"Trade openness and real effective exchange rate volatility: The case of Vietnam"

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TRADE OPENNESS AND REAL EFFECTIVE EXCHANGE RATE VOLATILITY: THE CASE OF VIETNAM

Abstract

The study aims to investigate the causal relationship between trade openness and real effective exchange rate volatility in Vietnam in the period 2004–2020. The study was conducted in the context that Vietnam's trade openness is increasing, causing significant challenges in macro management, including exchange rate management. The authors use vector autoregression model and Granger causality test to test this relationship. The study used a vector autoregression model and Granger causality test to investigate the causal relationship between trade openness and real effective exchange rate volatility in Vietnam over the period 2004–2020. The study was conducted in the context of Vietnam's trade openness index rising, causing significant challenges in macro management, including exchange rate management. The study takes a new approach (i) using Vietnam's real effective exchange rate relative to 143 trading partners; and (ii) examining the impact of economic growth on trade openness and exchange rate volatility. The research results indicate that trade openness has a two-way Granger causality with effective real exchange rate volatility in Vietnam at the 1% significance level. Specifically, the effect of trade openness on real exchange rate volatility is positive at a 1-period lag and 4-period lag. Meanwhile, real exchange rate fluctuations have a negative effect on trade openness with a 1-period lag. At the same time, the study also finds that increased economic growth reduces real effective exchange rate volatility and increases Vietnam's trade openness. On that basis, the study proposes implications for the management of trade openness and exchange rate management in the current Vietnamese context.

Keywords	trade openness, volatility, real exchange rate, Vietnam
JEL Classification	F15, F31, F41, F43

INTRODUCTION

After the collapse of the Bretton Woods system, in 1971 advanced economies changed to a floating system from a fixed exchange rate. According to Stockman (1983), this conversion gives greater volatility to both the nominal and real exchange rates. Dornbusch (1976) argues that the monetary factor is the main cause of exchange rate fluctuations. However, according to Calderon (2004), besides monetary factors, non-monetary factors are becoming increasingly important in explaining exchange rate fluctuations. Among these non-monetary factors, Calderon (2004) mentioned an important factor, which is the degree of economy openness. Calderon (2004) argues that the volatility of the real exchange rate is lower in more open economies, and (ii) openness to trade helps to reduce the impact of external shocks on real exchange rate volatility.

Since officially becoming a World Trade Organization (WTO) member, Vietnam has integrated more and more deeply with the regional and international economic community. According to data collected

from the General Statistics Office of Vietnam (2018), the economy of Vietnam has a relatively high trade openness in recent years and tends to increase rapidly. In addition to opportunities for the economy, the increased trade openness has created challenges in exchange rate management in the face of fluctuations in the international financial market, such as the 2008 global financial crisis or the depreciation of the renminbi (CNY) against the US dollar in 2018.

The question is whether there is a link between trade openness and exchange rate volatility in Vietnam? What is the nature of the link between exchange rate volatility and trade openness in Vietnam? This study is conducted with the objective of analyzing the relationship of trade openness and real effective exchange rate volatility in Vietnam with the following key points:

1) examining the relationship of trade openness and real effective exchange rate volatility in Vietnam, in order to add empirical evidence on the case of developing countries with increasing trade openness to the existing research literature;

2) using the real effective exchange rate with many trading partners (different from previous studies that used bilateral or multilateral real exchange rates with a small number of partners);

3) policy implications of trade openness management and exchange rate management in the current Vietnamese context.

1. LITERATURE REVIEW AND RESEARCH HYPOTHESES

1.1. Negative relationship between trade openness and real exchange rate volatility

Theoretical model of Hau (2002) predicts an inverse relationship between trade openness and real exchange rate volatility. According to Hau (2002), real exchange rates are less volatile in more open economies. In an open economy, more imported goods facilitate a quick adjustment of the aggregate domestic price level, leading to a reduction in the short-term effects of the money supply, a reduction in the effects on the exchange rate real or domestic consumption. Less open economies have less price flexibility passed through to the exchange rate and thus affect consumption and the real exchange rate. Due to the limitations of the law of one price, Hau (2002) worries that the link between exchange rate volatility and trade openness will be less obvious when measuring volatility at high frequencies. Therefore, Hau (2002) measured real exchange rate volatility at a low enough frequency with the expectation of finding clear

evidence of the impact of trade openness on real exchange rate volatility. In line with his theoretical forecasts, Hau (2002) indicates that trade openness significantly reduces real exchange rate volatility in 48 countries. Devereux and Lane's (2003) study shows that Bilateral real exchange rates are less volatile in nations with more trade openness. Similarly, Calderon's (2004) study found a strong negative relationship between real exchange rate volatility and trade openness.

A study by Bleaney (2008) shows that more open economies will help to limit fluctuations in exchange rates, at least in the short term. At the same time, the exchange rate regime also has a significant influence on the movement of the real exchange rate. In countries with greater trade openness and floating exchange rate regimes, exchange rate reversals are stronger and faster than in countries with fixed exchange rates.

Romelli et al. (2018) examined the effect of trade openness on the relationship between the current account and the real exchange rate. The study was conducted in a variety of developed and emerging economies during the period 1970–2011. The novelty of the study is the use of two variables representing trade openness:

1) sum of imports and exports to GDP;
2) the ratio of imports to GDP.

The results indicate that both trade openness indexes have a statistically significant positive impact on the exchange rate.

The degree of currency devaluation is related to the trading openness of the economies. Economies with greater trade openness have a larger improvement in the current account and exchange rates are less susceptible to external shocks. In the meantime, the study by Calderón and Kubota (2018) shows that openness to trade can reduce the possibility of real exchange rate volatility.

1.2. The relationship of trade openness and exchange rate volatility is ambiguous

The results of Li (2004) show that the real exchange rate will decrease in most countries after permanent trade liberalization. However, in countries in the process of liberalization, the real exchange rate does not depreciate at the beginning but fluctuates significantly over time. In countries with unstable trade liberalization, exchange rates fluctuate more as trade openness increases. On the other hand, the study shows that relative GDP growth is one of the macro factors that affect real exchange rate volatility. In general, the research results on 45 countries by Li 2004 show that the impact of economic openness on the real exchange rate depends greatly on the liberalization characteristics of that country.

Hausmann et al. (2004) provide evidence that there are large variations in long-run real exchange rate volatility across countries. The study found that real exchange rates in developing countries fluctuated approximately three times higher than real exchange rates in developed countries. This is because developing countries face larger nominal and real shocks, many of which often have recurrent currency crises. The study also shows that the difference in real exchange rate volatility is strongly related to the economic development level, as mentioned by GDP per capita.

A study by Karras (2006) shows that the relationship between trade openness and macroeconomic

volatility is not clear. Increased openness can protect the economy against the domestic shocks effects by allowing more of their ones to be "exported" to the country's trading partners. However, increased openness will also increase the vulnerability of the economy to foreign shocks. The study uses two annual data sets: a sample of 56 economies for the period 1951–1998 and a sample of 105 economies for the period 1960–1997. Both datasets include countries at different stages of development. The results show that the relationship between openness and macro factors is weak and generally not statistically significant, in both data sets with different methods and measures of volatility. However, when the economic size variable is included in the estimation models, the study results show that the economic size and trade openness have a negative, statistically significant impact on exchange rate volatility. Besides, Bagella et al. (2006) find there is a difference in the relationship between the volatility of the multilateral real exchange rate and the bilateral real exchange rate and economic growth.

On the other hand, as argued by Candelon et al. (2007), the responsiveness of the real exchange rate to monetary and fiscal shocks is measured by trade openness. The more the economy is closed, the better the exchange rate responds to monetary and fiscal shocks. Candelon et al. (2007) estimate the factors affecting the bilateral real exchange rate for a group of eight new EU member states (NMS), 1993–2003. The study finds a significant negative impact from trade openness on the real exchange rate through increased demand for overall tradable commodities. However, in the short run, these are minor coefficients that are only important in the situation of private consumption. However, it is only when government consumption is used as an indicator of commodity demand that the effect of openness on the exchange rate becomes positive and significant in the period 1995–2003.

Melecký and Komárek (2007) argue that a high degree of trade openness enables a country to benefit through the transfer of knowledge and technology, as well as by taking advantage of comparative advantages. However, opening to trade also brings certain risks. Research results of Melecký and Komárek (2007) on the factors affecting the real exchange rate in Czech Koruna, the period

1994–2004, did not find a statistically significant impact of trade openness on the real exchange rate in the Czech Republic Koruna.

Mpofu (2021) examines the determinants of medium and long-run real exchange rate volatility in South Africa from 1986 to 2015. The study evaluated the effect of trade openness on real exchange rate volatility. Using the cointegration approach with the model of Autoregressive Distributed Lag (ARDL), the study found that the interaction variable between trade openness and the dummy variable for account liberalization has a significant negative impact on real exchange rate volatility. In particular, the study shows that real exchange rate volatility is higher in countries with flexible exchange rate regimes. Besides, the exchange rate regime and other macro factors such as output, money supply, commodity prices and government consumption have a significant influence on the fluctuation of the rand value.

In general, the studies available in the world have obtained some statistical evidence confirming the existence of a relationship between exchange rate fluctuations and trade openness. However, the empirical results on the relationship between trade openness and the real exchange rate are mixed. Several studies have found the real exchange rate to be less volatile in countries with increased trade openness (Hau, 2002; Devereux & Lane, 2003; Calderon, 2004; Bleaney, 2008, Romelli et al., 2018; Calderón & Kubota, 2018). Besides, other studies show that the impact of trade openness on exchange rate is still ambiguous (Li, 2004; Karras, 2006; Candelon et al., 2007; Melecký & Komárek, 2007, Mpofu, 2021). On the other hand, the research results of Alam and Sumon (2020) and Kong et al. (2020) show a two-way causal relationship between economic growth and trade openness.

The reasons for this difference are due to differences in the sample of the countries studied, the time period studied, as well as the differences in econometric techniques for estimating exchange rate variables. In the past time, there have been studies on exchange rates in Vietnam and in the world using different variables representing exchange rate factors such as nominal exchange rate, real bilateral exchange rate or real exchange rate with a small number of partners. This is the limitation of the existing studies. According to Carrieri et al. (2006), Bagella et al. (2006), Berdiev et al. (2012), researchers should consider the real exchange rate rather than the nominal rate because the real exchange rate removes the inflation effect and is a better indicator of the performance of the exchange rate. On the contrary, according to Bleaney (2008), the real effective exchange rate should be used instead of the bilateral real exchange rate, because "current account sustainability is intrinsically a multilateral concept". In particular, the real effective exchange rate index (with a large number of trading partners) will more accurately reflect exchange rate behavior. Therefore, it is necessary for this research topic to continue to supplement empirical studies on the relationship between the real effective exchange rate and trade openness in different countries.

1.3. Development of research hypotheses

The literature review shows that several studies have found an inverse relationship between trade openness and real exchange rate volatility (Bleaney, 2008; Hau, 2002; Romelli et al., 2018; Calderón & Kubota, 2018). However, other research results show that the relationship between trade openness and real exchange rate volatility is ambiguous: it depends on the country's trade liberalization process (Li, 2004); effect is unknown (Karras, 2006); there is a difference when using real effective exchange rate volatility versus bilateral real exchange rate volatility (Bagella et al., 2006); depends on the exchange rate regime in each country (Mpofu, 2021).

The theoretical context suggests that it is necessary to develop hypotheses about the relationship between exchange rate volatility and trade openness in Vietnam, an emerging country in the process of trade liberalization, with a recent increased trade openness.

The objective of this paper is to examine the relationship between trade openness and real effective exchange rate volatility in Vietnam with two main hypotheses:

H1: *Trade openness has an effect on Vietnam's real effective exchange rate volatility.*

H2:   *Real effective exchange rate volatility has an effect on Vietnam's trade openness.*

Basing theoretical research and practical observations in Vietnam, the study expects that there is a link between real effective exchange rate volatility and trade openness in Vietnam – a country that is accelerating integration and increasing trade openness.

2. METHODOLOGY

2.1. Research model

Based on Hau (2002) and the characteristics of data series in which there is no co-integration, this paper builds a research model of the relationship between real effective exchange rate and trade openness in Vietnam as follows:

$$V\_reer_t = \alpha_0 + \sum_{j=1}^{n} \alpha_{1j} V\_reer_{t-j} +$$

$$+ \sum_{j=1}^{n} \alpha_{2j} OPEN_{t-j} + \sum_{j=1}^{n} \alpha_{3j} GROWTH_{t-j} + \varepsilon_t \quad (1)$$

$$OPEN_t = \beta_0 + \sum_{j=1}^{n} \beta_{1j} OPEN_{t-j} +$$

$$+ \sum_{j=1}^{n} \beta_{2j} V\_reer_{t-j} + \sum_{j=1}^{n} \beta_{3j} GROWTH_{t-j} + \varepsilon_t \quad (2)$$

where V_reer_t is real effective exchange rate volatility at time t. Real effective exchange rate volatility (V_reer) is calculated by using the GARCH (1,1) model; V_reer_{t-j} is a lagged variable of real effective exchange rate volatility; $OPEN_t$ is trade openness (%) at time t, which is calculated by the author; $OPEN_{t-j}$ is a lagged variable of trade openness; control variable: GROWTH of GDP (%).

All variables are collected for the period of 2004: Q1 to 2020: Q4 (quarterly frequency).

2.2. Exchange rate volatility (V_reer)

There are two methods of calculating exchange rate volatility, which are the standard deviation of the exchange rate and the GARCH (1,1) model. According to Lanyi and Suss (1982) and Arize

(1997), both methods are popular and effective in studies related to exchange rate fluctuations. Exchange rate volatility, which is the variability of an exchange rate, is measured by the standard deviation. Standard deviation measures volatility, dispersion of exchange rate values each period compared to the average exchange rate value in the data set. Exchange rate volatility, which is the uncertainty of an exchange rate measured by the GARCH (1,1) model, is understood as an uncertain, volatile state of the exchange rate.

Clare (1992) and Brzozowski (2006) suggested that the methods of measuring exchange rate volatility reflect different aspects of volatility. Researchers can choose to use a method that fits their research goals and delivers results close to their expectations.

This study considers exchange rate volatility in terms of exchange rate uncertainty, as measured by the GARCH (1,1) model. This choice of volatility method is consistent with previous studies (Vita & Abbott, 2007; Crowley & Lee, 2003). Data on the Vietnamese currency's real effective exchange rate connecting with 143 major Vietnamese trading partners are obtained from the BRUEGEL (Europe).

2.3. Trade openness

Previous studies have measured trade openness in a variety of ways. Benita (2019) uses three methods:

1) trade openness is determined by the trade measure, total import and export over GDP;

2) trade openness is measured by the reciprocal of import and export tax rates;

3) trade openness is calculated as the correlation ratio of the prices of exports to the prices of imports.

Romelli et al. (2018) measure trade openness in two ways: trade openness is the ratio of imports and exports to GDP or trade openness is determined by the ratio of imports to GDP. Among those methods, trade openness as a ratio of imports and exports to GDP is the more well-known and commonly used measure (Benita, 2019).

Based on previous research (Eriş & Ulaşan, 2013; Calderón & Kubota, 2018; Romelli et al., 2018; Kong et al., 2020), this study uses trade openness calculated as Vietnam's total exports and imports divided by Vietnam's GDP. The data of export, import and GDP are collected from the General Statistics Office of Vietnam.

2.4. Economic growth

Economic growth is the increase in income or output calculated for the total economy over a given period of time (which can be a month, quarter, or year). To measure economic growth, economic studies can use absolute growth, annual economic growth rates, or average growth rates over a period. According to Alam and Sumon (2020), Benita (2019), and Kong et al. (2020), the study uses quarterly average GDP growth rate, unit (%). GDP growth data (%) is collected from the General Statistics Office of Vietnam.

3. RESEARCH RESULTS

3.1. Unit root tests

According to Nelson and Plosser (1982), time series are often stochastic non-stationary processes and non-stationary at the same level. Regression analysis with nonstationary series can lead to spurious regression or nonsense regression. Therefore, to avoid spurious regression, this study examines the stability of the variables in the model. In this study, the ADF test (Augmented Dickey and Fuller, 1979) is used to test the trend of a time series.

Table 1. Unit root test results

Source: Analysis results by the authors.

Variable	Test statistic	P-value	Result
V_reer	-4.74^{***}	0.00	I(0)
$OPEN$	-9.15^{***}	0.00	I(0)
$GROWTH$	-2.93^{**}	0.04	I(0)

Note: **, *** mean significance at the 5%, 1% levels, respectively.

The results given in Table 1 indicate that all the variables are found stationary at data series level I(0). Therefore, the research model can be analyzed by VAR model proposed by Sims (1980).

3.2. Determining the optimal lag

Table 2. Determining the optimal lag

Source: Analysis results by the authors.

lag	LL	LR	df	p	FPE	AIC	HQIC	SBIC
0	−307.38	−	−	−	3.27	9.70	9.74	9.80
1	−262.53	89.71	9	0.00	1.07	8.58	8.74	8.98
2	−244.06	36.94	9	0.00	0.80	8.28	8.56	8.99
3	−226.85	34.41	9	0.00	0.62	8.03	8.43	9.04
4	−177.05	99.61^{*}	9	0.00	0.17^{*}	6.75^{*}	7.27^{*}	8.07^{*}

Note: * indicates the optimal lag of the VAR.

Based on Lütkepohl (1993) and the results of testing the optimal lag with the LR, FPE, AIC, HQIC and SBIC criteria in Table 3, the study determined that the optimal lag of the variables in the model is 4.

3.3. Estimation of the research model by the VAR method

The results of the research model estimation on the link between trade openness and the real effective exchange rate in Vietnam are presented in Table 4.

Table 3. Testing results for the relationship between the V_reer and $OPEN$

Source: Analysis results by the authors.

Variable	V_reer		OPEN	
	Coef.	P > |z|	Coef.	P > |z|
V_reer(-1)	0.38^{***}	0.00	-0.03^{***}	0.00
V_reer(-2)	0.08	0.51	-0.01	0.35
V_reer(-3)	-0.15	0.26	0.01	0.61
V_reer(-4)	0.05	0.67	-0.01	0.37
$OPEN$(-1)	2.17^{**}	0.05	0.11	0.24
$OPEN$(-2)	1.41	0.19	0.11	0.22
$OPEN$(-3)	0.70	0.51	0.01	0.97
$OPEN$(-4)	4.66^{***}	0.00	0.75^{***}	0.00
$GROWTH$(-1)	0.19	0.62	0.06^{**}	0.03
$GROWTH$(-2)	0.20	0.73	-0.03	0.54
$GROWTH$(-3)	-1.90^{***}	0.01	0.11^{*}	0.06
$GROWTH$(-4)	0.74	0.18	-0.16^{***}	0.00
_cons	-6.83^{*}	0.08	0.44	0.16

Note: *, **, and *** mean significance at the 10%, 5% and 1% levels, respectively.

Table 4 shows that $OPEN$ has a positive effect on V_reer at the 1-period lag and 4-period lag, this result is also found in Figure 1. At the same time, real effective exchange rate volatility in the past have the effect of increasing real effective exchange rate volatility in the present. On the other hand, V_reer

Variable	V_reer	OPEN
Shocks		
V_reer		
OPEN		
GROWTH		
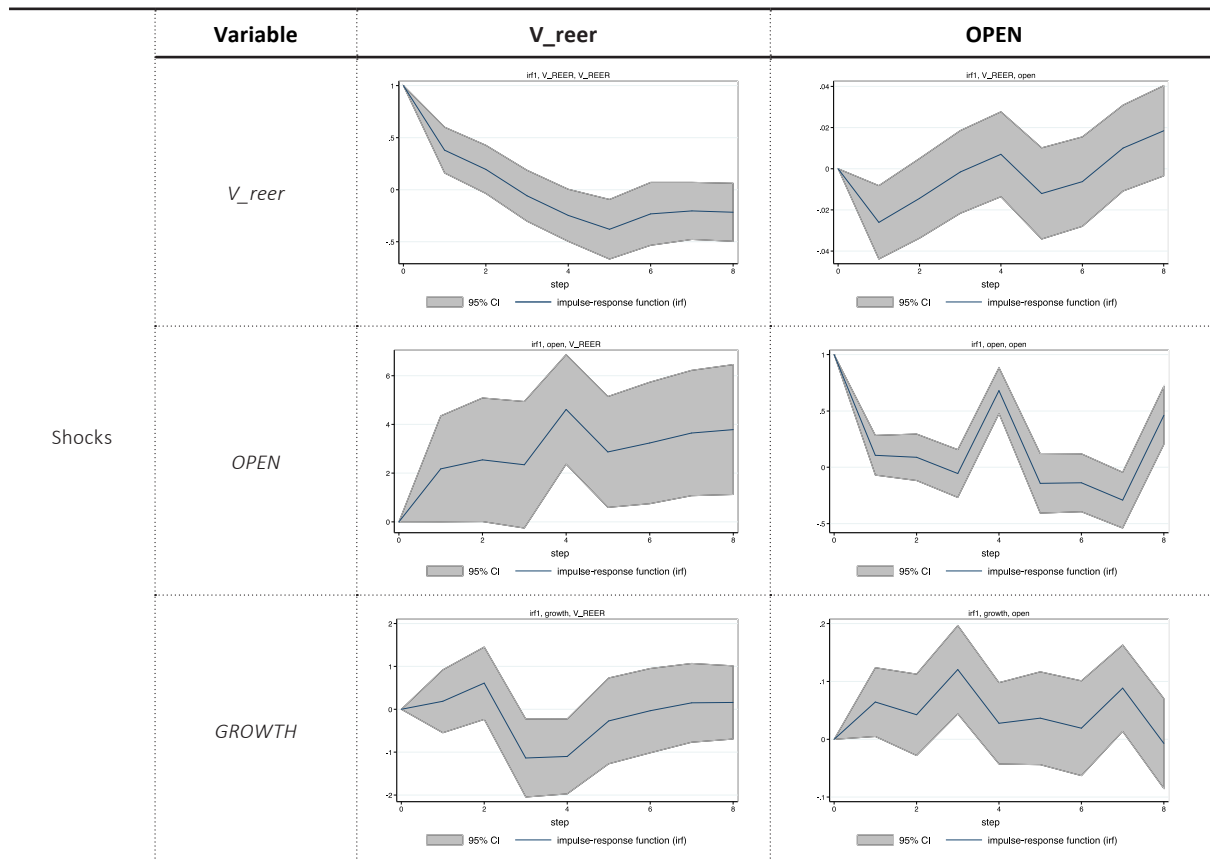
Figure 1. Analysis of impulse-response functions (IRF)

negatively affects *OPEN* at the 1-period lag (Table 4 and Figure 1). At the same time, the current trade openness is also affected by this same factor in the past with a lag of 4 periods. So, *V_reer* and *OPEN* have a two-way relationship, *OPEN* has a positive effect on *V_reer*, but the opposite direction is negative. In addition, the study also found that the control variable *GROWTH* had a negative impact on V_reer at the 3-period lag. At the same time, *OPEN* is negatively affected by *GROWTH* at 1-period lag and 3-period lag, however this effect becomes negative at the 4-period lag (Table 4 and Figure 1).

3.4. Granger causality tests

The Granger causality test, based on the methodology of the VAR model, was proposed by Granger (1969). The Granger causality test is used to see if one variable can predict another. Specifically, for each pair of model variables *X* and *Y*, it is said that *X* affects Granger on Y if and only if Y's prediction is better using the lagged values of *X* together with the lagged values of all other variables in the other model (including the variable *Y*). The sequence of

the VAR model and the stability of the variables determine the test's reliability. The test reliability will decrease if the variables are not stationary.

In this study, Granger Wald causality test and χ2 statistic are used to test Granger causality between two variables *OPEN* and *V_reer* in the model. Granger causality is distinguished in one-way and two-way. One-way causality exists from *OPEN* to *V_reer* if OPEN affects Granger to *V_reer* but *V_reer* does not affect Granger to *OPEN*. Two-way causality if OPEN affects Granger to *V_reer* and *V_reer* affects Granger to *OPEN*. The results of the Granger test are presented in Table 5.

Table 4. Granger causality Wald tests

Source: Analysis results by the authors.

Granger causality Wald tests	H_0: **OPEN** does not Granger-cause **V_reer**		H_0: **V_reer** does not Granger-cause **OPEN**	
	Chi-sq	Prob.	Chi-sq	Prob.
	25.13[***]	0.00	17.32[***]	0.00

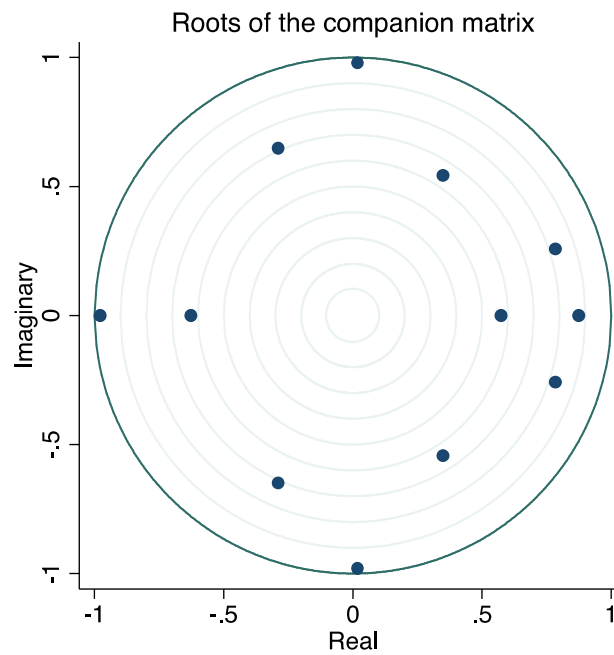*Note:* [***] indicates significance at 1%.

Figure 2. Unit circle

The results of Granger Cause Wald test show that there is a causal link between *OPEN* and *V_reer* at 1% significance level. Accordingly, *OPEN* has a positive effect on *V_reer*. In the opposite direction, *V_reer* negatively affects *OPEN*.

3.5. Check the stability of the model

According to the unit root standard, the test results have shown that the solutions are all within the unit circle, thus, so the VAR model with a delay of 4 is stable and suitable (Figure 2). Hypotheses testing results have shown that both hypothesis H1: "Trade openness has an effect on Vietnam's real effective exchange rate volatility" and hypothesis H2: "Real effective exchange rate volatility has an effect on Vietnam's trade openness" are accepted.

4. DISCUSSION

4.1. The effect of trade openness on real effective exchange rate volatility

Research results indicate that trade openness has a positive effect on exchange rate volatility at lags of 1 and 4 periods. This is consistent with observation of Li (2004), for some countries, at the beginning of integration, temporary trade liberalization will preclude adjustments to the equilibrium exchange rate. The research results are consistent with the comments of Candelon et al. (2007), the closer the economy closes, the better the exchange rate responds to monetary and fiscal shocks. Similarly, the research results of Karras (2006) and Melecký and Komárek (2007) suggest that the relationship between trade openness and macroeconomic volatility is uncertain.

The results of the study of Vietnam data for the period 2004–2020 show that the increased trade openness has increased real effective exchange rate volatility at 1-period and 4-period lags. This effect diminishes as the delay gets larger and becomes insignificant from the 8-period delay. This shows that Vietnam's economy is in the process of trade liberalization, not yet complete, and still vulnerable to external shocks. Currently, the exchange rate management mechanism of the State Bank of Vietnam pursues the goal of maintaining a stable USD/VND nominal exchange rate policy. In that condition, if trade openness increases, while inflation in Vietnam changes, or the value of currencies of partners changes, it leads to an increase in volatility in the real effective exchange rate. In the coming time, Vietnam's trade liberalization process becomes more and more stable, the exchange rate mechanism needs to adapt to exchange rate fluctuations against the currencies

of many of Vietnam's trading partners to promote multilateral commercialization policy. Achieving this, perhaps Vietnam will maintain a less volatile real exchange rate as trade openness increases, as is the case with other developed countries as found by Hau (2002), Bleaney (2008), Romelli et al. (2018), and Calderón and Kubota (2018). Besides, when estimating the impact of GDP growth variable on real effective exchange rate volatility, the research results show that GDP growth has a statistically significant negative impact on real effective exchange rate volatility. The economy with GDP growth has contributed to reducing real effective exchange rate volatility.

4.2. The effect of real effective exchange rate volatility on trade openness

On the other hand, real effective exchange rate volatility has a negative effect on trade openness with a 1-period lag. Increased real effective exchange rate volatility has affected export and import activities, leading to a decrease in trade openness. Over the past time, Vietnam's trade openness has increased and increased rapidly due to the important contribution of the foreign-invested sector. According to data from the General Statistics Office of Vietnam (2018), the proportion of this region's exports accounts for two-thirds of Vietnam's total export turnover. At the same time, Vietnam's export goods are of low value, reflected in the large proportion of raw and newly-processed goods and processed and assembled goods. Besides, other export products have a high pro-

portion of imported raw materials and low added value in exports. Under such conditions, real effective exchange rate volatility have greatly affected the trade openness.

The results indicate that there is a two-way causality between real effective exchange rate volatility and trade openness. According to the research model results, trade openness has a statistically significant impact on the volatility of the real effective exchange rate. Specifically, trade openness has a positive effect on the volatility of the real effective exchange rate at a lag of 1 period and 4 periods. At the same time, the real effective exchange rate volatility also shows a negative impact on trade openness in Vietnam.

Over the past time, Vietnam's economy has seen many positive changes in the process of economic integration with the world, reflected in the increasing trade openness. However, Vietnam's economy is still in the early stages of trade liberalization and is still being negatively impacted by external shocks. Specifically, the research results show that the increased trade openness has increased the volatility of the real effective exchange rate. In turn, fluctuations in the real effective exchange rate have reduced trade openness. On the contrary, the research results indicate that increased economic growth reduces the volatility of the real effective exchange rate. In the meantime, economic growth has an effect on increasing trade openness at 1-period and 3-period lag and reducing trade opening at 4-period lag.

CONCLUSION

The study provides empirical evidence of a two-way causal relationship between trade openness and real effective exchange rate volatility in Vietnam. Trade openness has a positive effect on the volatility of the real multilateral exchange rate at 1-period and 4-period lags. In contrast, real effective exchange rate volatility also shows a negative impact on trade openness in Vietnam. At the same time, economic growth also has a negative impact on real effective exchange rate volatility and a positive impact on trade openness.

Research results show that the process of trade liberalization in Vietnam is not really stable and long-lasting. During the integration process, Vietnam's economy is significantly affected by external shocks. Therefore, in the coming time, in addition to continuing to increase trade openness, the Government should have policies to increase the added value of exports to improve the quality of trade openness. Besides that, the Government needs to adjust the policy of managing the nominal exchange rate in the

direction of multilateralism, to ensure that it keeps up with developments in the international financial market, and to avoid large fluctuations in the real effective exchange rate. Implementing policy implications will create conditions to promote trade activities between Vietnam and many countries around the world.

AUTHOR CONTRIBUTIONS

Conceptualization: Nguyen Thi Kim Lien.
Data curation: Nguyen Thi Kim Lien.
Formal analysis: Nguyen Thi Kim Lien.
Funding acquisition: Nguyen Thi Kim Lien, Toan Ngoc Bui.
Investigation: Nguyen Thi Kim Lien.
Methodology: Nguyen Thi Kim Lien.
Project administration: Nguyen Thi Kim Lien.
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Software: Nguyen Thi Kim Lien, Toan Ngoc Bui, Thu-Trang Thi Doan.
Supervision: Nguyen Thi Kim Lien.
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Writing – original draft: Nguyen Thi Kim Lien.
Writing – reviewing & editing: Nguyen Thi Kim Lien, Toan Ngoc Bui, Thu-Trang Thi Doan.

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