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The Dynamics of the Trade Balance of Vietnam and Its Weak Currency Policy: A Bilateral Autoregressive Distributed Lag (ARDL) Analysis

Dr Woocheol Lee[1]

RMIT University, Vietnam

Abstract

This paper examines the dynamics of the trade balance of Vietnam employing the bilateral autoregressive distributed lag model where the error-correction term is incorporated. The real depreciation of the Vietnamese dong and higher foreign income deteriorates the trade balance whereas higher domestic income improves it. The bilateral analysis uncovers that the real depreciation improves bilateral trade balance in countries that Vietnam records a contemporary surplus and vice versa. Higher income countries in the sample consume less Vietnamese goods due to the inferior goods effect. The trade balance is real exchange rate inelastic and foreign income elastic. The weak currency policy is not a sustainable option for Vietnam.

Keywords: Determinants of bilateral trade balance; Weak currency policy; J-curve effect; ARDL approach; Error correction model; Vietnam.

JEL classification: F14, F31, C32

1. Introduction

Vietnam has maintained the value of its currency – the Vietnamese dong (VND) – low for the last two decades to stabilise its chronic trade deficits based on the rationale that the depreciation of domestic currency encourages the export of domestic goods and discourages the import of foreign goods. Furthermore, if a country has chosen, like Vietnam, an export-led growth strategy within which the influence of external economies is critical, its authority is strongly tempted to keep the value of its currencies low.

Figure 1 demonstrates that Vietnam has experienced trade deficits in most of quarters during the sample period 1996Q1 and 2016Q4. The nominal value of the VND expressed in terms of logged nominal effective exchange rate (NEER) depreciates from 1998Q1 to 2011Q2. Notably, the real value of the VND expressed in terms of logged real effective exchange rate (REER)

[1] Correspondence to Dr Woocheol Lee, Email to: leewoocheol@gmail.com; woo.lee@rmit.edu.vn

appreciated in such quarters from 2004Q1 to 2009Q4. The REER appreciates faster than the NEER does since 2011Q2[2]. The dynamics of the trade balance over the same period, however, contradicts what the authority aims to. It aggravated during the real depreciation period from 1998 to 2003 and it improved during the real appreciation period from 2012 to 2014. The contradictory movement of the trade balance casts doubt on the validity of the weak currency policy as an option for improving the trade balance in Vietnam.

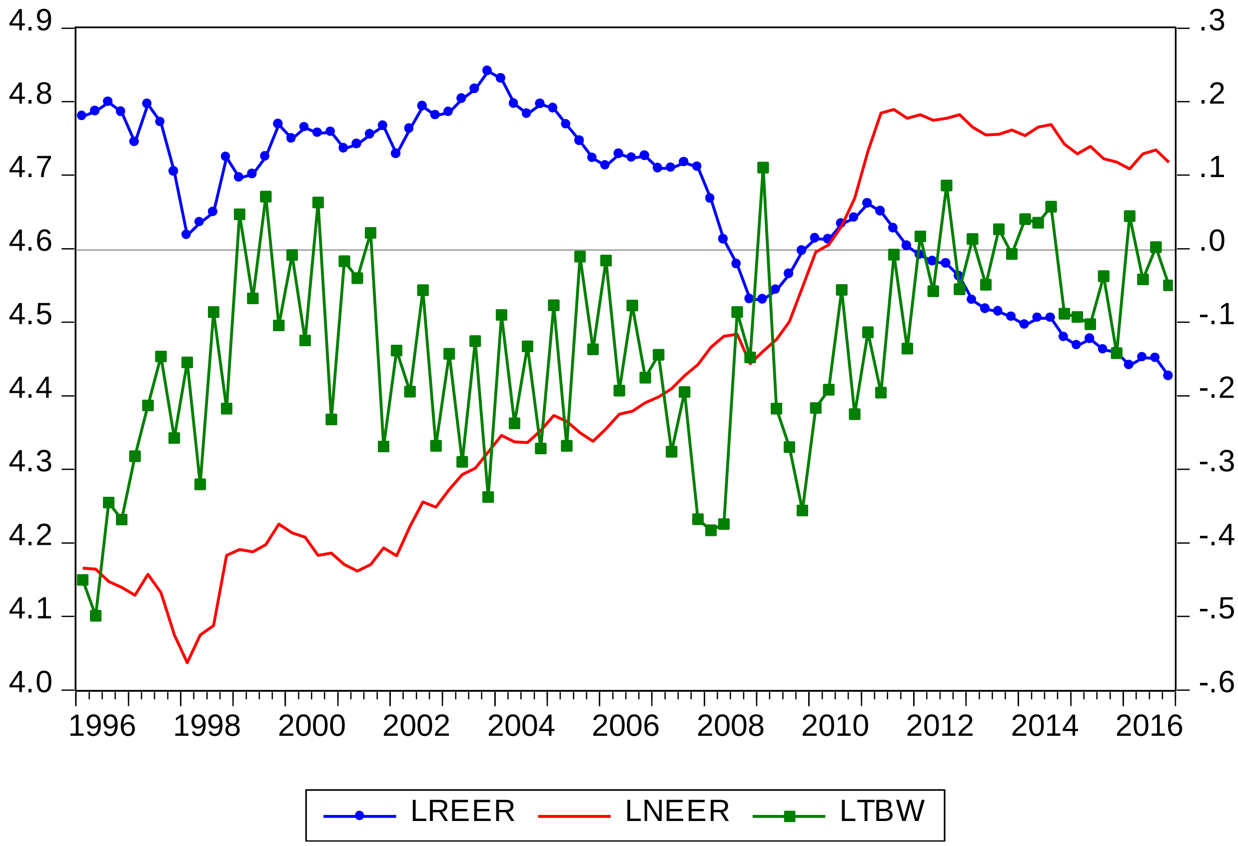

Figure 1: Logged nominal effective exchange rate, logged real effective exchange rate and logged trade balance of Vietnam

Note: Both nominal and real effective exchange rate is calculated as a weighted average of Vietnam's 15 trading partners. LREER denotes the logged real effective exchange rate, LNEER the logged nominal effective exchange rate and LTBW the logged trade balance of Vietnam vis-à-vis the world. LTBW is scaled on the right axis and any point below zero line indicates a trade deficit. LREER and LNEER are scaled on the left axis.

Source: International Financial Statistics, IMF (accessible at http://data.imf.org)

[2] The main reason of the opposite movement of the real value of the VND against its nominal values is extraordinary high inflation rates recorded between 2004 (7.8%) and 2012 (9.1%) which reached as high as 23.1% in 2008. It stabilised to 6.6% in 2013 and 4.1% in 2014 (data source: the IMF's *International Financial Statistics (IFS)*, accessible at https://data.imf.org).

To explain the conflicting movement of the trade balance this paper assumes that the trade balance does not sensitively respond to a shock in the real exchange rate. Instead, it reacts more sensitively to a shock in other factors such as domestic income or trading partner's income. To test the hypothesis, a bilateral autoregressive distributed lag (ARDL) model is employed to analyse quarterly trade data of fifteen largest trading partners' and of the World from 1996Q1 to 2016Q4. The analysis is conducted both at the aggregate and at the bilateral level. The bilateral analysis has helps filter the aggregate bias that averages out bilateral impacts across trading partners with which Vietnam records different status in the trade account (see Table 1). Moreover, an error correction term (ECT) is incorporated into the basic ARDL model to examine both the short-run and the long-run effect of a shock in the real exchange rate, the domestic and the foreign income individually. This paper is the first Vietnam study in which the bilateral, the short-run and the long-run analysis of the trade balance are conducted.

The structure of this paper is as follows. Section 2 reviews the literature, Section 3 explains the data and the bilateral ARDL model, Section 4 reports and discusses the results and Section 5 draws a conclusion.

2. Literature Review

The rationale of the weak currency policy, known as the elasticity approach, is based on the price competitiveness of domestic exports that can be improved as a result of real depreciation. It does not only encourage the export of home country by making domestic goods cheaper in foreign markets but also discourage the import from foreign countries by making foreign goods more expensive in the domestic market. Consequently, the trade balance of domestic country is expected to improve as long as the net impact is positive.[3]

Many of the literature have observed that the real depreciation of domestic currency is likely to improve home country's trade balance in the long run. Meanwhile, the opinions on the short-run impact of real depreciation have been divergent regardless of methodologies or target countries. The J-curve effect which Magee (1973) used to demonstrate the initial negative impact of real depreciation on trade balance before positive impacts begin to work is possibly the most rigorously tested short-run dynamics of trade balance. The works of the J-curve literature are conducted either at the aggregate or at the bilateral level. Many studies belonging to the first group tend to support the J-curve effect (Gupta-Kapoor and Ramakrishnan 1999, Himarios, 1989, Kyophilavong et al. 2013, Lal and Lowinger 2002, Rosensweig and Koch 1988) though there some exceptions (Bahmani-Oskooee 1985, Bahmani-Oskooee and Malixi 1992, Felrningham 1988, Miles 1979).[4]

On the contrary, many of studies belonging to the second group take inconclusive positions on the short-run impact of real depreciation. The bilateral model pioneered by Rose and Yellen (1989) who pointed out that the aggregate level analysis is biased due to its averaged calculation. Based on the bilateral model they questioned the existence of the J-curve effect[5]. The most common

[3] The net impact will be positive if "the sum of the absolute values of the import and the export demand elasticities is greater than one" (Bahmani-Oskooee *et al.* 2006, p. 879) which is known as the Marshall-Lerner condition.

[4] At the aggregate level, a delayed J-shape is observed in the US vs Japan (Mahdavi and Sohrabian 1993) and a W-shape is observed in Tunisia (Jelassi *et al.* 2017). An S-shape is reported in OECD countries (Backus *et al.* 1994) and in less developed countries (Senhadji 199

[5] Prior to Rose and Yellen (*ibid.*), Meade (1988) argued that real depreciation had different influence across the sector within the economy in the sectoral analysis of the US. Evidence for the J-curve was not found in her analysis.

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conclusion observed in bilateral studies is that the J-curve is observed in the case of some trading partners' and there is a favourable long-run impact of real depreciation (Arora et al. 2003, Bahmani-Oskooee and Brooks 1999, Bahmani-Oskooee and Harvey 2009, Bahmani-Oskooee and Kantipong 2001, Bineau 2016, Marwah and Klein 1996, Shirvani and Wilbratte 1997). Few studies reject the J-curve effect entirely when the trading partners are limited to few countries (Baharumshah 2001, Wilson 2001).

Whereas the literature is rich, there is a relatively small amount of studies on Southeast Asian economies if we put aside Thailand and Malaysia. Vietnam studies are no exception and only few studies are available. Pham (2014) observes the J-curve effect at the aggregate level employing an autoregressive distributed lag (ARDL) model. She notes that the exchange rate elasticity to the trade balance is relatively weak – one percent change in the REER leads to 0.2 percent change in the trade balance, attributing this to the inelastic import to the REER (ibid., p. 449). Thom (2017) detects the J-curve effect at the aggregate level, employing the vector error correction (VEC) model, noting that the effect of the real depreciation of the VND is relatively weak in the long run. Le et al. (2018) also detect the J-curve effect employing the aggregate ARDL approach at the aggregate level. The elasticity of the REER they find is larger than that of Pham (op. cit.) – one percent change in the REER lead to 0.75 per cent change in the trade balance in the long run. Phan and Jeong (2015), on the other hand, analyse 16 trading partners' using bilateral panel analysis. They detect a negative long-run relationship at the aggregate level – one percent real depreciation of the VND induces 3.11 percent deterioration in the trade balance (ibid., p. 230), which is quite responsive compared to the cited studies. As expected they report mixed outcomes at the bilateral level. Similar to Pham (op. cit.), they ascribe the negative long-run relationship to the heavy import dependency of Vietnam but do not examine the short-run dynamics.

Existing Vietnam studies, however, heavily biased to the analysis of the impact of the real depreciation of the VND while that of domestic and foreign income are pointed out as important determinants of trade balance. For example, the absorption approach developed by Alexander (1952) explains that the trade balance of a country is firstly affected by rea depreciation and then this first impact in turn has influence over both domestic output/income and domestic import. Such empirical studies as Kyophilavong et al. (2013) and Senhadji (1998) also pointed out the importance of foreign income as a determining factor of the trade balance in developing countries. This paper examines the impact of both domestic and foreign income on the trade balance to reflect the viewpoint of the absorption approach.[6]

[6] From the national accounting identity, we can derive a simple relationship between output (Y) and absorption (A) as follows. $Y = C + I + G + NX, NX(= TB) = Y - (C + I + G) = Y - A$. Hence, the change in trade balance is determined by the relative change in output and absorption. In turn, both output and absorption are affected by real depreciation of a currency.

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3. Data and Model

3.1. Data

This paper uses quarterly data from 1996Q1 to 2016Q4. Trade data are collected from the IMF's Direction of Trade (DOT). Exchange rate, consumer price index and nominal GDP data are collected from the IMF's International Financial Statistics (IFS).[7] The values of export and import are converted into the VND unit.[8] Apart from 14 real bilateral exchange rates, the REER is calculated as the weighted real bilateral exchange rates for the analysis at the aggregate level[9].As quarterly GDP data are not available for many of the partner countries, the collected annul nominal GDP data are converted into indexed real GDP data setting 2010Q4 as a base period. Then they are interpolated into quarterly data.[10]

Table 1: Vietnam's trade with major trading partners in 2016 (millions of USD)

Country	*Exports*	*Imports*	*Share of total trade (%)*	
World	175,637.62	185,291.98		
Australia	2,864.86	2,442.14	1.6	1.4
China	21,950.44	50,037.69	12.5	28.5
Germany	5,960.52	2,850.22	3.4	1.6
Hong Kong	6,088.08	1,500.28	3.5	0.9
India	2,687.19	2,745.53	1.5	1.6
Indonesia	2,617.85	2,992.48	1.5	1.7
Japan	14,671.49	15,098.32	8.4	8.6
Korea	11,406.06	32,193.12	6.5	18.3
Malaysia	3,341.99	5,174.31	1.9	2.9
Netherlands	6,011.63	676.89	3.4	0.4
Singapore	2,419.89	4,768.53	1.4	2.7
Taiwan	2,451.36	10,298.95	1.4	5.9
Thailand	3,690.73	8,855.14	2.1	5.0
UK	4,898.08	724.37	2.8	0.4
US	38,473.18	8,712.16	21.9	5.0

Source: IMF's *Direction of Trade* (accessible at http://data.imf.org)

Table 1 shows basic trade data of fifteen trading partners and the World. Twelve countries are in Asia-Pacific, three are in Europe and nine are high-income countries (seven OECD members plus Hong Kong and Singapore). The trading partners show different bilateral trade balance status. Vietnam records trade surplus with six countries – Australia, Germany, Hong Kong, the Netherlands, the UK and the US that are high-income countries. This should not be read as Vietnam

[7] The Taiwanese CPI index data are collected from the Statistical Bureau of Taiwan (accessible at https://eng.stat.gov.tw/) because they are not available from the IFS.

[8] The export values of the DOT are measured in FOB prices and the import values are in CIF prices. Being measured in the USD units, they are converted into the VND by multiplying contemporary exchange rates between the USD and the VND measured in terms of number of the VND per the USD (VND/USD).

[9] The number of currencies is fourteen because Germany and the Netherlands use the same currency since 1998Q1.

[10] EViews® 10 is used to interpolate the annual data. The same interpolation method is used in Kyophilavong et al. (2013) to acquire annual data.

records trade surpluses with high-income countries because Japan, Korea and Taiwan are included in trade deficit recording countries. This probably reflect that Japan, Korea and Taiwan dominate the foreign-invested sector that requires heavy imports of machinery and tools from its home countries. The fifteen countries share 73.8% of the exports and 80.5% of the imports of Vietnam among which the five largest trading partners are China, the US, Korea, Japan and Taiwan. The US is the only country Vietnam records trade surpluses out of the five countries while China is the largest trade deficits recording country. The variation in trade balance status validates that bilateral trade data analysis because a shock in the real bilateral exchange rate and the level of income is likely to cause different response of the trade balance.

3.2. Model

This paper employs an ARDL model in which the ECT is incorporated. Compared to the VEC model, the ARDL model does not require variables to be integrated at the same order. Variables can follow either I(0) or I(1) process. The ECT incorporated ARDL approach does not only assesse the short-run and the long-run effect of one variable upon the others simultaneously but also separate the short-run and the long-run effects (Kyophilavong et al. 2013, p. 834).

It is assumed that the trade balance of Vietnam is affected by three variables – the real bilateral exchange rate, the income of Vietnam and the income of trading partners. Based on the model used in Bahmani-Oskooee et al. (2006), the long-run bilateral trade balance model takes the following form:

$$LogTB_{it} = \alpha + \beta LogRER_{it} + \gamma LogY_{vnt} + \delta LogY_{it} + \varepsilon_t \quad (1)$$

where TB_{it} is the ratio of exports to imports of Vietnam with its trading partner (country i) at time t.11 RER_{it} is the real bilateral exchange rate between the VND and the currency of trading partner i at time t.12 The RER is defined in a way that an increase of it indicates the real depreciation of the VND. Y_{vnt}, Y_{it} and ε_t denotes the real GDP of Vietnam, that of country *i* and the error term, at time *t* respectively.

In the long run, it is expected that an estimate of β will be positive based on the assumption that the real depreciation of the VND is likely to improve the bilateral trade balance of Vietnam. An estimate of γ will be negative as an increase of the real GDP of Vietnam is likely to deteriorate the bilateral trade balance whereas an estimate of δ will be positive as an increase of the real GDP of a partner country is likely to improve the bilateral trade balance.

Short-run dynamics is examined by transforming Equation (1) in the form of the error correction model as follows:[13]

[11] Using the ratio makes trade data insensitive not only to the units of measurement of exports and imports but also to whether exports and imports are in real or nominal terms (Bahmani-Oskooee 1991, p. 404). In addition, the ratio can be logged without worrying the possible negative values, which enables us to take advantage of the elasticity properties of the data (Hsing 2005, p. 48).

[12] It also denotes the REER when the model is used at the aggregate level.

[13] A dummy variable was incorporated into Equation (2) in order to test structural changes, but the dummy is significant only in the case of Germany and the UK. The dummy variable is omitted in the final form.

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$$\Delta LogTB_{it} = b + \sum_{k=1}^{K} c_k \Delta LogTB_{it-k} + \sum_{k=1}^{K} d_k \Delta LogRER_{it-k} + \sum_{k=1}^{K} e_k \Delta LogY_{vnt-k} + \sum_{k=1}^{K} f_k \Delta LogY_{it-k} + \rho_1 LogTB_{t-1} + \rho_2 LogRER_{it-1} + \rho_3 LogY_{vnt-1} + \rho_4 LogY_{it-1} + \mu_t \quad (2)$$

where k stands for the lag length. We can test the existence of the J-curve effect by examining the sign of d_{k}. As assumed in Bahmani-Oskooee et al. (2006, p. 882), the J-curve effect would be supported "if at lower lags (d_{k}) takes negative values and at higher lags, positive values". Equation (2) contains a linear combination of a lagged level of all variables as a proxy for lagged error term from Equation (1), which is used to test the existence of cointegration or a long-run relationship among variables. Whether we have to keep this linear combination in Equation (2) depends on the joint significance of ρ_1, ρ_2, ρ_3 and ρ_4. Pesaran et al. (2001) demonstrate that the F-test with new critical values can be used to determine the joint significance, which is called the bounds testing approach. In this approach, the null hypothesis of $\rho_1 = \rho_2 = \rho_3 = \rho_4 = 0$ is tested against the alternative hypothesis of $\rho_1 \neq \rho_2 \neq \rho_3 \neq \rho_4 \neq 0$. The rejection of the null hypothesis indicates that variables are cointegrated and therefore there is a long-run relationship among the variables. Consequently, the linear combination should be kept in Equation (2). Once the cointegration is detected in the bounds test, Equation (2) is regressed again to select an optimal lag order and to estimate the short-run and the long-run coefficient of variables including that of the ECT.

4. Result and discussion

As mentioned in Section 3, the ARDL bounds test is carried out in two stages.[14] At first, this paper carries out the F-test from two lags to twelve to examine the joint significance of the linear combination of lagged level variables in Equation (2). The result reported in Table A.1 in Appendix indicates that the F-statistics are likely to be significant with fewer lag lengths as observed in the case of the UK (Bahmani-Oskooee *et al.* 2006) and the US (Bahmani-Oskooee and Brooks 1999).[15] Thirteen cases including the World support for cointegrating relationship and three cases – Australia, Hong Kong and Thailand – do not.[16] In the second stage, this paper regresses Equation (2) again to estimate both long-run and short-run coefficients by imposing maximum 12 lags on each first differenced variable. Akaike information criterion (AIC) is employed to select the

[14] The prerequisite for using the ARDL approach is that the variables in the model should not follow an I(2) process. This paper employs the augmented Dickey-Fuller test based on Akaike Information Criterion (AIC) to check the order of integration of the variables. None of them follows an I(2) process.

[15] Pesaran *et al*. (2001) calculate the asymptotic critical values based on a large sample period. Narayan (2005) calculates critical values applicable to a model whose small sample period varies from 30 to 80. As the sample period of this paper is 84, the lower (upper) bound critical value at the 5% significance applicable to this paper from Narayan's model is 2.688 (3.698). These critical values are not significantly different from those of Pesaran *et al.* (*ibid.*).

[16] Indeed, Thailand is the only country that fails to reject the null hypothesis at the 5% significance level. The F-statistics for Australia and Hong Kong fall between the lower and the upper bound and the decision is inconclusive.

optimum lag lengths.[17] Then diagnostic tests are applied to examine the adequacy of the model specification.

Table 2: Short-run coefficient estimates of real exchange rates based on Akaike information criterion

	World	*Australia*	*China*	*Germany*	*Hong Kong*	*India*	*Indonesia*	*Japan*
ARDL model	(11,12,0,1)	(10,12,9,12)	(4,0,6,3)	(12,12,12,12)	(9,12,12,3)	(12,12,11,11)	(12,11,10,11)	(12,10,12,11)
ΔLogRER	0.002 (0.365)	-0.013 (-0.584)	-0.002# (-0.394)	-0.027** (-2.150)	-0.010 (-0.542)	-0.004 (-0.620)	-0.001 (-0.208)	-0.004 (-1.294)
ΔLogRER$_{t-1}$	-0.005 (-0.923)	-0.008 (-0.278)		0.012 (0.810)	0.064*** (3.473)	-0.005 (-0.795)	0.003 (0.688)	-0.004 (1.105)
ΔLogRER$_{t-2}$	-0.001 (-0.287)	-0.073** (-2.584)		0.038** (2.536)	0.015 (0.890)	0.006 (1.034)	0.012*** (2.909)	0.009*** (3.255)
ΔLogRER$_{t-3}$	0.005 (0.939)	0.134*** (4.520)		0.000 (-0.022)	0.074*** (4.661)	0.007 (1.291)	0.008* (1.971)	0.001 (0.314)
ΔLogRER$_{t-4}$	0.006 (1.567)	-0.006 (-0.191)		0.016 (1.114)	0.000 (-0.015)	-0.010* (-1.757)	0.005 (1.553)	0.006** (2.534)
ΔLogRER$_{t-5}$	0.0001 (0.034)	0.057* (1.904)		0.021 (1.642)	0.025 (1.639)	0.010* (1.721)	-0.008** (-2.234)	-0.007*** (-3.265)
ΔLogRER$_{t-6}$	0.002 (0.673)	-0.093*** (-2.984)		0.034** (2.519)	-0.020 (-1.452)	0.002 (0.289)	-0.005 (-1.508)	0.011*** (4.245)
ΔLogRER$_{t-7}$	0.015*** (4.086)	0.045 (1.441)		0.020 (1.660)	-0.025 (-1.719) *	-0.006 (-0.922)	-0.005 (-1.468)	-0.006*** (-2.146)
ΔLogRER$_{t-8}$	0.002 (0.344)	0.008 (0.280)		-0.009 (-0.787)	0.006 (0.467)	0.004 (0.651)	-0.008** (-2.568)	0.002 (0.608)

[17] Schwarz criterion (SB) is commonly used to select the optimal lag length in the ARDL approach at the aggregate level (Duasa 2007, Kyophilavong et al. 2013, Le et al. 2018, Narayan 2005), whereas AIC is often adopted in the bilateral ARDL model (Bahmani-Oskooee et al. 2006, Bahmani-Oskooee and Harvey 2009, Bahmani-Oskooee and Ratha 2004). This paper adopts SC first, but the optimal lag length chosen in most cases is too short to analyse the shock of the real bilateral exchange rate on the trade balance. In contrast, the optimal lag lengths obtained using AIC are long enough to capture the influence of the real bilateral exchange rates over the trade balance. The maximum lag is set as twelve for the same reason.

Table 2 Cont.

	World	*Australia*	*China*	*Germany*	*Hong Kong*	*India*	*Indonesia*	*Japan*
$\Delta LogRER_{t-9}$	0.006 (1.598)	0.058** (2.189)		-0.011 (-910)	-0.009 (-0.628)	0.027*** (4.032)	-0.008*** (-2.863)	-0.007*** (-3.249)
$\Delta LogRER_{t-10}$	0.007 (1.882)	-0.050* (-1.792)		0.017 (1.189)	0.027* (1.952)	-0.024*** (-3.318)	0.005* (2.010)	
$\Delta LogRER_{t-11}$	0.008** (2.244)	0.091*** (3.274)		0.056*** (3.474)	0.036** (2.475)	0.016** (2.542)		
EC_{t-1}	-0.741*** (-7.654)	-0.281*** (-4.613)	-0.589** (-3.846)	-1.772*** (-5.695)	0.083*** (6.183)	-0.408*** (-4.416)	-0.206** (-4.180)	-3.431*** (-5.923)
Adj R^2	0.886	0.683	0.447	0.808	0.739	0.774	0.726	0.800
	Korea	*Malaysia*	*Netherlands*	*Singapore*	*Taiwan*	*Thailand*	*UK*	*US*
ARDL model	(12,12,12,9)	(11,9,12,10)	(12,9,6,9)	(3,1,11,1)	(8,10,11,12)	(11,12,8,2)	(1,10,12,5)	(1,5,0,0)
$\Delta LogRER$	-0.0004 (-0.497)	-0.017 (-0.948)	-0.056* (-1.858)	0.003# (0.641)	0.001 (0.598)	0.005 (1.461)	-0.051 (-1.633)	0.065 (0.702)
$\Delta LogRER_{t-1}$	0.0005 (0.475)	-0.032* (-2.034)	-0.054 (-1.642)		-0.0002 (-0.155)	0.005 (1.210)	-0.132*** (-3.526)	0.029 (0.328)
$\Delta LogRER_{t-2}$	0.003*** (3.133)	-0.037** (-2.402)	-0.077** (-2.416)		0.004*** (3.194)	-0.007* (-2.021)	-0.188*** (-4.786)	-0.232*** (-2.661)
$\Delta LogRER_{t-3}$	0.003*** (2.585)	0.020 (1.490)	0.055* (1.737)		0.004 (2.700) **	0.006** (2.090)	-0.069* (-1.867)	-0.016 (-0.176)
$\Delta LogRER_{t-4}$	0.001 (1.091)	0.031** (2.493)	-0.052 (-1.604)		0.000 (-0.044)	0.013*** (4.522)	-0.124*** (-3.382)	-0.221** (-2.496)
$\Delta LogRER_{t-5}$	0.002* (1.831)	0.016 (1.926)	0.070** (2.327)		0.001 (0.593)	0.011*** (3.799)	0.012 (0.336)	
$\Delta LogRER_{t-6}$	0.001 (1.596)	-0.008 (-0.952)	-0.071** (-2.447)		0.003** (2.648)	-0.003 (-1.362)	-0.070** (02.176)	
$\Delta LogRER_{t-7}$	0.001 (1.335)	-0.004 (-0.381)	0.080*** (2.947)		0.002* (1.747)	0.009*** (4.096)	-0.043 (-1.311)	
$\Delta LogRER_{t-8}$	-0.001* (-1.860)	0.015 (1.495)	-0.077*** (-2.885)		-0.001 (-1.030)	0.008*** (3.495)	-0.073** (-2.365)	
$\Delta LogRER_{t-9}$	0.0002 (0.223)				0.004*** (3.919)	-0.004** (-2.102)	-0.100*** (-2.910)	
$\Delta LogRER_{t-10}$	-0.002** (-2.446)					0.003 (1.623)		
$\Delta LogRER_{t-11}$	-0.002** (-2.569)					0.007*** (3.707)		
EC_{t-1}	-2.066*** (-5.178)	-1.187*** (-5.087)	-0.220*** (-4.811)	-0.964*** (-5.873)	-0.131*** (-4.823)	-0.552*** (-4.105)	-1.102*** (-8.717)	-0.787*** (-7.241)
Adj R^2	0.734	0.570	0.702	0.518	0.809	0.572	0.710	0.424

Notes: Numbers in the parentheses are t-statistics. *, ** and *** indicates the 10%, 5% and 1% significance level. # indicates that the coefficient of the variable, Z, should be interpreted as $Z = Z_{-1} + \Delta Z$.

Table 3: Short-run coefficient estimates of domestic income based on Akaike information criterion

	World	*Australia*	*China*	*Germany*	*Hong Kong*	*India*	*Indonesia*	*Japan*
ARDL model	(11,12,0,1)	(10,12,9,12)	(4,0,6,3)	(12,12,12,12)	(9,12,12,3)	(12,12,11,11)	(12,11,10,11)	(12,10,12,11)
$\Delta LogY_{vn}$	n.a.	0.266** (2.060)	-0.004 (-0.189)	-0.094 (-1.646)	0.088** (2.510)	0.051** (2.757)	0.077*** (4.189)	-0.069*** (-6.492)
$\Delta LogY_{vnt-1}$		0.060 (0.450)	0.034 (1.433)	-0.021 (-0.321)	-0.042 (-1.092)	-0.037 (-1.503)	-0.012 (-0.545)	0.011 (0.867)
$\Delta LogY_{vnt-2}$		-0.119 (-0.887)	-0.002 (-0.086)	0.025 (0.391)	0.146*** (3.471)	0.089*** (3.438)	0.072*** (3.306)	-0.053*** (-4.052)
$\Delta LogY_{vnt-3}$		-0.099 (-0.655)	0.044* (1.942)	-0.049 (-0.809)	-0.119*** (-3.226)	0.018 (0.750)	-0.043* (-1.957)	-0.024 (-1.548)
$\Delta LogY_{vnt-4}$		-0.217 (-1.514)	-0.006 (-0.264)	0.070 (1.150)	0.155*** (4.447)	0.009 (0.424)	0.017 (0.874)	-0.023* (-1.817)
$\Delta LogY_{vnt-5}$		-0.034 (-0.221)	0.037* (1.774)	0.152** (2.376)	-0.103 (-2.505)	0.050** (2.602)	0.065*** (3.427)	-0.041*** (-2.867)
$\Delta LogY_{vnt-6}$		-0.205 (-1.424)		-0.075 (-1.206)	0.058 (1.394)	-0.015 (-0.637)	-0.065*** (-2.898)	-0.030** (-2.161)
$\Delta LogY_{vnt-7}$		-0.059 (-0.458)		0.193*** (3.323)	0.059 (1.492)	0.040 (1.677)	0.095*** (4.069)	-0.058*** (-4.188)
$\Delta LogY_{vnt-8}$		0.244* (2.039)		0.045 (0.781)	-0.016 (-0.430)	-0.040 (-1.501)	-0.054** (-2.495)	-0.050*** (-3.144)
$\Delta LogY_{vnt-9}$				0.109* (1.752)	0.219*** (6.441)	0.018 (0.850)	0.091*** (4.250)	0.003 (0.228)
$\Delta LogY_{vnt-10}$				0.056 (1.024)	-0.145*** (-3.788)	0.020 (1.101)		-0.040*** (-3.530)
$\Delta LogY_{vnt-11}$				0.191*** (3.417)	0.114*** (3.325)			-0.015 (-1.448)

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Table 3: Contd.

	Korea	*Malaysia*	*Netherlands*	*Singapore*	*Taiwan*	*Thailand*	*UK*	*US*
ARDL model	(12,12,12,9)	(11,9,12,10)	(12,9,6,9)	(3,1,11,1)	(8,10,11,12)	(11,12,8,2)	(1,10,12,5)	(1,5,0,0)
$\Delta LogY_{vn}$	-0.002 (-0.536)	-0.004 (-0.134)	-0.208* (-1.752)	0.004 (0.478)	0.007*** (2.058)	-0.009 (-1.307)	-0.186 (-1.493)	n.a.
$\Delta LogY_{vnt-1}$	-0.001 (-0.260)	0.038 (1.106)	-0.374*** (-2.934)	0.002 (0.177)	0.000 (-0.046)	-0.010 (-1.184)	-0.140 (-1.004)	
$\Delta LogY_{vnt-2}$	0.007 (1.674)	0.003 (0.101)	0.128 (0.919)	-0.012 (-1.189)	0.003 (0.864)	-0.001 (-0.122)	-0.403*** (-2.868)	
$\Delta LogY_{vnt-3}$	-0.002 (-0.498)	-0.067** (-2.097)	-0.585*** (-4.035)	-0.010 (-0.937)	0.002 (0.437)	0.000 (0.010)	-0.075 (-0.500)	
$\Delta LogY_{vnt-4}$	0.002 (0.491)	0.094*** (3.101)	0.222* (1.715)	-0.012 (-1.152)	0.010*** (2.819)	-0.005 (-0.636)	-0.320** (-2.249)	
$\Delta LogY_{vnt-5}$	0.015*** (3.227)	-0.092*** (-2.999)	-0.552*** (-4.533)	-0.005 (-0.468)	-0.004 (-1.177)	-0.012 (-1.523)	-0.008 (-0.055)	
$\Delta LogY_{vnt-6}$	0.013** (2.233)	0.051* (1.716)		-0.016 (-1.609)	0.004 (1.119)	-0.015* (-2.012)	-0.053 (-0.384)	
$\Delta LogY_{vnt-7}$	0.008 (1.615)	-0.007 (-0.235)		-0.026** (-2.642)	0.003 (0.904)	0.013** (2.110)	0.169 (1.220)	
$\Delta LogY_{vnt-8}$	0.013*** (2.088)	0.021 (0.692)		0.007 (0.663)	-0.006 (-1.695)		0.261* (1.874)	
$\Delta LogY_{vnt-9}$	0.022*** (3.550)	0.044 (1.475)		-0.012 (-1.174)	0.006* (1.773)		0.081 (0.568)	
$\Delta LogY_{vnt-10}$	0.007 (1.366)	-0.036 (-1.312)		-0.026*** (-2.978)	-0.010*** (-3.138)		0.267** (2.107)	
$\Delta LogY_{vnt-11}$	0.013*** (2.828)	0.083*** (3.080)					0.164 (1.294)	

Notes: Numbers in the parentheses are t-statistics. *, ** and *** indicates the 10%, 5% and 1% significance level. # indicates that the coefficient of the variable, Z, should be interpreted as $Z = Z_{-1} + \Delta Z$.

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Table 4: Short-run coefficient estimates of the income of 'Country i' based on Akaike information criterion

	World	*Australia*	*China*	*Germany*	*Hong Kong*	*India*	*Indonesia*	*Japan*
ARDL model	(11,12,0,1)	(10,12,9,12)	(4,0,6,3)	(12,12,12,12)	(9,12,12,3)	(12,12,11,11)	(12,11,10,11)	(12,10,12,11)
$\Delta LogY_{i}$	19.961***,# (7.509)	-0.415 (-1.698)	0.001 (0.052)	0.097 (0.750)	-0.026 (-0.928)	0.033* (1.757)	-0.045** (-2.675)	0.070*** (3.942)
$\Delta LogY_{it-1}$		0.462* (1.753)	-0.031 (-1.116)	-0.178 (-1.310)	-0.002 (-0.071)	-0.037 (-1.701)	-0.050*** (-3.001)	-0.033 (-1.325)
$\Delta LogY_{it-2}$		-0.812*** (-2.999)	-0.053* (-1.864)	-0.220* (-1.747)	-0.089*** (-2.937)	0.012 (0.546)	-0.011 (-0.619)	0.101*** (4.192)
$\Delta LogY_{it-3}$		0.509* (1.879)		-0.038 (-0.275)		0.058** (2.712)	0.012 (0.697)	-0.026 (-1.008)
$\Delta LogY_{it-4}$		0.341 (1.179)		0.164 (1.158)		-0.053** (-2.162)	0.020 (1.163)	0.120*** (4.896)
$\Delta LogY_{it-5}$		0.057 (0.199)		-0.223 (-1.523)		-0.011 (-0.430)	0.007 (0.413)	0.010 (0.347)
$\Delta LogY_{it-6}$		0.686** (2.402)		0.028 (0.183)		0.012 (0.419)	-0.001 (-0.062)	0.064** (2.727)
$\Delta LogY_{it-7}$		-0.199 (-0.671)		-0.417** (-2.686)		-0.082*** (-3.334)	0.007 (0.399)	0.067** (2.448)
$\Delta LogY_{it-8}$		-0.204 (-0.688)		-0.433*** (-3.009)		-0.076*** (-2.850)	0.017 (0.972)	0.052** (2.335)
$\Delta LogY_{it-9}$		-0.560* (-1.915)		0.078 (0.491)		0.027 (1.020)	-0.025 (-1.294)	0.011 (0.546)
$\Delta LogY_{it-10}$		0.057 (0.207)		0.106 (0.678)		-0.094*** (-4.325)	-0.103*** (-5.804)	0.040* (2.059)
$\Delta LogY_{it-11}$		0.690*** (3.224)		-0.585*** (-4.073)				

	Korea	*Malaysia*	*Netherlands*	*Singapore*	*Taiwan*	*Thailand*	*UK*	*US*
ARDL model	(12,12,12,9)	(11,9,12,10)	(12,9,6,9)	(3,1,11,1)	(8,10,11,12)	(11,12,8,2)	(1,10,12,5)	(1,5,0,0)
$\Delta LogY_{i}$	-0.009 (-1.231)	-0.069*** (-3.213)	0.765*** (3.587)	0.012*,# (1.775)	-0.001 (-0.449)	0.001 (0.156)	-0.297 (-0.816)	n.a.
$\Delta LogY_{it-1}$	-0.002 (-0.228)	0.042** (2.154)	-0.428* (-1.949)		0.000 (-0.009)	0.012 (1.279)	0.487 (1.572)	
$\Delta LogY_{it-2}$	-0.021*** (-2.348)	0.049** (2.117)	0.212 (0.967)		-0.003 (-0.899)		0.001 (0.003)	
$\Delta LogY_{it-3}$	0.033*** (3.497)	-0.024 (-0.988)	-0.217 (-1.033)		0.001 (0.163)		0.164 (0.552)	

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	Korea	*Malaysia*	*Netherlands*	*Singapore*	*Taiwan*	*Thailand*	*UK*	*US*
$\Delta LogY_{it-4}$	-0.002 (-0.216)	-0.083*** (-3.054)	0.048 (0.223)		-0.003 (-0.984)		0.975*** (2.968)	
$\Delta LogY_{it-5}$	-0.004 (-0.536)	0.045* (1.757)	0.372 (1.667)		-0.008** (-2.324)			
$\Delta LogY_{it-6}$	-0.012 (-1.696)	0.048* (1.853)	-0.309 (-1.435)		0.005 (1.299)			
$\Delta LogY_{it-7}$	0.016*** (2.288)	-0.055** (-2.171)	0.234 (1.038)		0.001 (0.392)			
$\Delta LogY_{it-8}$	0.007 (1.076)	-0.080*** (-3.153)	-0.590** (-2.695)		-0.005 (-1.415)			
$\Delta LogY_{it-9}$		0.067*** (3.241)			0.004 (1.260)			
$\Delta LogY_{it-10}$					-0.001 (-0.332)			
$\Delta LogY_{it-11}$					0.005 (1.604)			

Notes: Numbers in the parentheses are t-statistics. *, ** and *** indicates the 10%, 5% and 1% significance level. # indicates that the coefficient of the variable, Z, should be interpreted as $Z = Z_{-1} + \Delta Z$.

4.1. Short-run dynamics of the trade balance: The J-curve effect and the impact of income changes

The short-run coefficients of $\Delta LogRER_i$, $\Delta LogY_{vn}$ and $\Delta LogY_i$ are reported in Table 2, Table 2 and Table 4. Several points are remarkable. Firstly, in contrast to the existing Vietnam studies, there is no clear evidence supporting for the typical J-curve effect both at the aggregate and at the bilateral level. This, however, does not mean that the trade balance of Vietnam is insensitive to the real depreciation in the short run as shown in Table 2. Instead, every single bilateral trade balance demonstrates significant responses to the real depreciation, producing various shapes such as M, N and W other than a J-shape as Magee (1973, p. 322) explained. A W-shape is observed at the aggregate level (the World) and in the case of Malaysia, the Netherlands and the UK. An N-shape is observed in the cases of Australia, Germany, Hong Kong, Indonesia, Japan, Taiwan and the US and an inversed V-shape is found in the case of Korea.

Secondly, the bilateral analysis reveals that the real depreciation leads to diversified impacts on the bilateral trade balance. This individual variation is not observable in aggregate level analyses that are criticised for having intrinsic bias (Bahmani-Oskooee and Brooks 1999, Marwah and Klein 1996, Rose and Yellen 1989). This paper observes that there are swings between a negative and a positive impact along the lag lengths in general with some exceptions. Positive impacts are dominant in the case of Germany, Hong Kong and Taiwan whereas negative impacts are dominant in the case of the US and the UK. One may conjecture that the real depreciation probably has a positive impact on the bilateral trade balance with a country which Vietnam records a trade surplus, but this is not supported. For example, both the UK and the US are countries which Vietnam records trade surplus whereas Taiwan is a country which Vietnam records trade deficits. There are no referable bilateral Vietnam studies to validate this result, but analyses of other economies support that it is common to fail to detect a discernible pattern (Arora *et al.* 2003, Bahmani-Oskooee and Goswami 2003, Bahmani-Oskooee and Kantipong 2001).

Thirdly, a change in the income of Vietnam influences its bilateral trade balance with fourteen countries as shown in Table 3.[18] This paper assumes that an increase in the Vietnamese income would deteriorate the bilateral trade balance. Both positive and negative impacts are observed in all cases except in the case of China.[19] Purely negative impacts are observed in the case of Japan, the Netherlands and Singapore whereas solely positive impacts in the case of Australia, Germany, India and Korea. This suggests that the growth of income in Vietnam does not induce a rise in domestic absorption against the former group and vice versa. It partly is because Vietnam imports final *consumption goods* more from the former group than from the latter group. It also is possible that there has been a switch of importable goods from the latter group to domestically produced goods.

Lastly, a change in the income of trading partners also influences the bilateral trade balance in fourteen cases in the short run as shown in Table 4.[20] A negative and a positive impact alternates in all cases except the case of Hong Kong and Singapore. This paper assumes that an increase in foreign income would improve the bilateral trade balance. The case of the World, Japan, Singapore and the UK support this assumption. Meanwhile solely negative impacts are observed in the case China, Germany, Hong Kong, Indonesia and Taiwan, suggesting that the income increase in these countries does not raise the consumption of Vietnamese goods. A reasonable explanation is that foreigners are likely to switch to other products considered as having better quality when they have higher income because the Vietnamese goods are probably perceived as inferior goods in the world market. For example, Vietnam is the second largest country exporting coffee beans but the breed it exports is Robusta (inferior taste) priced lower than Arabica (superior taste). A richer foreign market is likely to consume more Arabica than Robusta.

4.2. Long-run dynamics of the bilateral trade balance

The estimates of long-run dynamics are presented in Table 5. At the aggregate level, all three factors show significant impact upon the trade balance. The signs of coefficients, however, contradicts the expectation of this paper. The real depreciation of the VND and the increase in foreign income deteriorate the trade balance at the 1% significance level whereas the increase in domestic income improves the trade balance at the 10% significance level. The result is not entirely extraordinary. Phan and Jeong (2015) observe a negative sign for the coefficient of the real

[18] Due to the chosen lag lengths of the ARDL model, the influence over the bilateral trade balance with the US and the aggregate level trade balance are not available.
[19] If we apply the 10% significance level, the Chinese case is also significant.
[20] No significant coefficient is observed in the bilateral trade balance with Thailand. The coefficient for the US is not available due to the chosen lag lengths of the ARDL model.

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depreciation and Le *et al.* (2018) report a negative sign for both domestic and foreign income at the aggregate level.

Table 5: Long-run coefficient estimates of the bilateral trade balance model

Country i	$LogRER_j$	$LogY_{vn}$	$LogY_j$	*Constant*
World	-0.011*** (-3.066)	0.009* (1.795)	-2.196 ** (-2.407)	10.103 *** (2.870)
Australia	-0.023 (-0.190)	0.256 (1.418)	-0.605 (-1.616)	36.853 * (2.023)
China	-0.003 (-0.389)	-0.042*** (-3.351)	0.029 *** (3.202)	2.068 * (1.951)
Germany	-0.021*** (-5.163)	-0.014 (-1.450)	0.048 (0.767)	0.066 (0.012)
Hong Kong	0.381 (0.573)	0.119 (1.524)	0.388 (0.677)	-88.352 (-0.538)
India	-0.029 (-1.007)	-0.049 (-0.355)	0.073 (0.413)	0.724 (0.397)
Indonesia	0.031 (0.545)	-0.069 (-0.684)	0.085 (0.710)	-4.085 (-0.514)
Japan	-0.005*** (-7.593)	-0.003*** (-4.853)	-0.002 (-0.768)	2.136 *** (5.881)
Korea	-0.002*** (-10.624)	0.001 (1.207)	-0.0004 (-0.308)	0.434 *** (10.278)
Malaysia	-0.011* (-1.878)	0.023* (1.959)	-0.032 ** (-2.165)	2.702 *** (3.544)
Netherlands	0.019 (0.1111)	0.152 (0.631)	-0.242 (-0.624)	21.074 (1.331)
Singapore	-0.003 (-1.205)	0.005*** (2.905)	-0.005 * (-1.783)	0.851 *** (2.990)
Taiwan	-0.022 (-0.772)	-0.015 (-0.582)	0.011 (0.295)	2.839 (1.333)
Thailand	-0.010* (-1.790)	0.010* (1.828)	-0.015 * (-1.877)	1.948 *** (4.175)
UK	0.143*** (3.898)	0.164*** (3.844)	-0.295 *** (-3.001)	2.447 (0.844)
US	0.108*** (3.499)	0.032 (0.727)	0.073 (0.592)	-17.294 ** (-2.605)

Table 6: Vietnam's imports by commodity group (%)

Year	*Capital goods*	*Machinery, instrument, accessory*	*Fuels, raw material*	*Consumer goods*	*Food*	*Foodstuffs*	*Pharmaceutical and medicinal products*	*Others*
1996	87.6	27.6	60	12.4	..	2.9	1.9	7.6
1997	89.9	30.3	59.6	10.1	..	2.1	3.1	5
1998	91.5	30.6	61	8.5	..	2.4	2.8	3.2
1999	91.6	29.9	61.7	8.4	..	2.5	2.3	3.6
2000	93.8	30.6	63.2	6.2	0	1.9	2.2	2.1
2001	92.1	30.5	61.6	7.9	..	3	2	3
2002	92.1	29.8	62.3	7.9	0	2.5	1.8	3.6
2003	92.2	31.6	60.6	7.8	0	2.4	1.6	3.8
2004	93.3	28.8	64.5	6.7	0	2.4	1.4	2.9
2005	89.6	25.3	64.4	8.2	0	3	1.4	3.7
2006	88	24.6	63.4	7.8	0	2.8	1.3	3.7
2007	90.5	28.6	61.9	7.4	0	2.5	1.2	3.7
2008	88.8	28	60.8	7.8	0	2.8	1.1	3.9
2009	90.2	31.6	58.6	9.3	0.1	3	1.7	4.5
2010	89	29.6	59.4	9.9	0	3.3	1.6	5
2011	88.6	29.6	59	9.5	0	3.5	1.5	4.5
2012	90.9	35.1	55.8	9	0	3.3	1.6	4.1
2013	90.8	38.2	52.6	9.1	0	3.5	1.5	4.1
2014	91.1	38.1	53	8.8	0	3.7	1.4	3.7
2015	91.1	43.2	47.9	8.8	0	3.8	1.4	3.6
2016	91.1	41.4	49.7	8.9	..	..	1.5	..

Note: The figures of 2016 are estimated in the original source; empty cells' data are not available in the original source.

Source: General Statistics Office of Vietnam, Statistical Year Book (accessible at http://gso.gov.vn)

It is remarkable that the size of the real exchange rate elasticity is much smaller than that of the foreign income elasticity. A one percent increase in foreign income deteriorates the trade balance by 2.2% while a one percent change in the real exchange rate worsens the trade balance by 0.01%.[21] This implies that the trade balance of Vietnam is more sensitive to other factors than the

[21] The size of the real exchange rate elasticity in this paper is much lower than existing two studies cited earlier in Section 2.

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real exchange rate as this paper assumes. The non-existence of the J-curve effect in Vietnam complement this idea. These observations suggest that the weak currency policy of the Vietnamese authority is not a sustainable policy option implementable if the policy target is to stabilise to the trade balance. The real depreciation of the VND barely affects the trade balance and the impact is negative if any.

An income increase in Vietnam slightly improves the trade balance, suggesting that the higher income of Vietnam is unlikely to induce imports of consumption goods at the aggregate level.[22] The trade data of Vietnam support this opinion. Table 6 shows that the share of consumption goods in gross imports moves quite stably over time. It moves stably around 9% even during the time Vietnam recorded trade surpluses in 2014 and 2015. The size of induced absorption is not so large to cause a negative impact on the trade balance.

At the bilateral level, the real depreciation of the VND causes a positive impact on the trade balance with the UK and the US while it does a negative impact with Germany, Japan and Korea in the long run. If we put aside Germany, Vietnam records trade surplus with the former group and trade deficit with the latter group. We cannot draw a generalised conclusion from this observation, but at least, it is difficult to deny that the real depreciation is likely to strengthen the contemporary status of trade balance. The size of a trade surplus (deficit) with a trade surplus (deficit) recording country increases following the real depreciation. This conclusion is extendable to the case of the aggregate level analysis in which Vietnam records trade deficits and the corresponding coefficient is negative. It sounds like an oxymoron but recording a trade surplus is required prior to implement the weak currency policy if the target is to improve the trade balance.

Regarding the impact of a change in domestic income on the trade balance, this paper expects a negative effect. A negative response is observed in the case of China and Japan whereas a positive response in the case of Singapore and the UK in the long run. Higher income of Vietnam induces more import of consumption goods from China and Japan but not from Singapore and the UK. Vietnam records a trade surplus only with the UK and a trade deficit with the other three countries. Japan has the same sign to the case of short-run response whereas Singapore and the UK record the opposite sign. Thailand does not show a significant response in the short-run. No discernible pattern is detected.

Finally, this paper expects a positive impact of increased foreign income on the trade balance in the long run. An increase in the income of China causes a positive impact on the bilateral trade balance and an increase in the income of Malaysia, Thailand and the UK causes a negative impact. This paper explains the short-run pattern applying the concept of inferior goods to the commodities Vietnam exports. An immediate extension is possible. The fact that the income per capita of China is lower than that of the other three countries supports this explanation.

4.3. Diagnostic tests

The validity of the ECT (EC_{t-1}) is important because the term reflects the existence of cointegration, the convergence to the long-run equilibrium and the adjustment speed to the

[22] As Figure A: 1 in Appendix demonstrates the movement of two series, output (Y) and absorption (A) move highly closely. The correlation coefficient is 0.993. The gap between these two series in each period indicates the growth rate of the trade balance of Vietnam.

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equilibrium. A negative sign and the significance of the ECT indicates that variables are cointegrated (Pesaran et al. 2001). As the second row from the bottom of Table 2 shows, a negative and significant coefficient is obtained in all countries but Hong Kong. This confirms the result from the bounds test (see Table A.1).[23] The size of the coefficient of the ECT varies from as low as 0.13% (Taiwan) to as high as 3.43% (Japan). The different adjustment speed among the bilateral models does not show a discernible pattern. A relatively fast adjustment is observed in Germany, Japan, Korea and Malaysia, and the UK. They are a mix of regional and off-regional countries, of developing and developed countries and of trade surplus recording and trade deficit recording countries.

Various diagnostic tests are carried to confirm the adequacy of the specification of the model. The last row of Table 2 reports the adjusted R-squared which varies from 0.424 (the case of the US) to 0.809 (the case of Taiwan). At the aggregate level, the adjusted R-squared is 0.886. In addition, Ramsey RESET, CUSUM, CUSUM square ($CUSUM^{SQ}$) and residual diagnostic tests are carried out. The results are summarised in Table 7. None of the bilateral models fails all the diagnostic tests at the same time. The aggregate level model passes all the tests. The Ramsey RESET test for testing functional misspecification indicates that six cases (Australia, India, the Netherlands, Taiwan, the UK and the US) fail to pass. Residual diagnostics include three tests – normality, no serial correlation and homoscedasticity. Three cases – China, Malaysia and the US – show non-normality, two cases – Japan and Thailand – show serial correlation and one case (the US) shows heteroscedasticity. This implies that there is no significant problem in the model specification. This paper also tests the stability of the models by conducting CUSUM and $CUSUM^{SQ}$ tests. Four cases – China, India, Korea and the US – fail to pass either one of tests or both. Due to the space limitation, only the case of Taiwan is reported in Figure 2.[24]

[23] In the case of Hong Kong, if the maximum lag is set six or eight, the lag lengths of the chosen ARDL model is (2,4,6,6) and the derived coefficient is -0.389 whose t-value is -5.083.
[24] The graphs of the CUSUM and $CUSUM^{SQ}$ test for other cases are available upon request.

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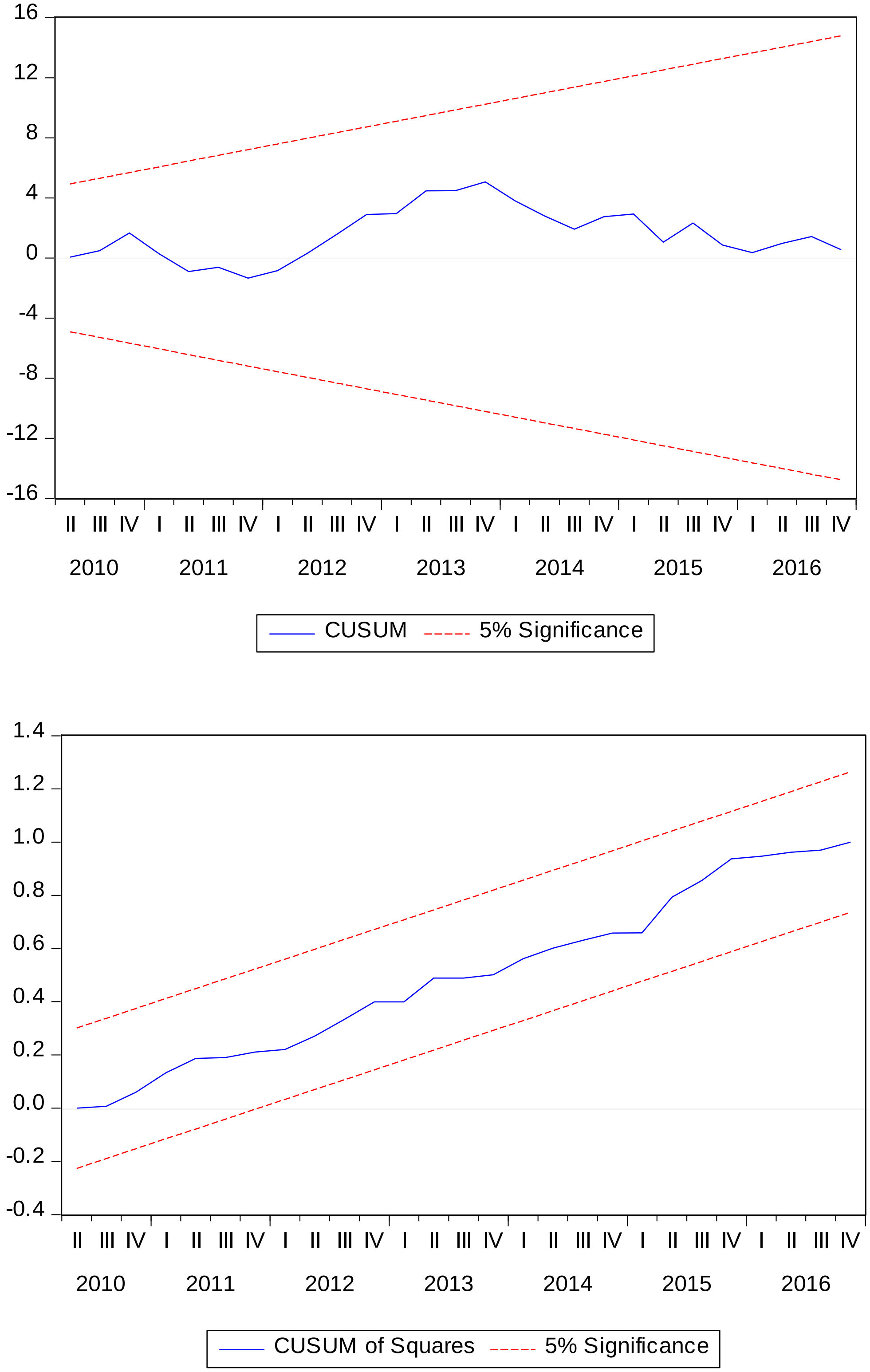

Figure 2: Plot of CUSUM and CUSUM^{SQ} (the case of Taiwan)

Table 7: Diagnostic test results

	Model specification / stability diagnostics				*Residual diagnostics*					
	Ramsey RESET		*CUSUM*	*CUSUM^{SQ}*	*Normality*	*Autocorrelation*		*Heteroscedasticity*		
	F-statistics	p-value			p-value	F-statistics	p-value	F-statistics	p-value	
World	F(1,42)= 0.075	0.786	stable	stable	0.883	F(4,39)= 1.121	0.361	F(28,43)=0. 562	0.945	
Australia	F(1,24)= 12.78	0.002	stable	stable	0.575	F(4,21)= 2.447	0.078	F(46,25)=1. 040	0.470	
China	F(1,60)= 0.047	0.829	unstable	unstable	0	F(4,57)= 1.015	0.407	F(16,61)=1. 301	0.226	
Germany	F(1,18)= 0.365	0.553	stable	stable	0.556	F(4,15)= 2.992	0.053	F(52,19)=1. 584	0.136	
Hong Kong	F(1,31)= 0.215	0.646	stable	stable	0.383	F(4,28)= 0.791	0.541	F(39,32)=1. 616	0.083	
India	F(1,21)= 21.84	0.000	stable	unstable	0.786	F(4,18)= 0.804	0.538	F(49,22)=1. 500	0.151	
Indonesia	F(1,23)= 0.447	0.510	stable	stable	0.406	F(4,20)= 0.690	0.608	F(47,24)=1. 286	0.256	
Japan	F(1,22)= 0.004	0.950	stable	stable	0.350	F(4,19)= 4.141	0.014	F(48,23)=0. 594	0.936	
Korea	F(1,22)= 3.432	0.077	unstable	stable	0.856	F(4,19)= 1.340	0.292	F(48,23)=0. 884	0.650	
Malaysia	F(1,25)= 1.281	0.269	stable	stable	0	F(4,22)= 0.658	0.627	F(45,26)=0. 429	0.994	
Netherland s	F(1,31)= 8.291	0.007	stable	stable	0.710	F(4,28)= 1.286	0.299	F(39,32)=1. 627	0.080	
Singapore	F(1,52)= 0.452	0.504	stable	stable	0.340	F(4,49)= 1.922	0.122	F(19,53)=0. 699	0.802	
Taiwan	F(1,26)= 7.282	0.012	stable	stable	0.587	F(4,23)= 1.042	0.407	F(44,27)=0. 576	0.949	
Thailand	F(1,34)= 1.867	0.181	stable	stable	0.182	F(4,31)= 5.259	0.002	F(36,35)=0. 611	0.927	
UK	F(1.38)= 7.596	0.009	stable	stable	0.186	F(4,35)= 0.691	0.603	F(32,39)=0. 502	0.976	
US	F(1,68)= 3.423	0.001	stable	unstable	0	F(4,65)= 0.349	0.844	F(9,69)=2.4 41	0.018	

Notes: In residual diagnostics, the Jarque-Bera method is used for normality, the Breusch-Godfrey LM Test for autocorrelation and the Breusch-Pagan-Godfrey Test for heteroscedasticity.

5. Conclusion

This paper casts doubt on the validity of the weak currency policy of Vietnam as an option for stabilising its trade balance based on the observation that the trade balance demonstrates contradictory moves against the real depreciation of the VND. This paper hypothesises that the trade balance of Vietnam is irresponsive to the real depreciation but responsive to other factors such as foreign income and domestic income. This paper employs the ECT incorporated bilateral ARDL model to test the hypothesis and draws a conclusion that the weak currency is not a sustainable option for Vietnam. Notable findings are as follows.

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Firstly, regarding the impact of the real depreciation of the VND on the trade balance, the J-curve effect is not observed in Vietnam both at the bilateral and at the aggregate level in the short run. In the long run, the real depreciation deteriorates the trade balance at the aggregate level, but it strengthens the contemporary trade surpluses (or deficits) at the bilateral level. In addition, the trade balance is considerably real exchange rate inelastic. These observations imply that the trade balance is not sensitive to the real depreciation of the VND and will be negatively influenced if any.

Secondly, regarding the impact of income changes, the trade balance is improved by the increase in domestic income and deteriorated by the increase in foreign income at the aggregate level in the long run. A mixed sign is observed across the trading partners at the bilateral level. The domestic income increase is unlikely to induce further imports of consumption goods to Vietnam or the growth of absorption is smaller than that of domestic income as the trade data supports. The domestic income elasticity of the trade balance is as small as the real exchange rate elasticity. On the other hand, the increase in trading partners' income showing the highest elasticity deteriorates the trade balance. A reasonable explanation for this contrast is that foreign consumers perceive the Vietnamese goods as inferior goods. Consequently, they are likely to substitute them as they earn more income. The bilateral result also supports this opinion.

It can be concluded that the weak currency policy is not a sustainable policy option for Vietnam to be implemented to improve its trade balance. Because its trade balance is not sensitive enough to stimulate the export of Vietnam. Rather, the significance of foreign income is stronger in the determination of the trade balance. Moreover, the bilateral result suggests that the real depreciation will possibly be effective only if Vietnam has recorded a contemporary trade surplus. Otherwise, it would aggravate the situation.

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Appendix

Table A: 1 F-statistics of the bounds test for bilateral trade balance model of Vietnam with its 15 trading partners

	Lag orders										
Trading partners	12	11	10	9	8	7	6	5	4	3	2
World	2.03	4.072	2.278	3.784	1.139	1.675	1.94	2.697	3.394	2.774	4.397
Australia	2.336	2.003	2.979	2.853	1.607	1.109	1.492	1.316	1.626	1.824	1.524
China	1.907	2.119	2.167	3.987	2.922	2.485	2.441	4.373	4.435	3.141	5.111
Germany	2.806	6.456	2.558	2.473	1.778	4.175	3.953	3.056	3.456	4.647	6.148
Hong Kong	1.233	2.702	2.819	2.376	2.67	2.445	2.323	3.035	2.401	2.332	1.448
India	3.219	3.014	5.526	3.133	2.371	2.935	2.817	2.02	1.215	1.096	1.469
Indonesia	1.06	0.37	0.831	1.818	0.933	5.806	4.605	4.611	3.691	2.38	2.156
Japan	5.412	4.33	6.625	1.383	1.946	1.383	1.89	3.514	3.903	3.021	4.191
Korea	3.668	4.458	2.232	4.725	3.078	2.224	1.031	1.167	1.065	2.303	2.857
Malaysia	5.042	2.977	2.559	3.192	1.989	1.913	2.179	1.661	2.16	1.455	1.752
Netherlands	2.202	2.445	3.962	2.192	3.019	3.371	5.529	5.092	5.187	4.508	3.761
Singapore	2.153	0.559	1.307	1.23	1.768	3.808	3.93	3.519	3.883	4.043	5.517
Taiwan	0.944	1.834	3.737	3.5	2.413	4.189	2.565	1.195	1.967	4.085	3.195
Thailand	1.752	1.948	1.577	2.049	1.263	1.107	2.116	1.839	2.334	1.143	1.786
UK	2.066	2.559	1.356	2.463	1.985	1.392	2.051	2.176	3.274	4.106	3.833
US	3.164	2.554	2.267	2.044	2.896	3.677	2.784	3.217	4.373	3.255	3.401

Note: The critical value of the lower bound at the 5% significance level is 2.79 and that of the upper bound is 3.67 following the Case II in Pesaran et al. (2001, p. 300). If the F-statistic is larger than 3.67 the variables are cointegrated.

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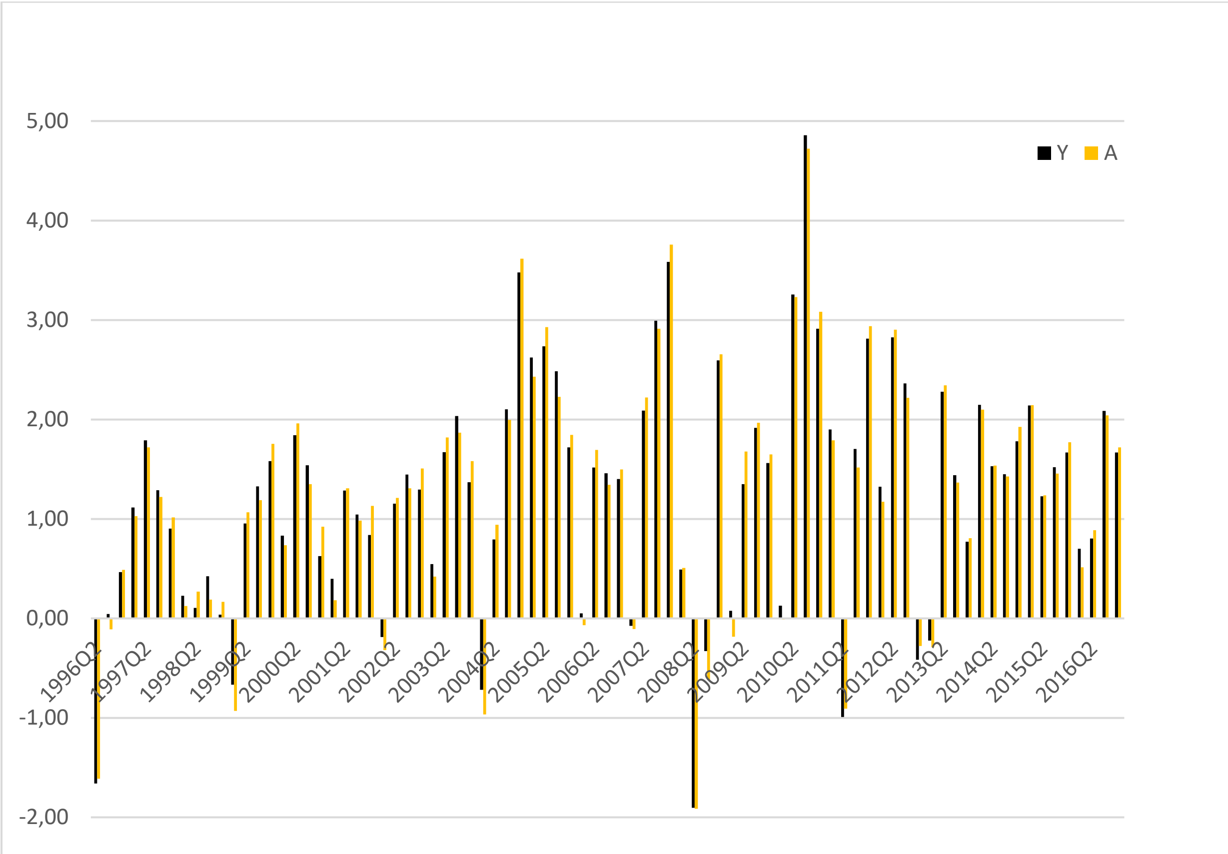

Figure A: 1 Growth rate of output (Y) and absorption (A) of Vietnam (%)

Source: Calculated by the author based on the trade and output data from the IMF's IFS.