Determinants of the Trade Balance in an Asian Emerging Economy: An ARDL Bounds Testing Approach

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Abstract This study examines the main factors that affect the trade balance in Vietnam, an Asian emerging economy. The ARDL methodology is employed to identify the cointegration and to assess the relationship among variables. The quarterly database is collected in the period of 1995–2020. The bounds test result confirms that there exists a cointegration relationship between the trade balance, national output, money demand, and exchange rate of Vietnam's economy. Furthermore, in the long run, the national output and money demand are found to have negative and significant effects on the trade balance, whereas the exchange rate has a positive and significant impact on the dependent variable. Additionally, in the short run, the national output has a significant negative impact and the money supply has a significant positive impact on the trade balance, while the lag of the trade balance variable has a significant negative effect on itself. Finally, the J-curve phenomenon is confirmed in Vietnam when the coefficient of the exchange rate is negative in the short run and positive in the long run. The empirical evidence suggests that the government needs to use monetary policy, in particular money supply, as an effective policy tool to support the Vietnamese trade balance in the future.

Keywords Trade balance · International trade · Monetary policy · Emerging economy · ARDL · Bounds test

1 Introduction

Trade and trade development are important macroeconomic indicators used to assess the status of an economy. Meanwhile, the role of international trade in supporting an economy is increasing in the context of globalization (Akbas & Sancar, 2021; Amiti & Konings, 2007; Brueckner & Lederman, 2015; Oloyede et al., 2021; Siddiqui, 2015, 2016; Singh, 2010; Thirlwall, 2000; Wong & Yip, 2002). The trade balance also reflects a country's level of participation in the global supply and production chains

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(Costinot et al., 2013; Ge & Luo, 2015; Jensen & Shin, 2014). Therefore, empirical studies on the factors affecting the trade balance are important in terms of exploring the economic issues related to this macroeconomic object. Moreover, policymakers can make normative economic decisions based on the obtained evidence. Several studies focusing on the determinants of the trade balance were carried out in both developed countries (Bahmani-Oskooee & Ratha, 2007; Beck, 2020; Gürtler, 2019; Sasaki & Yoshida, 2018) and developing countries (Ahad, 2017; Bahmani-Oskooee & Kanitpong, 2017; Brueckner & Lederman, 2015; Duasa, 2007; Khan & Hossain, 2012; Marin, 2020; Shubaita et al., 2020; Waliullah et al., 2010). However, the results are quite diverse, even contradictory. Hence, further analysis and assessment of the factors affecting the trade balance can help countries to achieve better participation in the international supply chains, making such research necessary.

Since "Doi Moi" economic reforms began in 1986, Vietnam has been known as an emerging economy as well as ranked among the most successful East Asian countries (Abbott & Tarp, 2012; Barker & Üngör, 2019; Bentzen & Tung, 2021). Over the past three decades, Vietnam has followed the path toward developing international trade relations in the direction of diversification. This economy has a proactive expansion strategy of international trade with global partners striving to ensure that all parties share the benefits (Abbott et al., 2009; Abbott & Tarp, 2012; Barker & Üngör, 2019; Deprez, 2018; Thanh, 2005). Hence, international trade has played an increasingly important role in the national economic development plan (Abbott & Tarp, 2012; Thanh, 2005). Since the beginning of the 2000s, Vietnam's foreign trade turnover has increased rapidly with the speeding up of both export and import flows (Abbott & Tarp, 2012). In addition to having a successful attractive strategy for foreign direct investment, the Vietnam government also make many free trade agreements with leading economies worldwide that help to robustly increase the international trade flows of this economy (see Abbott et al., 2009; Phan & Jeong, 2016; Thanh, 2005; Thanh et al., 2019; Tung & Bentzen, 2022). Obviously, the trade openness indicator, which is popularly denoted by the total value of exports plus imports over the gross domestic products (Brueckner & Lederman, 2015), has been significantly increasing in the previous decade (Barker & Üngör, 2019). In detail, the trade openness was 0.64 in 1995, then it significantly increased to 1.65 in 2005, 1.75 in 2015, and 1.98 in 2020, respectively (GSO, 2022). Development of international trade and joining the international production chains are the key targets for this country to maintain a high rate of economic growth in the next decades. However, these targets are not easy when they have faced some challenges in recent years (Baccini et al., 2019; Phan & Jeong, 2016; Tung, 2018; Tung & Thanh, 2015). Therefore, this current study is expected to provide a new evidence of related issues for policymakers in Vietnam as well as other developing countries. On the other hand, the findings from this study are obviously helpful for academics when this empirical evidence is great to explain in detail related the trade balance as a source for supporting the economic development in developing countries such as Vietnam. In this study, the ARDL bounds test approach is applied with a quarterly database collected from the General Statistics Office of Vietnam (GSO, 2022) from 1995 to 2020.

This study includes five sections. Section 2 is a compilation of relevant studies. Section 3 presents the methodology and data source. The result and discussion are shown in Sect. 4. Finally, a conclusion is summarized in Sect. 5.

2 Literature Review

The increase in globalization shows the important role of international commercial activities in the economic development of countries. Hence, there are some approaches to analyze the fluctuation of the trade balance in a country. The exchange rate is one of the elements that have a robust impact on the export–import activities of an economy. The impact of the exchange rate on international trade is explained through the Marshall-Lerner Condition (MLC), in which MLC shows the impact of the currency devaluation on the trade balance (eg., Mahmud et al., 2004). The study of Magee (1973) investigates the increase in exchange rate improving the trade balance described by a J-Curve (eg., Rose & Yellen, 1989). In the gross output analysis, the total number of national products is also a factor affecting the trade balance. Through spending flows, the change in the aggregate demand will be reflected in the total national output as well as the national trade balance (Brueckner & Lederman, 2015). Another approach is the monetary policy, where the change in money supply is also a variable regarding the trade balance (Bahmani-Oskooee & Kanitpong, 2017). There are several experimental results that show the impact of these factors on the balance of international trade in countries.

In an empirical study in Malaysia, Duasa (2007) estimates elasticities between trade balance, national output, money supply, and exchange rate in this country. The findings conclude that the Marshall-Lerner condition does not confirm in the long run for the economy. Waliullah et al. (2010) investigate the relationship between the trade balance, gross domestic product, money supply, and real exchange rate in the economy of Pakistan from 1970 to 2005. The bounds test confirms a significant long-term relationship between the balance of international trade and independent variables. The empirical results show that the exchange rate has a positive relationship to the trade balance in the long and short run. Besides, the results imply that money supply and national output have important roles in determining the fluctuation of the trade balance. The exchange rate policy helps to increase the trade balance much stronger than the national output and money supply. Khan and Hossain (2012) develop a new model to analysis the trade balance in Bangladesh. Based on an empirical test for Bangladesh's trade, the authors find the existence of a cointegration relationship between this economy and its major trading partners. On the other hand, a significant relationship between variables of the empirical research model is confirmed in the long run. Kodongo and Ojah (2013) do a study focusing on the intertemporal causal relationships between the real exchange rate, the balance of international trade, and external capital flows in the African region. The study sample included nine major African countries from 1993 to 2009. The empirical

result revealed that the net effect of a depreciation of the domestic currency can have an enhancement in the domestic country's international trade status in the short run.

Ahad (2017) investigates the relationship between financial development, exchange rate, inflation, and trade balance in developing countries. The result shows that three independent variables have significant effects on the trade balance in the long run. However, in the short run, there are only the exchange rate and inflation have statistically significant effects on the dependent variable. Bahmani-Oskooee and Kanitpong (2017) use a nonlinear econometric model to analyze the additional asymmetric effects in an Asian regional sample. The authors conclude that there is empirical evidence of long-term and short-term asymmetric effects of exchange rate fluctuation on the balance of international trade. Sasaki and Yoshida (2018) analyze Japan's trade balance which has reached a deficit after a long period of its surplus. The findings show that the national trade has gone through a structural change in both income and exchange rate pass-through elasticity which made the fluctuation of the trade balance.

From Africa, Ahiakpor et al. (2019) examined the relationship between trade openness and the tools of monetary policy in Ghana using a monthly time-series database from 2002 to 2017. The estimated results confirm that higher trade openness leads to the monetary policy (including the exchange rate) becoming more effective. Hoang et al. (2020) investigate the determinants of international trade between ASEAN countries and Taiwan. The study indicates that the economic scale and per capita income of ASEAN countries have stronger impacts than those of Taiwan in aggregate trade as well as in the degree of manufacturing. Gürtle (2019) investigated the J-curve situation in the Czech economy with quarterly data from 2000 to 2014. The study limits the research data on the economic relationship of a small open economy. The result shows that the real effective exchange rate has a strongly negative impact on the balance of international trade in the short run and a positive one in the long run. The evidence confirms the J-curve phenomenon in the study situation of the Czech economy. On the other hand, the economic growth rate has a significantly higher effect on the trade balance than in other countries.

In a recent study, Marin (2020) compared the affecting factors of trade activities between South Korea and Colombia. The variables are added in the quantitative model such as the gross domestic products of the importer and exporter countries. The results of the empirical econometric model revealed that the free trade agreements (FTAs) have an insignificant impact on international trade in South Korea. Besides, the empirical evidence suggests that the agricultural sector of Colombia has potential opportunities to compete in the Asian region. Shubaita et al. (2020) analyzed the relationship between trade balance, exchange rate, and real gross domestic product in Tunisia from 1980 to 2018. Although the bounds test confirms a cointegration between variables, the estimated result shows that this country does not follow the Marshall-Lerner framework in the long run.

Following the previous results, the quantitative effects of related variables on trade balance are much more varied. The empirical results depend on the characteristics of each economy. To the best of our knowledge, there is no evidence related to the factors affecting the trade balance in Vietnam. Hence, in the next section, the paper

presents the quantitative methodology and the database to analyze the determinants of the trade balance in Vietnam in recent years.

3 Methodology

The empirical research model has four variables. The dependent variable is the trade balance, besides, there are some independent variables are included in the function including national output, money demand, and nominal exchange rate. The research function is performed in a simple form as follows.

$$\mathrm{TB} = \mathrm{f(Y, M, EXCH)} \tag{1}$$

where:

TB = Trade balance

Y = National output, trillion VND

M = Money demand, trillion VND

EXCH = Exchange rate, VND/USD

The trade balance indicator is usually calculated by the total value of exports minus the total value of imports. However, in this paper, the trade balance variable is computed by the rate of exports value divides by imports value. This solution is a good idea because the values of the variable are not dependent on the unit of measurement. The national output and money demand values are adjusted from the nominal to the real values by a constant price. This kind of calculation was employed in some previous studies such as Onafowora (2003) and Duasa (2007). Based on the suggestions from related studies (see Baek, 2013; Bahmani-Oskooee & Kanitpong, 2017; Duasa, 2007; Hoang et al., 2020; Waliullah et al., 2010), a linear function will be well presented if all time-series variables transformed to the natural logarithm values, which obtain direct elasticities among variables. Using the natural logarithm of all variables, the function (1) can be rewritten in the below format.

$$\mathrm{LnTB_t} = \beta_0 + \beta_1 \mathrm{LnY}_t + \beta_2 \mathrm{LnM}_t + \beta_3 \mathrm{LnEXCH}_t + \varepsilon_t \tag{2}$$

where β_1, β_2, and β_3 are evaluated values. β_0 is a constant value that presents the trade balance elasticity value that is not explained by the independent variables. Furthermore, ε presents the error term, and t denotes the period.

The long-term cointegration relationship between the independent variables and trade balance is checked by the Autoregressive Distributed Lag (ARDL) method and the bounds values (Pesaran et al., 2001). The methodology is chosen because of some advantaged points including it helps to conclude with a mixture of $I(0)$ and $I(1)$ variables. The test can be employed in a single-equation format, and finally, a smaller observation is required than others (Baek, 2013; Bahmani-Oskooee & Kanitpong, 2017; Duasa, 2007). Hence, the ARDL bounds test is a powerful methodology for testing the cointegration relationship of variables in a linear functional form.

Table 1 The hypothesis of the ARDL bounds test

Null hypotheisis (H_0)	Alternative hypothesis (H_1)	Function
$\psi 1 = \psi 2 = \psi 3 = \psi 4 = 0$	$\psi 1 \neq 0$; or $\psi 2 \neq 0$; or $\psi 3 \neq 0$; or $\psi 4 \neq 0$	f(LnTB/LnY,LnM,LnEXCH)

Source Calculated from the study data

$$\begin{aligned}\Delta \mathrm{LnTB_t} = \varphi_0 + \sum_{i=1}^{k} \varphi_{1i} \Delta \mathrm{LnTB_{t-i}} + \sum_{i=0}^{k} \varphi_{2i} \Delta \mathrm{LnY_{t-i}} + \\ + \sum_{i=0}^{k} \varphi_{3i} \Delta \mathrm{LnM_{t-i}} + \sum_{i=0}^{k} \varphi_{4i} \Delta \mathrm{LnEXCH_{t-i}} + \\ + \psi_1 \mathrm{LnTB_{t-1}} + \psi_2 \mathrm{LnY_{t-1}} + \psi_3 \mathrm{LnM_{t-1}} + \psi_4 \mathrm{LnEXCH_{t-1}} + \varepsilon_t\end{aligned} \tag{3}$$

In the first step of the bounds test, the ARDL function will be calculated by the ordinary least squares (OLS) regression, and then chosen the optimal lag length by the Akaike Info Criterion (AIC) indicator (Pesaran et al., 2001). In the second step, the long-term cointegration relationship between the variables is checked by Wald's test (F-statistics). There are two hypotheses including the null hypothesis of no cointegration (H_0) against the alternative hypothesis (H_1) of a long-term cointegration between the variables. The alternative hypothesis means at least one of $\psi 1$–$\psi 4$ is different than zero. The hypothesis of the ARDL bounds test is performed as the Table 1.

There are three potential conclusions of the ARDL bounds test. First, if the F-statistic value is below the lower limit of the bound values, we cannot be rejected the null hypothesis of no long-term cointegration relationship. Second, if the F-statistic value is higher than the upper limit of the bound values, the null hypothesis (H_0) can be rejected, and the testing result confirms the existence of a long-term cointegration relationship among variables. Finally, the cointegration cannot be confirmed in the case the F-statistic value is between the lower limit and upper limit of the bound values.

If the ARDL bounds test confirms there is a long-term cointegration relationship between the variables, we will employ the error correction model (ECM) to explore the short-term dynamic relationship. The ECM model for identifying the short-term relationship among variables is written as the Eq. (4).

$$\begin{aligned}\Delta \mathrm{LnTB}_t = \delta_0 + \sum_{i=1}^{k} \delta_{1i} \Delta \mathrm{LnTB}_{t-i} + \sum_{i=0}^{k} \delta_{2i} \Delta \mathrm{LnY}_{t-i} + \sum_{i=0}^{k} \delta_{3i} \Delta \mathrm{LnM}_{t-i} \\ + \sum_{i=0}^{k} \delta_{4i} \Delta \mathrm{LnEXCH}_{t-i} + \gamma \mathrm{ECM}_{t-1} + \mu_t\end{aligned} \tag{4}$$

This paper uses a quarterly database form that was collected from 1995 to 2020. The total observation is 104. The data on the trade balance and yield are directly downloaded and calculated from the General Statistics Office of Vietnam (GSO, 2022). The data on money demand and nominal exchange rate are sourced from the State Bank of Vietnam. All the time-series variables are transformed to the natural logarithm values before putting in the quantitative process. The statistical descriptive analysis of the variables is shown in the Table 2, (Fig. 1)

Table 2 A statistical summary of the variables

Variable	Max	Min	Mean	Std. Dev	Obs
LnTB	0.146	− 0.595	− 0.106	0.157	104
LnY	6.113	3.782	4.830	0.618	104
LnM	7.855	3.543	6.051	1.267	104
LnEXCH	10.06	9.307	9.751	0.230	104
ΔLnTB	0.335	− 0.373	0.002	0.101	103
ΔLnY	0.317	− 0.563	0.023	0.231	103
ΔLnM	0.306	− 0.145	0.041	0.051	103
ΔLnEXCH	0.053	− 0.017	0.007	0.012	103

Source Calculated from the study data

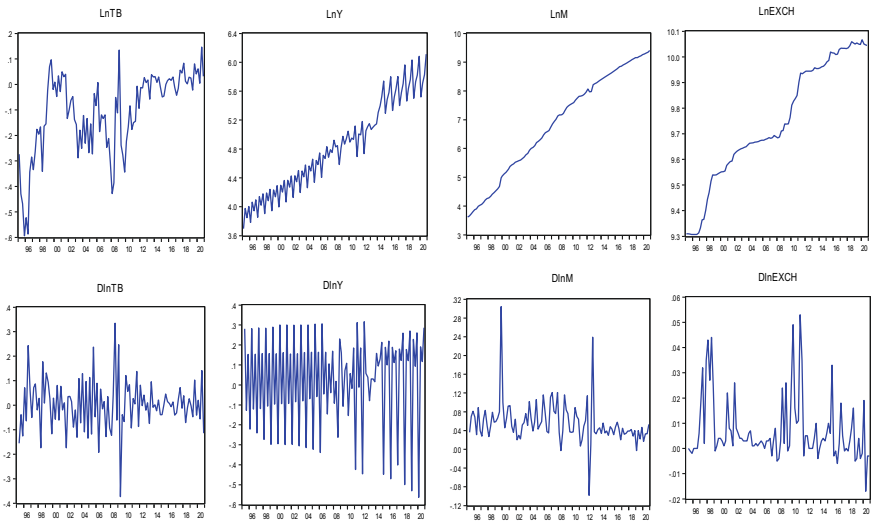

Fig. 1 The graphs of the variables in the ARDL function (*Source* Calculated from the study data)

4 Results

Before estimating the ARDL model to explore the determinants of the balance of foreign trade in Vietnam, the time-series properties of the variables are checked for the unit root by two methodologies including the augmented dickey-fuller (ADF) and the Phillips-Perron (P-P) test. In detail, the null hypothesis (H_0) of the presence of unit root is tested against the alternative hypothesis (H_1) of no unit roots. The testing results of the unit root test confirm that the variables at the level are received both stationary and non-stationary. However, all variables are stationary at their first difference values with both two testing methodologies (Table 3).

Following the bounds testing approach literature, the Akaike Info Criterion (AIC) value is employed to choose the optimal lag length of the general ARDL model (Pesaran et al., 2001). Based on the comparison of the received AIC values, the ARDL (3,2,0,1) is selected for the bounds testing process of the long-term cointegration relationship. The Wald test is done for examining the H_0 hypothesis of the ARDL model. The calculated F statistic = 5.387381 is much higher than the upper bounds critical value = 4.37 at a 1% significance level. The F-statistic value from the Wald test is, in this case, positive and significant; hence, the null hypothesis (H_0): $\psi 1 = \psi 2 = \psi 3 = \psi 4 = 0$ has been rejected at a 1% significance as well. The bounds test concludes that there is a long-term cointegration relationship among variables in the testing function (see Pesaran et al., 2001) (Table 4).

The bounds test has confirmed a long-term cointegration among trade balance and its determinants when trade balance is employed as the dependent variable in the function. Based on the testing result, the quantitative analysis is done by the estimation of both short-term and long-term elasticities using Eqs. (2) and (4). In the long-term result, independent variables significantly affected the trade balance. In

Table 3 The unit root test for the variables

Variable	ADF test			P-P test		
	t-statistic	CV	Conclusion	t-statistic	CV	Conclusion
Time series at the level						
LnTB	− 3.116	− 4.052	NS	− 4.275	− 4.049	*S*
LnY	− 2.340	− 4.053	NS	− 11.80	− 4.049	*S*
LnM	− 1.121	− 4.019	NS	− 1.160	− 4.049	NS
LnEXCH	− 1.606	− 4.050	NS	− 1.605	− 4.049	NS
Time series at the first difference						
ΔLnTB	− 8.792	− 4.052	*S*	− 27.50	− 4.050	*S*
ΔLnY	− 24.19	− 4.052	*S*	− 52.23	− 4.050	*S*
ΔLnM	− 8.189	− 4.051	*S*	− 8.736	− 4.050	*S*
ΔLnEXCH	− 6.845	− 4.050	*S*	− 6.986	− 4.050	*S*

Notes NS = non-stationary; *S* = Stationary; CV = Critical value at 1%
Source Calculated from the study data

Table 4 The Wald test result of the cointegration relationship

F-statistic value	Significance level (%)	Bounds critical values	
		I(0)	*I*(1)
5.387381 (P-value 0.0006)	1	3.43	4.37
	2.5	3.13	4.05
	5	2.86	3.78
	10	2.57	3.46

Source Calculated from the study data

detail, the estimated result of the long-run model shows negative impacts of national output (at 10% significance) and money supply (at a 1% significance) on the balance of trade. The negative sign of the coefficient from the national output can be explained when Vietnam had many years with the sum of imports was larger than the sum of exports (a trade deficit phenomenon), meanwhile, the national output has increased during the period (see Abbott & Tarp, 2012; Thanh, 2005). In the future, Vietnamese policymakers need to enhance the domestic demand shifts from foreign products to domestic production of substitution products as a reaction to the higher prices of imports. This solution can help a trade balance improvement. The negative effect of money demand on the trade balance is consistent with previous studies (for example, Duasa, 2007; Waliullah et al., 2010). On the other hand, the estimated coefficients mean a 1% increase in the gross domestic product can reduce the trade balance by 0.091%, while a 1% increase in money supply reduces the balance of foreign trade by 0.123%, respectively.

The long-term analysis demonstrates that the exchange rate variable positively and significantly affects the trade balance when a 1% rise in the exchange rate has caused a 1.336% increase in the trade balance over the study period. The estimated result indicates that in the long run, the exchange rate contributes most considerably to the increase of the trade balance in Vietnam. Furthermore, by finding a positive and significant effect of the exchange rate to trade balance in the long run, the J-curve phenomenon is expected to conclude in the short-term estimation. The short-term result will be identified by the error correction term technique computed from the long-term regression. Besides, it is important to note that the estimated coefficients in Table 5 merged both the short-term effect and the long-term effect of independent variables on the trade balance.

The short-term analysis investigates that the gross output significantly causes trade balance (at a 1% significance); for example, a 1% rise in the gross output causes a 0.159% decrease in the trade balance. Obviously, the short-term and long-term estimations confirm the significant positive effects of the gross domestic product on the trade balance. It is a serious problem when economic growth is merged with the trade deficit. In the future, Vietnam must put a position for itself at the center of the global production process and world value chain. Based on the foreign trade improvement strategy, the economy can approach and join high-value manufactured products in high-income markets related to the free trade agreements (FTAs) where Vietnamese

Table 5 The ARDL long run and short-run analysis

ARDL long-run analysis. Dependent variable = LnTB			
Variable	Coefficient	t-Statistic	P-value
LnY	− 0.091*	− 1.672	0.097
LnM	− 0.123***	− 3.093	0.002
LnEXCH	1.336***	6.494	0.000
Constant	− 11.95***	− 6.776	0.000
R-squared = 0.5342 Adjusted R-squared = 0.5203			
ARDL short-run analysis. Dependent variable = ΔLnTB			
ΔLnTB(−1)	0.034	0.373	0.709
ΔLnTB(−2)	0.148	1.624	0.107
ΔLnTB(−3)	− 0.173*	− 1.929	0.056
ΔLnY	− 0.047	− 1.060	0.291
ΔLnY(−1)	− 0.017	− 0.334	0.738
ΔLnY(−2)	− 0.159***	− 3.549	0.000
ΔLnM	0.248*	1.666	0.099
ΔLnEXCH	0.949	1.525	0.130
ΔLnEXCH(−1)	− 0.335	− 0.530	0.597
ECM(−1)	− 0.383***	− 4.447	0.000
Constant	− 0.004	− 0.375	0.708
R-squared = 0.5598 Adjusted R-squared = 0.5104			
Short-run diagnostic test Normality test (Jarque–Bera) = 4.506 (P-value = 0.105); Breusch-Godfrey Serial Correlation = 1.648 (P-value = 0.184); Heteroskedasticity: Breusch-Pagan-Godfrey = 0.877 (P-value = 0.557); Ramsey Reset = 0.563 (P-value = 0.574)			

Notes ***, **, * display significance at 1%, 5%, and 10% levels, respectively
Source Calculated from the study data

products enjoy preferential market access. With these solutions, Vietnam can receive more of the added value and put the domestic products up in the added value of the international production chain. On the other hand, the Vietnamese enterprises must improve the competitiveness level of domestic products to substitute foreign products as a solution to reduce imports. This strategy also helps to enhance the balance of foreign trade in the future.

The money supply has a significant positive effect on the trade balance at the 10% level. It means that a 1% increase in money supply is significant to a 0.248% increase in the short-term trade balance. The lag variable of the trade balance is negative and significant at a 10% level, which means the international trade shows a harmful effect on itself in the short run. Over three decades after the definition of

the Marshall-Lerner condition was presented and the J-Curve evidence came into academic existence. In detail, the J-curve phenomenon shows how a devaluation of a national exchange rate can affect the trade balance. Furthermore, the J-curve is understood as a dynamic view of the Marshall-Lerner condition by the elasticities approach. There is evidence of the J-curve in Vietnam when the coefficient of the exchange rate variable is negative (but insignificant) in the short run, while it shows a significant positive impact in the long run (see Halicioglu, 2007; Nusair, 2016; Onafowora, 2003; Shubaita et al., 2020). The weak negative effect of the exchange rate on the trade balance in the short run can consider a lucky phenomenon in the case of devaluation of the currency in Vietnam. The empirical evidence confirms that the Marshall-Lerner Condition holds in the long run in the Vietnamese economy, as a result, it explains how Vietnam could robustly increase its international trade in previous studies (see Abbott & Tarp, 2012; Barker & Üngör, 2019; Deprez, 2018; Gürtle, 2019; Thanh, 2005). In addition, the estimated result is consistent with the Marshall-Lerner condition in some developing economies (see Bahmani et al., 2013; Chebbi & Olarreaga, 2019; Mahmud et al., 2004; Sastre, 2012).

The coefficient of the ECM_{t-1} variable indicates the speed of adjustment of variables return to equilibrium; based on the literature, it is a statistically significant value with a negative sign. In the short-run estimation, the lagged variable of the error term (ECM_{t-1}) is found to have a negative sign and is statistically significant at a 1% level. The result ensures that long-run equilibrium can be attained. The significance of the error correction term implies the evidence of adjusting level from short run to long run (Pesaran et al., 2001). The coefficient of the ECM_{t-1} is − 0.383 showing a high rate of convergence to equilibrium. After estimating the short-term elasticities according to the ARDL method, an important note for the result is the conclusion of free from problems of econometrics, for the estimated coefficients to be consistent. The normality test (Jarque–Bera = 4.506 with P-value = 0.105), hence, the residuals of the regressive estimation follow the normal distribution. The Breusch–Godfrey testing value = 1.648, with P-value = 0.184, which confirms that there is no autocorrelation problem in the estimated result. The Breusch-Pagan-Godfrey test result = 0.877 (with P-value = 0.557) shows that the model is free of the heteroskedasticity phenomenon. The Ramsey Reset test = 0.563 (P-value = 0.574) helps to conclude the correct form used in the research model. Therefore, the diagnostic tests imply that the results of the ARDL estimation are stable and ensure reliability conditions (see Pesaran et al., 2001).

5 Conclusions

In this paper, we employ the ARDL bounds testing approach developed by Pesaran et al. (2001) to analyze the determinants of trade balance in Vietnam using a quarterly database from 1995 to 2020. The estimated results have contributed to several notable findings. First, there is evidence of a long-term cointegration relationship between the trade balance and independent variables. Second, the coefficients of the independent

variables have statistically significant impacts on the trade balance in the long-term model. In detail, the coefficients of the national output and money supply are negative; on the other hand, the coefficient of the exchange rate is positive. Third, the short-term estimated result confirms the effect of the exchange rate on the balance of foreign trade followed by the J-curve theory. Besides, in the short-term analysis, national output has a negative and statistically significant impact on the trade balance, while the supply of money confirms a significant positive effect on the dependent variable.

The empirical evidence suggests policymakers need to reconsider the management ways of monetary policy in the coming time. Because the increase in money supply has a short-term positive effect but it changes to a negative side in the long run. Hence, monetary policy should be studied so that the expansion mechanisms can promote the trade balance in both the short run and the long run. It is necessary to continue implementing the exchange rate policy for supporting the increase of the trade balance; besides, currency devaluation only has a negative effect in the short run (as a J-curve phenomenon). The increase in national output leads to a long-term decline in the balance of trade; it is evidence for policymakers to design policies in domestic consumption (decrease imports) as well as boost the production capacity of enterprises to increase exports. Consequently, the increase in national output can be enhanced with the surplus of the Vietnamese trade balance in the future.

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