J-Curve For Indonesia's Trade Balance With Non-Linier ARDL

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Abstract: The performance of Indonesia's Balance of Payments (BOP), especially for the trade balance/current account, which recorded a surplus and adequate foreign exchange reserves, controlled political conditions, and attractive yields, can impact the exchange rate. This improvement in the exchange rate further encouraged the entry of foreign investors, which caused the Indonesian economy to continue to grow when the world experienced a financial crisis. This study analyzes asymmetric models to prove the Marshall Lerner Condition of Indonesia with trading partners. Using NARDL methods, this study uses monthly data from 2005 to 2021 from the International Federal Reserve (IFS), a data source for foreign trade activities. The result of this study is a J curve in Indonesia's trade pattern with its trading partners, formed in the United States, Singapore, Vietnam, and Japan. For the nonlinear ARDL method, the J curve is formed in trading partners Netherlands, Germany, Korea, Singapore, United Kingdom, Vietnam, and Japan. The implementation of Indonesia's exchange rate policy should be followed by a policy that can suppress the exchange rate against inflation because if this policy is not followed, it will not significantly impact Indonesia's trade performance in the long run.

Key-words: Exchange rate, Depreciation, Non-Linier, ARDL, J-curve

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1. Introduction

Trade is the engine of economic growth in East Asian countries. This process can be traced back to Japan's export-driven economic boom in the 1960s. The East Asian economies of South Korea, Hong Kong, Singapore, and Taiwan followed suit in the 1970s and 1980s; ASEAN did the same in the 80s, and China followed suit in the '90s. East Asian economies have grown faster than developed countries over the past few decades. Export-oriented industrialization policies have exacerbated this. Trade is carried out by mutually agreed agreements and by individuals with individuals, individuals with governments, and countries with countries (Pujoalwanto, 2014). The exchange of goods and services also involves an economic transaction.

Economic transactions involve an exchange of ownership of goods or services involving the owners of money and assets (Santosa, 2010). Therefore, international trade involves transferring ownership of goods or services across national borders.

The Indonesian government has been trying to increase non-oil and gas exports through trade liberalization efforts since 1982. In 1987, non-oil exports, for the first time, overtook the more traditional oil and gas variety. The government tightly regulated imports to slow the growth of manufactured goods and raw materials imports. This demonstrated Indonesia's dependence on imported goods to sustain its economy.

In the 1970s, Indonesia's largest trading partner, Japan, delivered 41% of the country's oil exports, while Indonesia supplied 25% of Japan's imports. While Japan remains dominant, other trading powers, including the United States, Singapore, and China, significantly influence Indonesia's economy.

The trade balance is the tool to measure a country's international trade activity. This is the track record of economic transactions that citizens of a country conduct with the rest of the world over some time (Levi, 1996). International trade activity is prone to deficits when exports are more minor than imports and surpluses when exports are more significant than imports. Exports are beneficial in reducing the impact of the fragility of the domestic market by expanding the scope of the target market to the global market (Sayef, Bakari; Mohamed, 2017). On the other hand, imports are activities where countries import goods or services from other countries into the country. All countries that carry out international trade activities will have a trade balance that will record export-import. The balance of trade is also used as an indicator to see the economic condition of a country, including in the face of a crisis economic condition, including in the face of a crisis.

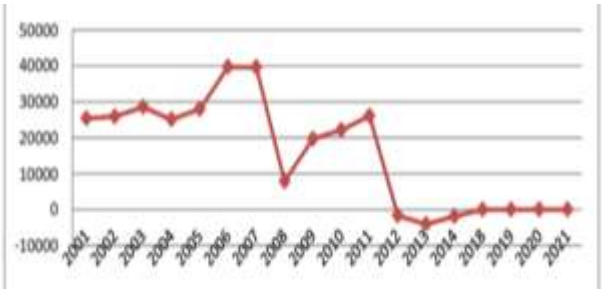

Figure 1. Size of Indonesia's Trade Balance 2001-2021 (US$)

Source: Central Statistics Agency (2001-2021)

One of the causes of the trade balance deficit is the weakening of the Rupiah. Moreover, it has been said by Bank Indonesia and the World Bank that the Rupiah exchange rate has a higher level of volatility than in the years after the 1998 crisis and has more significant movements than other Asian countries. In addition, if there are many imports when the Rupiah weakens, these goods will also become more expensive.

Theoretically, the trade balance will only increase when the real exchange rate depreciates (Husman, 2007). This is because the price of domestic goods is lower due to depreciation. It will encourage competitiveness, which will lead to increased demand for domestic goods abroad, ultimately improving the trade balance; on the import side, an increase in the real exchange rate (depreciation) will hurt import demand (Krugman, 1989) (Krugman, Paul R; Obstfeld, 2005). Depreciation will decrease people's purchasing power for foreign goods, thus reducing the volume of

imports. If the relative price (REER) rises, foreigners will divert their spending to buy domestic goods, reducing the volume of imports.
Similarly, depreciation or devaluation of a currency leads to a decrease in the value of exports, making them more affordable for foreign buyers. Conversely, it also results in a reduction in imports. However, neither effect occurs immediately; instead, there is a delay in the transmission of exchange rate effects. The J-curve phenomenon, initially presented by Magee (1973), is a well-documented concept in international trade. The J-curve theory posits that the trade balance will initially worsen after a currency depreciation, but over time, the trade balance will improve as demand becomes more elastic.

The exchange rate directly impacts the overall welfare of a nation. Following (Magee, 1973) contribution, numerous researchers in other nations have examined the J-curve phenomenon, utilizing aggregate, bilateral, and industrial-level trade data. The findings from these three types of investigations need to be more conclusive. (Bahmani-Oskooee, 1989) Pioneered the use of empirical methodology in aggregate-level research to examine the concept of the J-curve and concluded that the real exchange rate primarily influences the trade balance. Subsequently, (Noland, 1989) (Anju & Uma, 1999) investigated the J-curve hypothesis for Japan by employing the error correction model (ECM), the Vector Autoregressive Model (VAR) model, and the impulse response function. The empirical data confirm the presence of the J-curve phenomenon in Japan. The findings also indicate that the devaluation negatively impacts the trade balance in the near term and tends to enhance it in the long term. (Wang et al., 2016) attempted to investigate the occurrence of the J-curve phenomenon in China.

However, the findings did not support the existence of the J-curve and led to the conclusion that the exchange rate had no impact on the trade balance. Several further research have experimentally examined the concept of the J-curve by the utilization of various econometric approaches and have discovered evidence supporting the existence of the J-curve phenomenon (e.g. (Khatoon & Rahman, 2009) (Suri & Shome, 2013). Several researchers have conducted several previous studies related to depreciation, including (Hapsari & Kurnia, 2018), (Darwanto, 2014), (Marpaung, 2013), (Soleymani & Saboori 2012), (Gebeyehu & Gebeyehu, n.d.), (Simakova, n.d.)), (Shubaita et al., 2020), (Sulistyo Rini, 2013), Sabuhi Sabouni and Piri (2008) (Onafowora, 2003) and (Firdaus et al., 2019), the research results of some of these studies prove that the depreciation of the real exchange rate has a positive influence on the trade balance. If the exchange rate depreciates, the trade balance position will increase (trade balance surplus).

Meanwhile, according to the theory, exchange rate depreciation negatively impacts export volume. Exchange rate depreciation only sometimes immediately responds well to changes in export volume, so adjusting to the demand for exports takes time. This is supported by (Rose & Yellen, 1989), illustrating that the exchange rate did not affect the income balance in five OECD countries after the Bretton Woods era. (Rose, 1991) could not reject the hypothesis that accurate exchange rates are statistically insignificant in determining trade flows. Using quarterly data, they tested bilateral

trade flows between the United States and other OECD countries.

Furthermore, in this study, the author wants to elaborate on the differences in research results related to the exchange rate. According to the J curve theory, whether the weakening of the Rupiah will have an impact on improving the trade balance. Trade? Balance. In addition, researchers also want to include the use of domestic currency (LCS) policies that have been carried out since 2018 (Malaysia, Thailand, and Japan) and 2021 China, which is the country's trade balance 2018 (Malaysia, Thailand, and Japan) and 2021 China, which is a dispersed market share of both exports and imports, has also agreed to do LCS in international trade. From the problem statement above description, several problem formulations are raised, including: Does the Marshall-Lerner condition occur in Indonesia's trade balance with its Trade Partners using the Nonlinear ARDL model (asymmetric model)?

The exchange rate has a positive slope, meaning that an increase in the exchange rate causes a decrease in the company's value. Some of the variables used in the research above use the real exchange rate to balance the bilateral trade balance. Meanwhile, according to (Pratikto, 2012) and Sumiyati (2011), calculating export competitiveness using the real exchange rate is needed. Using only the real exchange rate of the Rupiah and U.S. dollar means ignoring the calculation of other currencies used by Indonesia in conducting trade, such as Won, Yuan, Euro, and Singapore Dollar. So, to be more adequate in seeing competitiveness, the Real Effective Exchange Rate (REER) is also used. The REER is the weighted average of a country's currency against the weighted average of a basket of other currencies adjusted for inflation. Assuming other variables are fixed (ceteris paribus), an increase in a country's REER (genuine appreciation) indicates a weakening of the country's trade competitiveness. Consequently, the increase in a country's current account imbalance is strongly related to the deviation of the actual REER value from its equilibrium REER value.

There are still differences in the results of previous studies and the phenomenon that using a floating exchange rate system in Indonesia has resulted in the Rupiah exchange rate fluctuating. Even during 2000-2020, the Rupiah exchange rate against the U.S. dollar weakened.

According to (Magee, 1973), the simple J-curve theory assumes that the value of a country's exports is calculated in domestic exchange rates, and the value of imports is calculated in foreign exchange rates of trading partners. To derive the theory of the J-curve effect, the trade balance is defined as the difference between the value of exports and the value of imports.

$$TB = PXX - ePx * M \quad .....(1)$$

T.B. is the trade balance calculated in the domestic exchange rate, Px is the domestic export price in the domestic exchange rate, Px* is the foreign export price in the foreign exchange rate, and X(M) is the export (import) entity. E is the exchange rate measured as the domestic exchange rate divided by the domestic exchange rate divided by the foreign exchange rate. Based on Jungho Baek's (2007) research to show the effect of exchange rate changes on the trade balance, equation (1) is derived for the exchange rate (e) and produces the following elasticity form:

$$dTB/de = P_xX[((1+\varepsilon)n^*)/((\varepsilon+n))]-ePx^* M[((I-n)\varepsilon^*)/((\varepsilon+n))] \quad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

2. Problem Formulation

The first step in developing the analytical framework is to build a trade balance model. The model to be used in this study is based on the two-country model as expressed by (Bahmani-Oskooee and Kantipong, 2001). The two primary functions used are the import demand and export supply equations. The two equations below show the import demand in the home and trading partner countries.

The data analysis technique used in this study is the Nonlinear Autoregressive Distributed Lag (NARDL) model developed by (Shin, 2018). The NARDL model tests the asymmetric relationship of variables observed in the long term. In the context of this study, the asymmetric relationship can be explained by the increase (positive) and decrease (negative) of the independent variable on the dependent variable.

The following is a nonlinear asymmetric cointegration, according to Shin et al. (2014), which is shown in the following equation: yt = β+ tx + + β- xt - + et.

In time series data, stationarity is one of the essential requirements that must be met. A set of data is said to be stationary if the mean and variance of the data are constant or do not change systematically over time. Using non-stationary data in the equation will result in a spurious regression equation (Gujarati, 2004). This situation occurs when parameter estimates are statistically significant, but R2 is close to zero, or when the parameter estimates are statistically significant, but R2 is close to zero, or when the parameter estimates are not statistically significant, but R2 is large enough. One of the formal procedures for stationarity testing is the unit root test.

This test was developed by David Dickey and Wayne Fuller and is called the Augmented Dickey-Fuller (ADF) Test. If a time series data is not stationary at the level (zero order, I(0)), then the stationarity of the data can be sought through the following order.

$$\Delta \ln BT_t = \beta_0 + \beta_1 \ln BT_{t-1} + \beta_2 \ln GDPindo_{+t-1} + \beta_3 \ln GDPindo_{-t-1} + \beta_4 \ln GDPj_{+} t-1_{+} + \beta_5 \ln GDPj_{-t-1} + \beta_6 \ln REER_{+t-1} + \beta_7 \ln REER_{-t-1} + \sum_{(k=1)}^{n} \alpha 1i \Delta BT_{t-1} + \sum_{(k=0)}^{n} (\alpha 2i \Delta \ln GDPIndo_{t-1+} + \alpha 3i \Delta \ln GDPIndo_{t-1}) + \sum_{(k=0)}^{n} (\alpha 4i \Delta \ln GDPj_{+t-1} + \alpha 5i \Delta \ln GDP_{-j} t-1) + \sum_{(k=0)}^{n} (\alpha 6i \Delta \ln REER_{+t-1} + \alpha 7i \Delta \ln REER_{-t-1}) + \mu t$$

3. Problem Solution

The data used in this study is secondary data, which is a quantitative time series sourced from Bank Indonesia and International Financial Statistics from 2000 - 2021 every month. Real exchange rate, which in this case is obtained from the calculation of the nominal exchange rate between the nominal exchange rate multiplied by the ratio of the CPI of each trading partner country to the Indonesian CPI. Trade balance, a reflection of the trade balance in goods between Indonesia and the largest trading partner, is the ratio of Indonesia's exports to trading partners to Indonesia's imports from trading partners (Total).

Problems with data stability are a common occurrence in time series. This is

a severe problem because performing regressions in a non-stationary environment will result in spurious regressions, characterized by high values of the coefficient of determination and statistical significance of the regression but no theoretically supported relationship between the two variables. Time series data is considered stationary when its mean and variance remain relatively constant throughout the study. Recently, the Unit Root Test has become a popular method used by econometricians to evaluate the stability of their data. The test in this study was conducted using the augmented version of the Dickey-Fuller (1979) testing methodology. The following table shows the results of the unit root test:

Table 1. Unit Root Test

Variable	Stasionerity			
	Level		First Difference	
	|t-statistic|	Description	|t-statistic|	Description
D(LN_BT_AS)	-0,290	non Stationer	-	**Stationer**
D(LN_BT_AUSTRALIA)	-5,019	Stationer	-	**Stationer**
D(LN_BT_BELANDA)	-3,962	non Stationer	-	**Stationer**
D(LN_BT_INDIA)	-4,806	Stationer	-15,716	**Stationer**
D(LN_BT_JEPANG)	-4,029	Stationer	-12,426	**Stationer**
D(LN_BT_JERMAN)	-2,566	non Stationer	-14,800	**Stationer**
D(LN_BT_KORSEL)	-4,361	Stationer	-10,027	**Stationer**
D(LN_BT_MALAYSIA)	-2,506	non Stationer	-13,997	**Stationer**
D(LN_BT_PHILIPINA)	-3,754	Stationer	-12,627	**Stationer**
D(LN_BT_RRC)	-2,863	non Stationer	-16,117	**Stationer**
D(LN_BT_SINGAPORE	-8,787	Stationer	-10,649	**Stationer**
D(LN_BT_THAILAND)	-4,630	Stationer	-	**Stationer**
D(LN_BT_UK)	-4,428	Stationer	-16,807	**Stationer**
D(LN_BT_VIETNAM)	-2,592	non Stationer	-23,515	**Stasioner**
D(LN_GDP_AS)	-2,416	non Stationer	-15,066	**Stasioner**
D(LN_GDP_AUSTRALI	-14,211	Stasioner	-12,130	**Stasioner**
D(LN_GDP_BELANDA)	-14,322	Stasioner	-11,144	**Stasioner**
D(LN_ GDP _INDIA)	-14,439	Stasioner	-	**Stasioner**
D(LN_ GDP	-11,740	Stasioner	-10,473	**Stasioner**
D(LN_ GDP _JEPANG)	-14,622	Stasioner	-10,829	**Stasioner**
D(LN_ GDP _JERMAN)	-12,350	Stasioner	-10,459	**Stasioner**
D(LN_ GDP _KORSEL)	-13,894	Stasioner	-	**Stasioner**
D(LN_ GDP	-14,393	Stasioner	-10,308	**Stasioner**
D(LN_ GDP	-6,300	Stasioner	-12,639	**Stasioner**
D(LN_ GDP _RRC)	-4,018	Stasioner	-23,904	**Stasioner**
D(LN_ GDP	-2,353	non Stationer	-11,011	**Stasioner**
D(LN_ GDP	-14,395	Stasioner	-12,104	**Stasioner**
D(LN_ GDP _UK)	-12,709	Stasioner	-10,724	**Stasioner**
D(LN_ GDP _VIETNAM)	-4,477	Stasioner	-13,030	**Stasioner**
D(LN_REER_AS)	-1,532	non Stationer	-	**Stasioner**
D(LN_ REER	-2,563	non Stationer	-	**Stasioner**

D(LN_ REER	-2,522	non Stationer	-11,745	**Stasioner**
D(LN_ REER _INDIA)	-2,346	non Stationer	-10,631	**Stasioner**
D(LN_ REER _JEPANG)	-1,586	non Stationer	-	**Stasioner**
D(LN_ REER	-1,889	non Stationer	-11,872	**Stasioner**
D(LN_ REER _KORSEL)	-1,188	non Stationer	-	**Stasioner**
D(LN_ REER	-1,786	non Stationer	-	**Stasioner**
D(LN_ REER	-1,941	non Stationer	-	**Stasioner**
D(LN_ REER _RRC)	-1,952	non Stationer	-	**Stasioner**
D(LN_ REER	-1,678	non Stationer	-	**Stasioner**
D(LN_ REER	-1,685	non Stationer	-	**Stasioner**
D(LN_ REER _UK)	-1,482	non Stationer	-	**Stasioner**
D(LN_ REER	**-1,549**	**non Stationer**	-	**Stasioner**

Source : Author Data (2022)

The Bound Test is used to assess the cointegration and long-run equilibrium relationship between the variables in the model. The decision-making criterion is to compare the F-statistic value with the lower bound (I0 Bound) and upper bound (I1 Bound) critical values. If the F-statistic value exceeds the I1 Bound critical value, then there is cointegration. However, if the F-statistic value is less than the critical value, then there is no cointegration.

Based on the Bounds Test results for the ARDL model in the table above, it can be seen that the F-statistic values of the above models have varying values, Among them at the 5 percent confidence level, for trading partners Australia, India, South Korea, the Philippines, Singapore, the United Kingdom, and Japan indicate the existence of cointegration in the model variables tested in each trading partner so that there is a short-term to long-term balance in these variables.

Whereas for trading partners the United States, the Netherlands, Germany, Malaysia, the PRC, Thailand, and Vietnam have an F Statistic value smaller than the lower bound critical value, the null hypothesis is accepted, and H_1 is rejected, so it can be said that there is no cointegration in the model of Indonesia's trade balance with its trading partners in the respective lag models according to table 4.5. Thus, each independent variable (Indonesian GDP, Trading Partner GDP, and Real Exchange Rate) affects Indonesia's trade balance in the short term. This proves that the variables in some models of Indonesian trading partners are cointegrated in the long run, or it can be said that the three variables move together in the long run.

As mentioned above, the best model of Indonesia's bilateral trade balance equation with 13 trading partners is correctly specified. This indicates that the residuals of the estimated model are not serially correlated and are typically distributed with constant variance in the form of a proper model function.

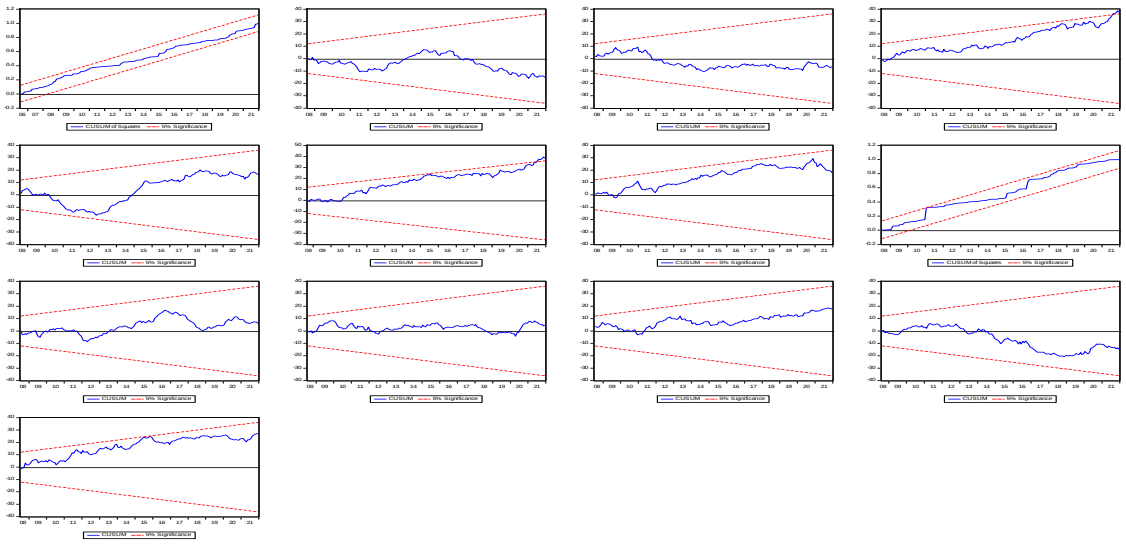

Figure 2 Stability Testing Through Cusum and Cusumq For All Trading Partners (Left to Right) Trading Partners USA, U.K., Japan, Germany, Korea, Malaysia, Philippines, China, Singapore, Thailand, Vietnam, Australia, and India

Source: Author's Data (2022)

In addition to the diagnostic test, this study also tested the stability or consistency of the parameters of the best model using CUSUM and CUSUMQ. The results show that all estimated parameters are structurally stable over time during the analysis period so that they can be used further. This is indicated by the CUSUM and CUSUMQ plots in the 5% critical bound interval, as seen in the figure above.

Table 2. The Coefficient Estimates: The Long-Run Trade Models

Variable	Coefficient	t-statistic	Wald Test
Indonesia – Inggris			
D(LN_BT_UK(-1))	-0.237620	-2.740169***	
D(LN_BT_UK(-2))	-0.115292	-1.671442**	f-stat = 0,491
D(LN_GDP_INDONESIA_NEG)	0.033966	1.165259**	Prob. 0,484
D(LN_REER_UK_POS)	-2.816952	-2.639269***	Value = -1,754
D(LN_REER_UK_POS(-1))	-0.799010	-0.761728	Std.eror= 2,502
D(LN_REER_UK_POS(-2))	1.144939	1.089523	
D(LN_REER_UK_POS(-3))	4.259509	4.032993***	
CointEq(-1)*	-0.592109	-6.303536***	
Indonesia – Amerika Serikat			
D(LN_BT_AS(-1))	-0.167313	-2.338036***	f.stat = 1.374224
D(LN_GDP_AS)	-0.024086	-2.009917	(prob. 0,171)
D(LN_GDP_AS(-1))	0.021866	1.906836	
CointEq(-1)*	-0.318541	-5.207747	
Indonesia – Australia			
D(LN_BT_AUSTRALIA(-1))	-0.308290	-4.630011	t-stat Prob. = 0,8073
D(LN_GDP_AUSTRALIA_NEG)	0.003974	0.452978	f-stat = 0,8073
D(LN_GDP_INDONESIA_POS)	-0.220497	-4.618230	Value = 0,1501

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D(LN_GDP_INDONESIA_POS(-1))	0.065540	2.136630	Std.eror = 0,614
D(LN_GDP_INDONESIA_NEG)	0.019784	0.636952	
CointEq(-1)*	-0.454445	-6.240995	
Indonesia – Belanda			t-stat=-2,016
D(LN_BT_BELANDA(-1))	-0.314677	-4.826539	Prob=0,045
D(LN_REER_BELANDA_POS)	-5.181848	-1.298465	F-stat=4,066
D(LN_REER_BELANDA_POS(-1))	-10.89449	-2.662886	Value =-25,17
D(LN_REER_BELANDA_POS(-2))	8.169893	2.007896	Std.eror=12,48
D(LN_REER_BELANDA_NEG)	8.442296	2.035467	
CointEq(-1)*	-0.352992	-5.455800	
Indonesia _ India			F-stat=2,876
D(LN_GDP_INDIA_NEG)	0.018128	1.828539	Prob=0,091
CointEq(-1)*	-0.741206	-11.14573	Value=0,018
			Std.eror=0,089
Indonesia – Jepang			
D(LN_BT_JEPANG(-1))	-0.443941	-6.295447	F-stat=0,940
D(LN_BT_JEPANG(-2))	-0.196515	-2.659140	Prob.=0,3335
D(LN_BT_JEPANG(-3))	-0.182298	-2.830424	Value = 1,134
D(LN_GDP_INDONESIA_POS)	0.054253	2.851251	Std eror = 1,170
D(LN_GDP_INDONESIA_POS(-1))	0.002512	0.139671	
D(LN_GDP_INDONESIA_POS(-2))	-0.059474	-3.310501	
D(LN_GDP_INDONESIA_POS(-3))	-0.042906	-2.341637	
D(LN_GDP_JEPANG_NEG)	0.001670	0.250326	
D(LN_REER_JEPANG_POS)	2.538520	3.350623	
D(LN_REER_JEPANG_POS(-1))	-1.356714	-1.730895	
CointEq(-1)*	-0.236744	-5.378687	
Indonesia – Jerman			
D(LN_BT_JERMAN(-1))	-0.266908	-3.879840	F-stat =3,958
D(LN_REER_JERMAN_NEG)	0.387106	0.136887	Prob=0,048
D(LN_REER_JERMAN_NEG(-1))	-3.195105	-1.076023	Value=-9,46
D(LN_REER_JERMAN_NEG(-2))	-6.923242	-2.426319	Std.eror=4,757
CointEq(-1)*	-0.470778	-6.267256	
Indonesia – Malaysia			
D(LN_BT_MALAYSIA(-1))	-0.342912	-4.466611	F-stat =5,188
D(LN_BT_MALAYSIA(-2))	-0.228886	-3.429074	Prob = 0,023
D(LN_GDP_INDONESIA_POS)	0.082964	1.527111	Value =0,215
D(LN_GDP_INDONESIA_POS(-1))	-0.032123	-1.527440	Std.eror = 0,094
D(LN_GDP_INDONESIA_NEG)	0.009173	0.440057	
D(LN_GDP_INDONESIA_NEG(-1))	-0.198987	-3.591792	
D(LN_GDP_MALAYSIA_NEG)	-0.009987	-0.704166	
D(LN_GDP_MALAYSIA_NEG(-1))	0.034661	2.471700	
CointEq(-1)*	-0.383971	-5.500339	
Indonesia – Philipina			
D(LN_BT_PHILIPINA(-1))	-0.113356	-1.618017	f-stat =6,510
CointEq(-1)*	-0.622938	-7.517559	Prob. 0,000
Indonesia – Singapore			
D(LN_GDP_INDONESIA_POS)	-0.054020	-2.515263	f-stat=0,124
D(LN_GDP_INDONESIA_POS(-1))	0.013255	0.614441	Prob=0,724
D(LN_GDP_INDONESIA_POS(-2))	0.050302	2.346678	Value=0,866
D(LN_GDP_SINGAPORE_NEG)	-0.009582	-0.610598	Std eror=2,456
D(LN_GDP_SINGAPORE_NEG(-1))	0.044830	2.885023	
D(LN_REER_SINGAPORE_POS)	1.025373	0.755305	
D(LN_REER_SINGAPORE_POS(-1))	1.797884	1.299370	
D(LN_REER_SINGAPORE_POS(-2))	-3.664104	-2.551958	

CointEq(-1)*	-0.741201	-11.13937	
Indonesia – Thailand			
D(LN_BT_THAILAND(-1))	-0.203023	-3.050585	t-stat=2,766
D(LN_GDP_THAILAND_POS)	0.148954	3.911193	f-stat=7,651
D(LN_GDP_THAILAND_NEG)	0.000867	0.141268	Prob=0,006
D(LN_GDP_THAILAND_NEG(-1))	0.081695	2.148206	
D(LN_REER_THAILAND_NEG)	-1.419800	-3.399488	
CointEq(-1)*	-0.477456	-6.615451	
Indonesia – Vietnam			
D(LN_BT_VIETNAM(-1))	-0.284399	-4.303710	t-stat=1,561
D(LN_REER_VIETNAM_POS)	1.882064	1.059840	f-stat=2,438
D(LN_REER_VIETNAM_POS(-1))	-2.765238	-1.482047	Prob=0,1201
D(LN_REER_VIETNAM_POS(-2))	3.790544	2.117519	
D(LN_REER_VIETNAM_NEG)	-2.438574	-1.851503	
CointEq(-1)*	-0.340638	-5.630091	
Indonesia – Korea			
D(LN_BT_KORSEL(-1))	-0.460625	-6.687665***	
D(LN_BT_KORSEL(-2))	-0.264485	-4.334406***	F.stat=0,112
D(LN_GDP_INDONESIA_NEG)	-0.014838	-0.656012	Prob=0,737
D(LN_REER_KORSEL_POS)	0.398302	0.536988	Value=0,546
D(LN_REER_KORSEL_POS(-1))	-1.402716	-1.856045**	Std.eror=1,629
D(LN_REER_KORSEL_POS(-2))	-1.610900	-2.120843**	
CointEq(-1)*	-0.397284	-6.596637***	
Indonesia – China			
D(LN_BT_RRC(-1))	-0.242864	-3.453942***	
D(LN_GDP_RRC_POS)	0.031548	0.373587	F-stat = 3,87
D(LN_GDP_RRC_NEG)	0.011328	0.643560	Prob=0,05
D(LN_GDP_RRC_NEG(-1))	0.145586	1.760424**	Value = -0,134
D(LN_GDP_INDONESIA_POS)	-0.032120	-0.990957	Std.error =0,068
D(LN_GDP_INDONESIA_POS(-1))	-0.021024	-0.832806	
D(LN_GDP_INDONESIA_POS(-2))	0.044134	1.755084**	

Source: Author Data (2022)

4. Conclusion

In the long run, estimated for trading partners the United States, Australia, the Netherlands, and Japan, there is a negative relationship between real foreign income and the trade balance. This is consistent with the results of research from Onafowora, 2003, saying that there is a negative relationship between domestic GDP (Indonesia) and bilateral trade balance can occur if the increase in domestic GDP is due to increased production of import substitution goods so that when production increases, exports need to be done to reduce excess supply in the country.

Indonesia's domestic income (Indonesia's GDP) is positive and significant, with a 99% confidence interval, and 90% occurs in the case of bilateral trade with Japan, Thailand, the Philippines, Vietnam, and Korea. This indicates that Indonesia's economic growth decreases domestic demand for imports, thus improving Indonesia's bilateral trade balance with these trading partners. In other words, if imports are defined as the difference between consumption and domestic production, then an increase in real domestic income can increase

domestic production of substitute imported goods faster than an increase in domestic consumption, causing a decrease in domestic imports (Magee, 1973; Bahmani-Oskoee, 1985).

Conditions during the United States trade war with China in 2018 can lead to economic weakness in both countries. This can make the demand for goods from Indonesia (exports) decline because every one percent slowdown in the U.S. economy will cut Indonesia's economic growth by 0.05 percent. Likewise, with China, every one percent slowdown in its economy will impact Indonesia's economic growth by 0.27 percent (Karunia, 2019).

The impact of trading partners' domestic income (GDP) on Indonesia's bilateral trade balance with trading partners India, Malaysia, Philippines, Singapore, and Vietnam shows a positive and significant coefficient with a confidence interval of 90% and 95%, respectively. This means that the economic growth of trading partners causes their imports to increase, which impacts improving Indonesia's bilateral trade balance with these trading partners.

For example, according to Didi Sumedi, in January-August 2021, Indonesia recorded a trade surplus of US$ 2.01 billion. This surplus resulted from Indonesia's exports to Malaysia, amounting to US$ 7.68 billion, and Indonesia's imports from Malaysia, amounting to US$ 5.67 billion. ("Indonesia - Malaysia Sign US$ 87.89 Million Trade Contract," 2021). This is because various economic sectors have started to run in Malaysia, which directly affects demand for various products, especially from Indonesia pre-Covid-19.

Indonesia exports various commodities to Singapore, including tools / spare parts for vehicles, cables, processed food, etc. Indonesia's exports to Singapore occupied the third position as the destination country and continued to experience the most significant increase in July 2020. Non-oil and gas commodities are superior, although large amounts of oil and gas exports are recorded. The most significant increase occurred in 2021 by 15.82% to reach US$24.29 billion in trade value between Indonesia and Singapore.

In the long run, the exchange rate variable is proven to have a positive and significant effect on the trade balance. The results of this study support previous research, namely Hapsari and Kurnia (2018), Darwanto (2014), Marpaung (2013), Soleymani et al. (2011), Gebeyehum (2014), Šimáková (2013), Shubaita et al. (2020), Hartarto (2014), and Firdaus et al. (2019), which proves that in the long run the real exchange rate has a positive relationship with the trade balance where if the exchange rate depreciates, the trade balance position will increase (trade balance surplus). This indicates that Rupiah depreciation will improve the trade balance to a surplus in the long run due to exchange rate depreciation. The volume of exports will increase because the price of domestic products is much cheaper for foreign buyers, so it will slowly improve the trade balance position. Indonesia's trading partners that have positive and significant results are Germany, the Philippines, and Korea.

The negative short-term effect of the exchange rate on the trade balance is found in Indonesia's bilateral trade balance with its trading partners, namely the United States, Japan, Singapore, and Vietnam. For Japan, the coefficient of the REER variable is negative at lag 1, followed by a positive lag at lags 2 and 3, but not significant.

However, the J-Curve effect on Indonesia's bilateral trade balance with the

Philippines, Thailand, and Vietnam only lasts for a while in the long run. This is because the coefficient of the long-term REER variable for the three countries is negative. This can be interpreted as the negative effect of REER on the trade balance continuing in the long run, which states that Marshall learner needs to be fulfilled for the three Indonesian trading partners above.

References

[1]. Anju, G. K., & Uma, R. (1999). Is There A J-Curve? In *A New Estimation For Japan*.

[2]. Baek, J. (2007). The J-Curve Effect And The U.S.–Canada Forest Products Trade. *Journal Of Forest Economics*. Https://Www.Sciencedirect.Com/Science/Article/Pii/S1104689906000493

[3]. Bahmani-Oskooee, M. (1989). Devaluation And The J-Curve: Some Evidence For Ldcs: Errata. In *The Review Of Economics And Statistics*. Ideas.Repec.Org. Https://Ideas.Repec.Org/A/Tpr/Restat/V71y1989i3p553-54.Html

[4]. Bahmani-Oskooee, M., & Baek, J. (2016). *Asymmetry Cointegration And The J-Curve: New Evidence From Korean Bilateral Trade Balance Models With Her 14 Partners* (MPRA Paper). University Library Of Munich, Germany. Https://Econpapers.Repec.Org/Repec:Pra:Mprapa:83195

[5]. Bahmani-Oskooee, M., & Kantipong, T. (2001). Bilateral J-Curve Between Thailand And Her Trading Partners. *Journal Of Economic Development*, *26*(2).

[6]. Darwanto. (2014). Adakah Fenomena Marshall-Lerner Condition Dan J-Curve Di Indonesia - Neliti. *Jurnal Bisnis Dan Ekonomi*, *21*(1). Https://Www.Neliti.Com/Publications/24205/Adakah-Fenomena-Marshall-Lerner-Condition-Dan-J-Curve-Di-Indonesia

[7]. Firdaus, M., Satriani, R., Amaliah, S., Salam, F. A., & ... (2019). Defisit Neraca Perdagangan: J-Curve, Perang Dagang Dan Model Salter Corden. *Jurnal Ekonomi* Https://Jurnal.Isei.Or.Id/Index.Php/Isei/Article/View/34

[8]. Gebeyehu, A. B., & Gebeyehu, A. B. (N.D.). *Exchange Rate And Trade Balance; J Curve Effect In Ethiopia*. Retrieved July 8, 2022, From Http://Citeseerx.Ist.Psu.Edu/Viewdoc/Summary?Doi=10.1.1.735.5436

[9]. Gujarati, D. N. (2004). Basic Econometric, Fourth Edition. In *New York*.

[10]. Hapsari, A. T., & Kurnia, A. S. (2018). Fenomena Kurva J Pada Neraca Perdagangan Indonesia Dengan Enam Negara Mitra Dagang Utama. *Jurnal Dinamika Ekonomi Pembangunan*. Https://Doi.Org/10.14710/Jdep.1.2.10-27

[11]. Husman, J. A. (2007). Pengaruh Nilai Tukar Riil Terhadap Neraca Perdagangan Bilateral Indonesia: Kondisi Marshall-Lernerdan Fenomena J-Curve. *Buletin Ekonomi Moneter Dan Perbankan*, *8*(3). Https://Doi.Org/10.21098/Bemp.V8i3.141

[12]. Khatoon, R., & Rahman, M. M. (2009). Assessing The Existence Of The J-Curve Effect In Bangladesh. *The Bangladesh Development Studies*. Https://Www.Jstor.Org/Stable/40795723

[13]. Krugman, Paul R; Obstfeld, M. (2005). *Ekonomi Internasional Teori Dan Kebijakan Edisi Kelima* (Edisi : V). PT Indeks Kelompok Gramedia.

[14]. Krugman, P. (1989). The J-Curve, The Fire Sale, And The Hard Landing. *The American Economic Review*. Https://Www.Jstor.Org/Stable/1827725

[15]. Levi, M. D. (1996). *International Finance : The Markets And Financial Management Of Multinational Business*. Mcgraw-Hill.

[16]. Magee, S. P. (1973). Currency Contracts, Pass-Through, And Devaluation. *Brookings Papers On Economic Activity*, *1973*(1), 303. Https://Doi.Org/10.2307/2534091

[17]. Marpaung, E. (2013). Pengaruh Nilai Tukar Riil Terhadap Trade Balance Di Negara Asean (Pendekatan Kondisi Marshall–Lerner Dan Fenomena J–Curve). In *Economics Development Analysis Journal*. Journal.Unnes.Ac.Id.

Https://Journal.Unnes.Ac.Id/Sju/Index.Php/Edaj/Article/View/1977/1778

[18]. Noland, M. (1989). Japanese Trade Elasticities And The J-Curve. *The Review Of Economics And Statistics*. Https://Www.Jstor.Org/Stable/1928067

[19]. Onafowora, O. (2003). Exchange Rate And Trade Balance In East Asia: Is There A J-Curve? *Economics Bulletin*, *5*(18), 1–13.

[20]. Pratikto, R. (2012). Dynamics Of Indonesia's International Trade: A VAR Approach. *Procedia Economics And Finance*, pp. *4*, 149–159. Https://Doi.Org/10.1016/S2212-5671(12)00330-9

[21]. Pujoalwanto, B. (2014). *Perekonomian Indonesia Tinjauan Historis* (Vol. 110). Https://Scholar.Googleusercontent.Com/Scholar.Bib?Q=Info:Sgwlu__-Jy8j:Scholar.Google.Com/&Output=Citation&Scisdr=Cgu1huqxep7p1lnkg4c:Aagbfm0aaaaaysvia4catkr6w6_Htl6bylg8kt6wuixd&Scisig=Aagbfm0aaaaaysviaxqk76a0qseaqv_Ykccw87adhaoj&Scisf=4&Ct=Citation&Cd=-1&Hl=En

[22]. Rose, A. K. (1991). The Role Of Exchange Rates In A Popular Model Of International Trade. Does The "Marshall-Lerner" Condition Hold? *Journal Of International Economics*, *30*(3–4), pp. 301–316. Https://Doi.Org/10.1016/0022-1996(91)90024-Z

[23]. Rose, A. K., & Yellen, J. L. (1989). Is There A J-Curve? *Journal Of Monetary Economics*, *24*(1), 53–68. Https://Doi.Org/Https://Doi.Org/10.1016/0304-3932(89)90016-0

[24]. Santosa, A. B. (2010). Pengaruh Fluktuasi Nilai Tukar Rupiah Terhadap Neraca Transaksi Berjalan | Dinamika Keuangan Dan Perbankan. *Dinamika Keuangan Dan Perbankan* , *2*(2), 169–181. Https://Unisbank.Ac.Id/Ojs/Index.Php/Fe1/Article/View/190

[25]. Sayef, B.; Mohamed, M. (2017). Impact Of Exports And Imports On Economic Growth: New Evidence From Panama. *Journal Of Smart Economic Growth*.

[26]. Shin, J. (2018). J-Curve Phenomenon Might Be Inherent: How To Know If It Is Treatment Induced? *Korean Circulation Journal*. Https://Synapse.Koreamed.Org/Articles/1094014

[27]. Shubaita, E., Mar'i, M., & Seraj, M. (2020). Investigating The J-Curve Phenomenon In Tunisia-ARDL Bound Test Approach. *Journal Of Economics ...*. Https://Ojs.Amhinternational.Com/Index.Php/Jebs/Article/View/3077

[28]. Simakova, J. (N.D.). Bilateral J-Curve Between Slovakia And Its Major Trading Partners Електронний Ресурс. In *Режим Доступу Http://Mme2012. Opf. Slu. Cz ...*.

[29]. Soleymani, A., & Saboori, B. (2012). The J-Curve: Evidence From Commodity Trade Between Malaysia And Japan. In *The ...* Asian Network For Scientific ….

[30]. Sulistyo Rini, H. (2013). Dilema Keberadaan Sektor Informal. *Komunitas: International Journal Of Indonesian Society And Culture*, *4*(2). Https://Doi.Org/10.15294/Komunitas.V4i2.2415

[31]. Suri, D. K., & Shome, S. (2013). Evidence Of A J-Curve In India. In *Journal Of Research In Management & Technology*.

[32]. Wang, R., Zhao, W., Li, S., & Zhang, S. (2016). Influence Of "J"-Curve Spring Stiffness On Running Speeds Of Segmented Legs During High-Speed Locomotion. In *Applied Bionics And Biomechanics*. Hindawi.Com. Https://Www.Hindawi.Com/Journals/Abb/2016/1453713/

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