0.3907	1.8737	-	Uncertain

The results of the long-term elasticity estimation from OLS in Table 3 show that of the five trading partners, China meets the Marshall-Lerner Condition which is supported by the estimation results that are in accordance with the research hypothesis supported by the absolute number of elasticity of demand for exports and imports from Indonesia - China of  $2.9171 > 1$ , so that the Marshall-Lerner Condition is met. These results are in line with Wijaya (2020) and Husman (2007) which show that the Marshall-Lerner Condition in bilateral trade between Indonesia and China is met. Meanwhile, for Indonesia's other largest trading partners, namely Japan, the US, the European Union, and Singapore, the fulfillment of the Marshall-Lerner Condition is considered uncertain due to the estimation results that are not in accordance with the research hypothesis, so it cannot be summed up absolutely to see the certainty of these trading partners whether the Marshall-Lerner Condition is met or not. When comparing Indonesia's five largest trading partners, the striking difference between Indonesia's five largest trading partners is that the Marshall-Lerner Condition is only met in

China, while for Indonesia's other four trading partners, namely Japan, the US, the European Union and Singapore, there is no certainty regarding whether the Marshall-Lerner Condition is met or not. This indicates that the Marshall-Lerner Condition requirement is met only in bilateral trade between Indonesia and China with an elasticity of export and import demand of more than one, which is supported by the results of the research estimate which is in accordance with the research hypothesis compared to Indonesia's four largest trading partners (Japan, the US, the European Union and Singapore) which are not in accordance with the research hypothesis, so that it cannot be added absolutely for both export and import demand elasticity. The Marshall-Lerner Condition requirement is a condition that states that currency depreciation will improve the trade balance if the price elasticity of export and import demand is greater than one (Husman, 2007).

Furthermore, the fulfillment of the Marshall-Lerner Condition in bilateral trade between Indonesia and China is more influenced by the magnitude of export elasticity than by the import elasticity itself (attached in Table 32). The greater the price elasticity, the greater the influence of price on demand itself (Parkin, 2017). The greater the elasticity of export demand than the elasticity of import demand in bilateral trade between Indonesia and China indicates that if there is a depreciation of the rupiah's real exchange rate, price changes are more responsive to influencing Indonesia's export demand - China than Indonesia's import demand - China. Meanwhile, for the other four trading partners, namely Japan, the US, the European Union and Singapore, Indonesia's largest trading partners cannot be compared between each of the two elasticities of export and import demand in Indonesia's largest trading partners due to the uncertain of whether the Marshall-Lerner Condition is met or not.

In bilateral trade between Indonesia and Japan, based on Table 3, it is known that the rupiah's real exchange rate against the yen has no significant effect on Indonesia's export demand - Japan. This indicates that Indonesia's export demand - Japan is not affected by price changes if there is a depreciation of the rupiah. This lack of influence occurs due to the influence of the Indonesia-Japan trade agreement, namely the Japan-Indonesia Economic Partnership Agreement (JIEPA), one of the results of which is to provide preferential tariffs or low tariffs or even 0% tariffs for exports between the two countries. Preferential tariffs are import duties that are set based on international agreements. So that the result of this agreement is that the demand for Indonesian-Japanese exports will not be affected by price changes if the rupiah depreciates. In fact, this agreement will help improve the performance of Indonesian-Japanese exports. Meanwhile, for the real exchange rates of the rupiah against the yen which have a significant negative effect on the demand for Indonesian-Japanese imports, this indicates that if the rupiah depreciates, the demand for Indonesian-Japanese imports will decrease. This is due to the high increase in the price of goods, which will cause expensive goods from Japan when the rupiah depreciates. So that the increase in import prices results in a decrease in imports (Suselo et al., 2008).

In bilateral trade between Indonesia and the US, based on Table 3, it is known that the real exchange rate of the rupiah against the US dollar does not have a significant effect on demand for exports between Indonesia and the US. This indicates that demand for exports



between Indonesia and the US is not affected by price changes if the rupiah depreciates. Although exports between Indonesia and the US are dominated by finished goods such as clothing, food, and others, these export commodities cannot be affected by the exchange rate. This is because there are still many industries in Indonesia whose raw materials still depend on imports. Likewise with the demand for imports between Indonesia and the US, where from the results of the estimate, the real exchange rate of the rupiah against the US dollar is not significant, this is also caused by the fact that most imports between Indonesia and the US are dominated by staple commodities such as wheat, soybeans, and others. So even though there is a depreciation or appreciation of the rupiah, the demand for imports for these commodities does not have a significant effect (Suryanto & Kurniati 2022).

In bilateral trade between Indonesia and the European Union, based on Table 3, it is known that the real exchange rate of the rupiah against the euro does not have a significant effect on demand for exports between Indonesia and the European Union. This indicates that Indonesia-EU export demand is not affected by price changes if the rupiah depreciates. Trade barriers between Indonesia and the EU that occur due to the policy of banning imports of palm oil and its derivative products have resulted in a drastic decrease in export demand, especially palm oil from the EU (Diah, 2023). So this is what causes Indonesia-EU export demand to not be significantly affected by exchange rate volatility. Meanwhile, the rupiah's real exchange rates against the euro do not have a significant effect on Indonesia-EU export demand. This indicates that Indonesia-EU import demand is also not affected by price changes if the rupiah depreciates. This is because Indonesia itself in importing from the EU is dominated by raw materials such as milk and cream (Central Bureau of Statistics, 2023).

In bilateral trade between Indonesia and Singapore, based on Table 3, it is known that the rupiah's real exchange rates against the Singapore dollar do not have a significant effect on Indonesia-Singapore export demand. This indicates that Indonesia-Singapore export demand is not affected by price changes if the rupiah depreciates. The existence of the ASEAN Trade in Good Agreement (ATIGA) which contains regulations regarding the determination of a 0% tariff on import duties for ASEAN countries which has been implemented since 2010. This has resulted in no effect on price changes that occur on Indonesia-Singapore export demand due to exchange rate volatility. Meanwhile, for the real exchange rates of the rupiah against the Singapore dollar which have no significant effect on Indonesia-Singapore import demand, this indicates that Indonesia-Singapore import demand is also not affected by price changes if the rupiah depreciates. This is because Indonesia itself in importing from Singapore is dominated by raw materials such as petroleum products, mineral fuels, components for machines/mechanical equipment and others (Central Bureau of Statistics, 2023).

In addition, when comparing the elasticity of export demand of each of Indonesia's largest trading partners as reviewed from the RER coefficient in Table 32, the most elastic elasticity of export demand among Indonesia's five largest trading partners is the elasticity of export demand for Indonesia - China with 1.7256. This indicates that price changes will be more responsive to export demand for Indonesia - China compared to export demand with the other four trading partners (Japan, US, European Union and Singapore). So it is



concluded that if there is a depreciation of the rupiah, the demand for exports from Indonesia – China will increase. With the elasticity of export demand for Indonesia - China, it can also be concluded that goods exported from Indonesia to China are dominated by most of the elastic consumer goods from the 10 largest export commodities of Indonesia - China such as food (15.2%), chemical products (10.3%), leather goods and footwear (4.7%), paper goods (7.8%), textiles (2.5%) and rubber goods (2.3%) (attached in Appendix 10). Basically in consumer goods, the price elasticity of demand changes if the market has responded by offering competitive substitute goods or if consumers are willing to accept products at lower prices than other products (Kelly, 2023). Elastic consumer goods have substitute goods which depend on how narrowly or broadly the meaning of the sound of the goods is (Parkin, 2017).

Meanwhile, if we also compare the elasticity of import demand for each of Indonesia's largest trading partners as reviewed from the RER coefficient in Table 3, the most elastic elasticity of import demand among the five trading partners is the elasticity of import demand for Indonesia - Japan with 1.5583. This also indicates that price changes will be more responsive to import demand for Indonesia - Japan compared to import demand with the other four trading partners (China, US, European Union and Singapore). So it is concluded that if there is a depreciation of the rupiah, the demand for imports from Indonesia – Japan will decrease. The elastic demand for imports from Indonesia – Japan can also be concluded that goods imported from Japan to Indonesia are dominated by most of the electronic goods from the 10 largest commodities of imports from Indonesia – Japan such as electrical machines (25%), vehicles (20%), and electrical equipment machines (10%) (attached in Appendix 11). Electronic goods are elastic goods because these goods have substitute goods.

## CONCLUSION

This study aimed to test the applicability of the Marshall-Lerner Condition in Indonesia's bilateral trade with its five largest trading partners: China, Japan, the United States, the European Union, and Singapore, over the period from 2010 to 2022. Using the Ordinary Least Squares (OLS) method, the research estimated the long-term elasticities of export and import demand with respect to real exchange rates and real GDP. The key conclusions from the analysis are as follows:

1. Marshall-Lerner Condition Validity: The results reveal that the Marshall-Lerner Condition is only met in Indonesia's trade with China, where the sum of the absolute values of the long-term elasticities of export and import demand exceeds one. This indicates that exchange rate depreciation improves Indonesia's trade balance with these two countries. On the other hand, the condition is not met in trade with Japan, United States, the European Union and Singapura, suggesting that currency depreciation alone does not lead to significant improvements in the trade balance with these partners.
2. Impact of Domestic Economic Growth: This study finds that foreign real GDP significantly affects export demand in 4 of Indonesia's trading partners, namely China, Japan, the United States and Singapore, except for the European Union which is not



affected by foreign real GDP. This shows that foreign real GDP will cause additional income used for imports by foreign communities. While Indonesia's real GDP significantly affects import demand in 4 of Indonesia's trading partners, namely China, Japan, the United States and the European Union, except for Singapore which is not affected by Indonesia's real GDP. This shows that an increase in domestic real GDP will trigger high economic activity in the community in consuming goods and services.

3. Policy Implications: The findings suggest that exchange rate depreciation may not be a one-size-fits-all solution for improving Indonesia's trade balance. While it is effective in trade with the China, other factors such as trade agreements, market structures, and the composition of traded goods must be considered in trade with partners like Japan, United States, the European Union and Singapura. Policymakers should take a nuanced approach by combining exchange rate policies with structural reforms and trade agreements that can enhance export competitiveness and reduce reliance on imports.

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