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ASYMMETRIC EFFECTS OF EXCHANGE RATES ON MALAYSIAN PALM OIL EXPORTS TO CHINA

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Abstract: Fluctuations in exchange rates can induce uncertainty, significantly impacting a country's exports. The unexpected appreciation or depreciation of a currency can also influence the flow of palm oil exports between Malaysia and China, affecting relative prices. This study aims to investigate whether the effects of exchange rate fluctuations on palm oil exports exhibit a symmetric or asymmetric relationship. Additionally, this study endeavours to ascertain the presence of the J-curve phenomenon in explaining the connection between exchange rates and Malaysia's palm oil exports to China. This study employs a quarterly dataset spanning from January 2010 to June 2023 and utilises the linear and Nonlinear Autoregressive Distributed Lag (NARDL) approaches. The study's results affirm the presence of asymmetric effects stemming from exchange rate movements on Malaysia's palm oil exports to China. This study found that ringgit depreciation positively impacts palm oil exports in the long run. These empirical findings hold significance for policymakers, shedding light on the positive repercussions of palm oil price changes on economic activity, ensuring that all stakeholders in the sector reap the benefits accordingly.

Keywords: Asymmetric, exchange rate, export, nonlinear, palm oil.
Abbreviation: RER, DI, FI, PO, and SO.

Introduction

The palm oil industry in Malaysia has a long history, dating back to British colonial times when the oil palm tree was first introduced. Since then, it has evolved into a major agricultural industry. Malaysia currently ranks as the second largest producer and exporter of palm oil globally, and palm oil is a significant contributor to Malaysia's economy as it generates substantial export revenue and provides employment opportunities for a large portion of the rural population. It is reported that there are about three million people in Malaysia whose livelihood depends on the palm oil industry, of which 650 thousand are smallholders (Hamidi *et al*., 2022). Palm oil is also a highly versatile vegetable oil, widely used in various industries, including food, cosmetics, pharmaceuticals, and biofuels. Due to this, palm oil has created a higher demand globally compared to other vegetable oils.

As for 2022, total exports of palm oil and other palm-based products are higher by 1.8% from 24.28 million tonnes recorded in 2021 (Parveez *et al*., 2023). One of the key countries for Malaysia's palm oil exports is China, which has been the second-largest market since 2019. Although China is among the top countries producing soybean oil, it still cannot fully capture overall consumer demand due to its larger population. It is reported that palm oil is among the top five vegetable oils used in that country (Research & Market, 2021). The demand for palm oil from this country has also seen an increasing trend since 2000 (Zakaria *et al*., 2022), despite a critical claim concerning the environmental issues raised by this country. Therefore, it is proven that China is one of the most significant markets that contribute to the Malaysian palm oil industry.

Exchange rate movements significantly influence trade flows (Ng & Chin, 2021; Zhu *et al*., 2022; Lal *et al.,* 2023). In general, changes in the exchange rate will have an impact on household and business decisions, which will ultimately have an effect on economic activity. The ringgit may occasionally rise and depreciate for a nation with a flexible exchange rate like Malaysia. Based on Figure 1, it can be seen that the Malaysian Ringgit (MYR) to Chinese Yuan (CNY) has fluctuated over time and has shown a decreasing trend (depreciation) since 2020. The trade balance between these two nations may be impacted by this trend, particularly with regard to exports of palm oil. However, Bahmani-Oskooee and Aftab (2018) argued that the relationship between trade balance and exchange rate may appear insignificant if only tested using a linear model without considering the exchange rate variable's nonlinear adjustment. Thus, it is important to consider the nonlinear adjustment of the exchange rate as it may appear to have a different impact on the exports.

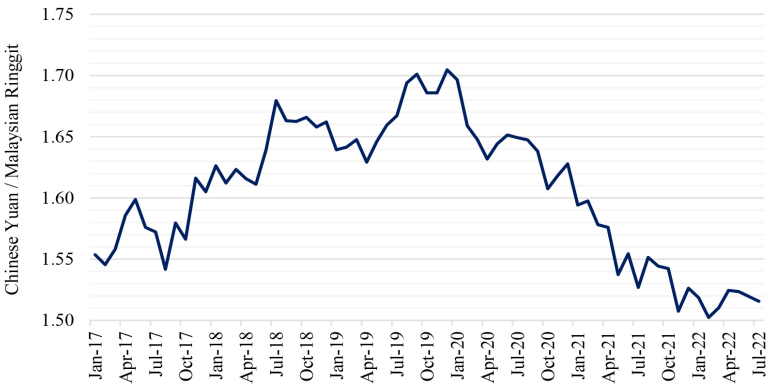

Figure 1: Real exchange rate (Chinese Yuan/Malaysian Ringgit)
Source: Central Bank of Malaysia (2023)

Moreover, the relationship between exchange rate and export can also be explained by using the J-curve theory. The theory states that after a country faces the depreciation of its currency, its trade will initially worsen as the price adjusts before quantities. Then, the trade will increase over time due to their more attractive prices to foreign buyers. In other words, the trade balance may experience a positive impact on currency depreciation in the short term but will have a negative impact in the long term. Thus, this study aims to examine the symmetric and asymmetric effects of exchange rate fluctuations on Malaysia's palm oil exports to China. This study may contribute to the further understanding of how the MYR depreciation in relation to the CNY affects Malaysia's palm oil export to China. To the author's knowledge, the asymmetric relationship between exchange rates and commodity exports is still lacking, especially in palm oil exports. Thus, this study also extends the palm oil industry literature by focusing on the asymmetric relationship between these two variables.

The remaining parts of this paper are arranged as follows: The relevant theoretical and empirical literature is reviewed in Section 2. Section 3 describes the data source and baseline empirical model using a linear and Nonlinear Autoregressive Distributed Lag (NARDL) approach. Section 4 summarises the main empirical findings and the conclusion and policy implications are presented in Section 5.

Literature Review

The link between the real exchange rate and the trade balance has been discussed in depth by early studies such as Brissimis and Leventankis

(1989), Rosenweig and Koch (1988), and Meade (1988). It is found that exchange rate movements can positively or negatively affect trade depending on the behaviour of the importers or exporters. Baggs (2009) and Fitzgerald and Haller (2018) have discussed the relationship from both theoretical and empirical perspectives. The positive impact of Yuan appreciation on ASEAN exports was established by Thorbecke (2011) Hooy *et al*. (2015) and Li *et al*. (2015) but only for disaggregated exports. Then, the relationship between exchange rate, exports, and economic growth in Asia was revisited in studies by Zhu *et al.* (2022), and it was found that depreciated currencies positively impact exports and economic growth.

Several researchers have studied the case of Malaysia. Doroodian *et al*. (1999) revealed a negative impact of exchange rate volatility on exports from Malaysia, South Korea, and India. Arize *et al*. (2000) found similar results as the exchange rate volatility had a negative impact on exports for all 13 nations, including Malaysia. The idea that exchange rate volatility has a detrimental effect on Malaysia's export of electrical goods was backed by Wong and Tang (2008), implying that the link between the two variables varies depending on the nation. Recent studies by Arize *et al*. (2017) and Bahmani-Oskooee and Aftab (2018) consider the nonlinear adjustment of exchange rates in their studies. Iqbal *et al.* (2022) and Xu *et al*. (2022) have taken a similar consideration. Bahmani-Oskooee and Aftab (2018) found that the ringgit's depreciation against the yuan affects nearly a third of the industries. Zainuddin and Zaidi (2020) reached a similar conclusion. On the other hand, Ng and Chin (2021) found that exchange rate fluctuations had a negative but statistically insignificant impact on exports but had a positive and statistically significant impact on imports.

Few researches, including those by Cho *et al*. (2002), Wang and Barrett (2007), Kandilov (2008) and Foragasi (2011), particularly addressed the influence of exchange rate changes on the agricultural trade. Foragasi (2011) proves that the nominal exchange rate movement positively impacted the trade flow for agricultural sectors for Hungary and major export destinations over nine years (1999-2008). This result is consistent with Kandilov (2008), who found that the exchange rates affect the trade flows negatively. The impact was stronger in the agricultural trade sector compared to other industries.

Agriculture trade volumes seem to be particularly responsive to real exchange rate fluctuation, and the effect is detrimental, according to Wang and Barrett (2007). Studies by Lee and Masih (2018) aim to determine whether the link between the two is linearly symmetric or not in terms of palm oil exports and the linkages between the fluctuations of exchange rate and palm oil export flows in Malaysia. The findings demonstrated a long-term unbalanced relationship between the exchange rate and palm oil exports.

Data and Methodology

For this analysis, a quarterly time series data collection covering the period from January 2010 to June 2023 is used. The dependent variable is export (X), which represents Malaysia's palm oil export volume to China. The independent variables for this study are RER which represents the real exchange rate; DI as domestic income (Growth Domestic Product Malaysia); FI as foreign income (Growth Domestic Product China); PO as the export price of palm oil; and SO as the export price of soybean oil. The real exchange rate is calculated manually based on the nominal exchange rate between Malaysia and China and the consumer prices index in both countries (Zainuddin & Zaidi, 2020). The selection of the independent variable is based on the studies of Bahmani-Oskooee and Hegerty (2011) and Bahmani-Oskooee and Fariditavana (2016). The variables are then all stated in terms of natural logarithms. To control for COVID-19 pandemic shocks, this study includes the COVID-19 dummy based on the movement control date imposed by the Malaysian government. Table 1 summarises the overall description of the variable and data sources.

Table 1: Variable description and data sources

Variables	Description	Data Sources
X	Export Malaysia to China (RM)	Department of Statistics Malaysia
RER	Real Exchange Rate (Yuan/RM)	Central Bank of Malaysia
DI	Domestic Income GDP Malaysia	Central Bank of Malaysia
FI	Foreign Income GDP China	International Monetary Fund
PO	Export price of palm oil (US$/mt)	The World Bank
SO	Export price of soybean oil (US$/mt)	The World Bank
COVID	Dummy variable for the COVID-19 pandemic, equal to one from Mac 2020 till December 2021.	Department of Statistics Malaysia

The ARDL cointegration test method introduced by Pesaran and Shin (1996) and Pesaran *et al*. (2001) is used in this study. Basically, the ARDL model for this study is presented as follows:

$$\Delta lnX_t = \alpha_0 + \sum_{i=1}^{p} \beta_i \Delta lnRER_{t-i} + \sum_{i=0}^{q} \gamma_i \Delta lnDI_{t-i} + \sum_{i=0}^{r} \delta_i \Delta lnFI_{t-i} + \sum_{i=0}^{s} \pi_i \Delta lnPO_{t-i} + \sum_{i=0}^{v} \rho_i \Delta lnSO_{t-i} + \sum_{i=0}^{w} \omega_i \Delta COVID_{t-i} + \theta_1 lnRER_{t-1} + \theta_2 lnDI_{t-1} + \theta_3 lnFI_{t-1} + \theta_4 lnPO_{t-1} + \theta_5 lnSO_{t-1} + \theta_6 COVID_{t-1} + \varepsilon_t. \quad (1)$$

In the context of this analysis, Δ represents the first-difference operator, and p, q, r, s, v, and w denote the optimal lag lengths. The initial step involves assessing the presence of a long-term connection (cointegration) among the variables. The null hypothesis concerning the absence of cointegration in Equation 1 is stated as H_0: $\theta_1 = \theta_2 = \theta_3 = \theta_4 = \theta_5 = \theta_6 = 0$, while the alternative hypothesis is H_1: $\theta_1 \neq \theta_2 \neq \theta_3 \neq \theta_4 \neq \theta_5 \neq \theta_6 \neq 0$. If the calculated F-statistic exceeds the upper critical value, this study rejects the null hypothesis, indicating the existence of a long-term relationship (cointegration) among the time series variables. Conversely, if the F-statistic falls below the lower critical value, this study fails to reject the null hypothesis. Additionally, if the estimated F-statistic falls between the lower and upper critical values, it remains inconclusive whether cointegration exists because the degree of integration of the variable is uncertain. If there is substantial evidence of cointegration among the variables, this study proceeds to estimate the long-run model as follows:

$$lnX_t = \alpha_1 + \sum_{i=1}^{p} \beta_{i1} lnRER_{t-i} + \sum_{i=0}^{q} \gamma_{i1} lnDI_{t-i} + \sum_{i=0}^{r} \delta_{i1} lnFI_{t-i} + \sum_{i=0}^{s} \pi_{i1} lnPO_{t-i} + \sum_{i=0}^{v} \rho_{i1} lnSO_{t-i} + \varepsilon_t. \quad (2)$$

The final stage involves creating an error correction model (ECM) using the following structure to obtain an ARDL specification of the short-run dynamics:

$$\Delta lnX_t = \alpha_2 + \sum_{i=1}^{p} \beta_{i2} \Delta lnRER_{t-i} + \sum_{i=0}^{q} \gamma_{i2} \Delta lnDI_{t-i} + \sum_{i=0}^{r} \delta_{i2} \Delta lnFI_{t-i} + \sum_{i=0}^{s} \pi_{i2} \Delta lnPO_{t-i} + \sum_{i=0}^{v} \rho_{i2} \Delta lnSO_{t-i} + \sum_{i=0}^{w} \omega_{i2} \Delta COVID_{t-i} + \psi ECT_{t-1} + \varepsilon_t, \quad (3)$$

Where ECT_{t-1} is an error correction term. The error correction term quantifies the rate of change (ψ) toward long-term equilibrium. It measures the dependent variable's convergence time to the long-run equilibrium is measured. In the current study context, the long-term causal relationship between all explanatory variables and the export of Malaysian palm oil to China can be explained by ECT_{t-1}.

Then, to evaluate the asymmetric impact of the exchange rate on the export of palm oil, this study utilises the Nonlinear ARDL (NARDL) approach by Shin *et al*. (2014). This approach disaggregates the movement of exchange rates into positive and negative changes, thus allowing for short- and long-run asymmetry. The exogenous variable used in this study is $InRER_t$. Thus, the positive partial sum change in the series is represented by the notation $InRER_t^+$, while the negative partial sum is $InRER_t^-$. These can be generated as:

$$lnRER_t^+ = \sum_{j=1}^{t} \Delta lnRER_j^+ = \sum_{j=1}^{t} \max(\Delta lnRER_j, 0), \tag{4}$$

$$lnRER_t^- = \sum_{j=1}^{t} \Delta lnRER_j^- = \sum_{j=1}^{t} \min(\Delta lnRER_j, 0). \tag{5}$$

In Equation 4, the positive variable reflects only ringgit appreciation, and the negative variable only ringgit depreciation. The next step is to substitute Equations 4 and 5 into 1 to form the NARDL model, which is expressed as follows:

$$\begin{aligned}\Delta lnX_t = \alpha_3 &+ \sum_{i=1}^{p} \beta_i \Delta lnRER_{t-i} + \sum_{i=0}^{q} \gamma_i \Delta lnDI_{t-i} + \sum_{i=0}^{r} \delta_i \Delta lnFI_{t-i} + \sum_{i=0}^{s} \pi_i \Delta lnPO_{t-i} \\ &+ \sum_{i=0}^{v} \rho_i \Delta lnSO_{t-i} + + \sum_{i=0}^{w} \omega_i \Delta COVID_{t-i} \sum_{i=0}^{u} \pi_i^+ \Delta lnRER_{t-i}^+ + \sum_{i=0}^{v} \pi_i^- \Delta lnRER_{t-i}^- \\ &+ \theta_1 lnRER_{t-1} + \theta_2 lnDI_{t-1} + \theta_3 lnFI_{t-1} + \theta_4 lnPO_{t-1} + \theta_5 lnSO_{t-1} + \theta_6 COVID_{t-1} \\ &+ \theta_7 lnRER_{t-1}^+ + \theta_8 lnRER_{t-1}^- + \varepsilon_t.\end{aligned} \tag{6}$$

This study expects the negative impact of RER^+ as ringgit appreciations should lead to lower export volumes due to relatively higher prices. Meanwhile, this study expects a positive relationship for RER- as ringgit depreciation should decrease export prices and eventually lead to higher export volume. In addition, this study also conducts various diagnostic checks by using normality tests, heteroscedasticity, serial correlation, misspecification tests, and parameter stability tests to ensure the robustness of the estimation results.

Results and Discussion

Before conducting regression, this study evaluates the nature of the variables by using the descriptive statistics reported in Table 2. The mean for In*RER*, In*PO*, In*SO*, and *COVID* are higher than the median, which indicates that the data for these variables have a negatively skewed distribution. Meanwhile, In*X*, In*DI*, and In*FI* have positively skewed distribution. The same can be said of the skewness. All variables have low dispersion, as seen from the standard deviation, which is less than 10. The minimal differences between maximum and minimum values also show the low dispersion. Overall, there are no issues with the data distribution. Next, this study evaluates the stationary of the data by conducting a unit root test.

Table 2: Descriptive statistics

	ln*X*	ln*RER*	ln*DI*	ln*FI*	ln*PO*	ln*SO*	COVID
Mean	12.964	0.529	4.631	4.678	6.747	6.903	0.136
Median	13.051	0.483	4.647	4.670	6.722	6.820	0.000
Maximum	14.014	0.780	4.876	4.772	7.483	7.582	1.000
Minimum	10.723	0.341	4.321	4.460	6.282	6.522	0.000
Std. Dev.	0.589	0.124	0.142	0.038	0.258	0.257	0.344
Skewness	-0.736	0.555	-0.178	-0.946	0.426	0.631	2.126
Kurtosis	3.388	1.932	1.908	9.128	2.793	2.386	5.521

Table 3 shows the results of unit root tests based on Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Overall, the results for both tests are consistent, where ln*X*, ln*DI*, and ln*FI* are stationary at level, while ln*RER*, ln*PO*, and ln*SO* are stationary at first difference. In other words, the variables used belong to the I(0) and I(1) categories. A mixture of I(0) and I(1) supports the intention of this study to use ARDL methodology to investigate the long-term relationship between variables selected in this study. Therefore, this study continues with the estimation using ARDL and NARDL.

Table 3: Unit root test results

Variables	PP		ADF	
	Level	First Difference	Level	First Difference
ln*X*	-7.989***	-40.190***	-7.982***	-11.103***
ln*RER*	-2.161	-13.627***	-2.188	-13.544***
ln*DI*	-8.857***	-65.108***	-8.857***	-6.837***
ln*FI*	-5.320***	-23.084***	-4.257***	-13.375***
ln*PO*	-1.915	-8.741***	-2.225	-8.938***
ln*SO*	-1.598	-8.492***	-1.818	-8.354***
COVID	-2.252	-12.570***	-2.148	-12.570***

Note: ***, **, and * represent significant levels at 1%, 5%, and 10% respectively.

This study first investigates the optimal lag length based on lag order selection criteria that rely on the Akaike Information Criterion (AIC), Schwartz Information Criterion (SIC), and Hannan-Quinn Information Criterion (HQC). This study chooses lag 2 as the optimal lag and proceeds the analysis to investigate the existence of a long-run relationship in the model using a bound test. Table 4 shows the bound test results for both linear and NARDL. It is evident from Table 4 that the computed F-statistics for both models are higher than the upper bound I(I) critical values at a 1% significant level. This shows strong evidence of long-run relationships among the variables chosen in both models.

Table 4: Bound test result

k	10%		5%		1%	
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
6	1.990	2.940	2.270	3.280	2.880	3.990
7	1.920	2.890	2.170	3.210	2.730	3.900
Estimated Function						F-Statistic
$\ln X_t = f(\ln RER_t, \ln DI_t, \ln FI_t, \ln PO_t, \ln SO_t, COVID_t)$						9.500***
$\ln X_t = f(\ln RER_t^{POS}, \ln RER_t^{NEG}, \ln DI_t, \ln FI_t, \ln PO_t, \ln SO_t, COVID_t)$						8.508***

Note: ***, ** and * represent significant levels at 1%, 5%, and 10%, respectively.

After establishing the cointegration among variables, this study proceeds to conduct the ARDL estimation to determine the short-term and long-term relationship between the exchange rate, domestic income, foreign income, palm oil price, and soybean oil price towards bilateral palm oil export between Malaysia and China. This study has performed linear ARDL and NARDL to test the symmetrical and asymmetrical relationship. To ensure the stability of the model used, this study also performed several diagnostic tests on the model. Table 5 reports the linear ARDL estimation results, while Table 6 reports the nonlinear ARDL estimation results.

Table 5: Linear ARDL estimation results

Variables	Coefficient	Std. Error
Short run		
$\Delta \ln DI_t$	1.958***	0.650
$\Delta \ln DI_{t-1}$	1.286**	0.649
ECT_{t-1}	-0.612***	0.069
Long run		
$\ln RER_t$	2.112*	1.231
$\ln DI_t$	-1.619	1.078
$\ln FI_t$	-2.586	2.455
$\ln PO_t$	-1.660**	0.653
$\ln SO_t$	1.360**	0.663
$COVID_t$	0.309	0.199
Constant	33.187**	13.228
Diagnostic results		
Normality	47.174***	
LM	0.130	
BPG	1.114	
Ramsey	0.005	
CUSUM	Stable	
CUSUM^2	Stable	

Notes: ***, **, and * represent significant levels at 1%, 5% and 10%, respectively.

Based on Table 5, the exchange rate has no significant impact in the short run, but in the long run, the exchange rate positively impacts palm oil exports. This means that palm oil exports increase when the ringgit appreciates in relation to the yuan. This clearly contradicts the theory that ringgit appreciation should lead to relatively higher export prices and, thus, decrease foreign demand. The domestic income has a positive relationship in the short run, which is expected as higher income leads to higher demand. No significant impact is found from foreign demand. On the other hand, palm oil prices negatively affect palm oil exports in the long run. Meanwhile, soybean prices have an inverse relationship. Both are consistent with demand theory as higher palm oil prices reduce palm oil demands and higher substitute goods prices, such as soybean oil, increase palm oil demands. The COVID-19 variables have no significant impact in the long run or short run. The diagnostic results for the linear ARDL are also reported in Table 5, where it can be seen that the model used in this study is free from the problem of serial correlation, heteroskedasticity, and model specification shown through Lagrange Multiplier (LM), Autoregresive Conditional Heteroskedasticity (ARCH), Breusch Pagan (BPG), and Ramsey tests. In addition, the stability test using the CUSUM and CUSUM squared tests shows that the estimators obtained in the linear ARDL model are stable.

This study examines the effect of ringgit appreciation and depreciation based on the nonlinear ARDL model in the short run and long run, following the approach of Bahmani-Oskooee and Nasir (2020). Table 6 shows the nonlinear ARDL estimation results where, like linear ARDL estimation results, only domestic income has a positive and significant relationship in the short run. However, interestingly, for the focus variables, such as exchange rate, this study found that ringgit appreciation has no significant impact. Meanwhile, ringgit depreciation has a positive impact on palm oil exports. This clearly indicates a nonlinear relationship where only ringgit depreciation affects the palm oil export flows.

Table 8: Nonlinear ARDL estimation results

Variables	Coefficient	Std. Error
Short run		
Δ ln DI_t	2.406***	0.579
ΔECT_{t-1}	-0.632***	0.070
Long run		
ln RER_t^{POS}	1.062	1.491
ln RER_t^{NEG}	2.355**	1.162
ln DI_t	1.430	1.592
ln FI_t	-3.428	2.446
ln PO_t	-1.596**	0.629
ln SO_t	1.237*	0.635
$COVID_t$	0.520**	0.218
Constant	25.730**	12.843
Diagnostic results		
Normality	41.549***	
LM	0.248	
BPG	1.156	
Ramsey	0.451	
CUSUM	Stable	
CUSUM^2	Stable	

Notes: *** and ** represent significant levels at 1% and 5%, respectively.

Consistent with the linear ARDL, the palm oil prices and soybean oil prices in the NARDL results also show positive and negative relationship, respectively. As stated previously, it is consistent with demand theory. On the other hand, the COVID-19 variable positively and significantly impacts palm oil exports, indicating that the bilateral palm oil export from Malaysia to China increased during the COVID-19 pandemic. Overall, the NARDL model used in this study does not have the problems of serial correlation, heteroskedasticity, or model specification shown through various diagnostic tests. In addition, the CUSUM and CUSUM square test results show that all the estimators obtained in the NARDL model are stable.

Conclusion

This study examines the asymmetric effect of exchange rate variations on the palm oil trade between Malaysia and China. The linear ARDL and NARDL methods have been employed in this study. Empirical results from the linear ARDL model found that the exchange rate has been positively and significantly related to palm oil exports in the long run. At the same time, nonlinear ARDL shows that only ringgit depreciation has a positive impact, and ringgit appreciation has no significant impact on palm oil exports from Malaysia to China. This means that palm oil exports increase when the ringgit depreciates in relation to the yuan. This is clearly in line with theory as ringgit depreciation leads to relatively lower export prices and thus increases foreign demand. This is an interesting finding as several past literatures assume a symmetric relationship between these variables.

Aside from exchange rates, this study found that domestic income has a positive impact in the short run in both linear and nonlinear models. This means that higher domestic income in Malaysia can also be interpreted as higher export capacity, thus increasing bilateral palm oil exports to China. No significant impact is found from foreign demand. In addition, both models show that palm oil prices negatively affect palm oil exports in the long run. Meanwhile, soybean prices have an inverse relationship. Based on demand theory, higher prices are expected to lead to lower demand, while higher substitute prices will lead to higher demand. On the other hand, the NARDL model found that the COVID-19 variable positively and significantly impacts palm oil exports in the long run, indicating that the bilateral palm oil export from Malaysia to China increased during the COVID-19 pandemic. Overall, neither the linear nor NARDL models used in this study have the problems of serial correlation, heteroskedasticity, or model specification.

The findings of this study are very useful for policymakers and researchers. The policymakers can use this study as a benchmark in evaluating the impact of ringgit depreciation on the main export products between Malaysia and trading partners. This study focuses on ringgit depreciation to be helpful in terms of palm oil exports. However, it is undeniable that some products are affected negatively. Hence, this opens a policy space where the government may provide financial aid, such as subsidies, to ensure that local industries and products can continue to compete in the international market after the fall in the value of the ringgit. For commodities like palm oil that gain higher export benefits, policymakers can consider export taxes on these products to compensate for those negatively affected industries.

The results of this study can provide information to policymakers on the effects of positive and negative changes in the exchange rate on the country's exports and imports. This can be used to detect and overcome the problem of imported inflation. In addition, the results of this study show that there is an asymmetric effect from the change in the value of the ringgit. Hence, by obtaining information about this asymmetric effect, the government can take more proactive steps in improving the country's economy. Meanwhile, for researchers, the results of this study can be used as a reference for future studies in looking at the existence of this J-curve phenomenon.

This study has its own limitations that require extension in future research. This study focused on palm oil export but not on multiple other products. Detailed multiple product-level analysis is suggested for future studies to evaluate the asymmetric impact of exchange rates on product-level trade flows. This matter has yet to be explored widely based on the observations of past studies.

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Conflict of Interest Statement

All authors declared that they have no conflicts of interest.

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