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Vietnam Trade Balance and Exchange Rate: Evidence from Panel Data Analysis

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Abstract

This study attempts to examine the effect of real exchange rate, domestic and foreign income on bilateral trade balance for Vietnam and her sixteen trading partners over the period 1999-2012. This study for the first time applies the most recently developed panel co-integration method to examine the long-run relationship between the real exchange rate and bilateral trade. The null hypothesis of no co-integration is rejected in all tests, implying that there is a long-run relationship between trade balance, real exchange rate, domestic income, and foreign income in the case of Vietnam. The results from both panel FMOLS and DOLS estimation show that, overall, the real exchange rate and domestic income have negative effect on trade balance, whereas foreign income reported positive effect on trade balance. All variables are in expected sign and statistically significant. A policy implication from this study is that Vietnam's trade balance can be improved by restructuring the economy rather than devaluating currency in the long run.

Keywords: *Trade balance, Real exchange rate, Panel co-integration, DOLS, FMOLS, Vietnam*

JEL classification: *F14, F31, C33*

1. Introduction

Vietnam's transition towards a market economy has been a bright success story so far. After two and a half decades of deliberate and cautious reform measures that became popular under the Vietnamese word ''doi moi'' (renovation) the economy still flourishes with annual growth rates around 7 percent. Transitioned from a close, centrally planned economy, Vietnam has quickly opened up and become one of the most open economies in the world, with very high rate of trade and foreign investment as percentage of GDP. However, the country's economy faced with the constant increasing of chronic trade deficit, for which trade deficits have been gradually and steadily increasing after 2000. Trade deficit turns to be serious from 2000 at around 1 billion USD, and reaches peak in 2008 at 22 billion USD, causing current account deficit-to-GDP ratio rises up to 10 percent. In order to improve the trade balance, two approaches to changing the country's competitiveness are at the authorities' disposal. One relies on supply-side policies, such as

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improving labor productivity or production conditions, whereas, the other bases on devaluating/depreciating the currency.

In recent years, the lack of exchange rate flexibility has taken even greater prominence, often times as criticism for contributing to country's trade imbalances. The question of whether exchange rate significantly affects on trade has been an emerging issue for economists and policymakers of Vietnam. There have been numerous studies focus on explaining the performance of Vietnam's trade balance. However, there is little study examine the role of exchange rate to trade balance deficit. Moreover, existing empirical studies suggest consistent conclusions, by which, real exchange rate does have positive impact on trade balance in the long-run though its impact is very limited (Lord, 2002; Phan and Nguyen, 2007; Pham, 2012).

This study differs from earlier work in several ways. First, for the first time, our study applies a panel of countries rather than a single bilateral case. The benefits of panel data analysis includes: they are more informative (more variability, less collinearity, more degrees of freedom), estimates are more efficient, allow studying individual dynamics, and allow controlling for individual unobserved heterogeneity. Second, the results of earlier studies may be biased and ineffective due to the problem of endogeneity among each variable. To avoid the endogeneity problem, this study utilizes the recently developed panel unit root and panel cointegration tests; the Fully-Modified OLS (FMOLS) and Dynamic OLS (DOLS) methodology. FMOLS and DOLS estimators are able to account for both serial correlation and potential endogeneity problems, and hence are preferable to simple OLS estimation. One of the advantages of using this technique is that it allows for the country-specific fixed effects to be heterogeneous while estimating the long-run relationships (Pedroni, 2000). Third, this study also examines the effect of real exchange rate on trade balance both for country as a whole and on a bilateral basis.

The purpose of this paper is to examine the existence of a long run relationship between trade balance and exchange rate of Vietnam with her major sixteen trading partners using panel cointegration techniques. This relationship for Vietnam case is considered in the literature in a few papers (Lord, 2002; Phan and Nguyen, 2007; Pham, 2012). These studies, however, analysed the trade balance and exchange rate relationship on a bilateral time series basis with simple OLS regression techniques. Thus, the present paper contributes further to the literature by examining this type of relationship as a group and individually, using the recently developed econometric techniques.

The paper is organized as follows. Section II presents an overview of Vietnam's trade performance with selected trading partners. Section III provides a brief review of previous studies on trade balance and exchange rate. Section IV presents the theoretical model and the modeling techniques employed. Section V presents the empirical results and discussion. Section VI concludes and suggests the policy implication.

2. Overview of Vietnam's trade balance

Vietnam is a small open economy on the process of industrialization that depends mainly on international trade. Although Vietnam has succeeded with export-driven strategy with impressive growth of exports at 19.4 percent on annual average during the past decades, the average annual growth of imports is higher at 20.2 percent, leading to lasting trade-balance deficit (table 1). Before 2000, trade deficit is rather small, around 200 million USD. The trade deficit has dramatically increased since 2000. During the period 1999 to 2011, the average trade deficit was about 7% and

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38%, if it was estimated in million US dollars and annual growth rate, respectively. This is reasonable since most of Vietnam's exports are raw materials, semi-processed goods, and contract-manufacturing goods while her imports more high-value goods, machinery, equipment, production lines, and parts.

Table 1. Vietnam Trade Balance (1999-2011, Unit: million USD)

	1999	2001	2003	2005	2007	2009	2011	Growth rate (%)
Exports Value	11.541	15.029	20.149	32.447	48.561	57.096	96.906	19.4
Imports Value	11.742	16.218	25.256	36.761	62.765	69.949	106.750	20.2
Trade Balance	-0.201	-1.189	-5.106	-4.314	-14.203	-12.853	-9.844	38.3
Trade Ratio	0.98	0.93	0.80	0.88	0.77	0.82	0.91	

Source: UN comtrade database

In term of trading markets, the top 20 trading partners of Vietnam as shown in table 2, account for about 80% of her total trade. China, the United States and Japan have been the three largest trade partners of Vietnam for many years. Since signing a bilateral trade agreement with the US in 2000 and joining the WTO in 2007, Vietnam's trade relations have been more diversified. Trade with Europe accounted for 8.32 percent of Vietnam's total trade in 2011. Trade with Australia and South Africa also accounts a considerable share. At the same time, trade with ASEAN member and emerging economies such as Singapore, Indonesia, Philippines and India has increased noticeably over the past decade.

3. Review of related literature

The literature on the relationship of real exchange rates and trade balance is very extensive. There is general consensus in this area that movements in the exchange rate have direct impacts on trade balance in the long run (Aftab and Aurangzeb, 2002; Bahmani-Oskooee, 1991, 2001; Moffett, 1989; Musila and Newark, 2003; Rawlins and Praveen, 2000; Shahbaz et al. 2010; and Singh, 2002;). However, there is also existing literature provides mostly inconclusive evidence on the response of trade balance to exchange rate movements (Duasa, 2007; Hatemi and Irandoust, 2005; Narayan, 2004; and Rose, 1991;). These mixed results may be due to the fact that, a deficit in the trade balance of a country may be eliminated by a real devaluation in the domestic currency, while the success of devaluation depends on whether or not the sum of import and export elasticities exceeds unity, which is also known as the Marshall- Lerner (ML) condition. In addition, differences in investigated sample, time period and applied estimation methods can lead to different results.

The brief review of existing literature on this topic shows that, first, the evidence of trade balance and exchange rate relationship is mostly inconclusive. Second, there are very few studies that utilize the most recently developed cointegration techniques such as panel FMOLS and DOLS. Third, there is also limited studies focus on developing countries.

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Table 2. Vietnam's Trade with Top 20 Trading Partners in 2011 (Unit: billion USD and percent)

Partner	Imports Value	Imports Share	Exports Value	Exports Share	Total trade	Trade Balance
China	24.866	11.65	11.613	5.99	36.480	-13.253
USA	4.555	2.13	16.970	8.76	21.526	12.415
Japan	10.401	4.87	11.092	5.72	21.492	0.691
Korea	13.176	6.17	4.867	2.51	18.043	-8.309
Singapore	6.391	2.99	2.149	1.11	8.540	-4.241
Thailand	6.384	2.99	1.938	1.00	8.322	-4.445
Malaysia	3.920	1.84	2.771	1.43	6.691	-1.149
Germany	2.199	1.03	3.367	1.74	5.565	1.168
Australia	2.123	0.99	2.602	1.34	4.725	0.479
Indonesia	2.248	1.05	2.359	1.22	4.606	0.111
India	2.346	1.10	1.554	0.80	3.900	-0.792
Hong Kong	0.970	0.45	2.206	1.14	3.175	1.236
United Kingdom	0.646	0.30	2.398	1.24	3.044	1.752
Switzerland	1.771	0.83	1.189	0.61	2.960	-0.583
Cambodia	0.430	0.20	2.519	1.30	2.949	2.089
France	1.205	0.56	1.659	0.86	2.864	0.454
Netherlands	0.669	0.31	2.148	1.11	2.817	1.479
Italy	0.999	0.47	1.534	0.79	2.533	0.536
Philippines	0.805	0.38	1.535	0.79	2.340	0.730
South Africa	0.224	0.10	1.864	0.96	2.088	1.641

Source: UN comtrade database

In regards to the empirical evidence of the relationship between trade balance and exchange rate for Vietnam, one can identify a few previous studies with consistent results. Lord (2002) used cointegration and ECM model to examine the short-run and long-run effect of real exchange rate elasticity on demand for Vietnam's exports for the period of 1990-2001. Lord finds that the real exchange rates have significant impact on Vietnam's international competitiveness and global market demand for her exports. The work of Phan and Nguyen (2007), which is also based on cointegration and ECM techniques, reported that real exchange rate has impact on trade balance in the long run. The trade balance will increase about 0.7 percent in response to one percent depreciation of real exchange rate. On employing the autoregressive distributed lag (ADRL) and ECM methods, Pham (2012) asserts that a real depreciation of the domestic currency helps to improve the trade balance after four quarters and new equilibrium will be set after twelve quarters. Corresponding error correction model (ECM) based on long-run cointegration equation indicates immediate deterioration of trade balance after depreciation. Impulse response functions based ECM exhibit J-curve pattern of trade balance when there is a permanent depreciation.

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In order to overcome the problem caused by the endogeneity of the regressors, this study uses two estimators, FMOLS and DOLS. OLS cannot be used because the effect of super consistency may not dominate the endogeneity effect of the regressors. This may result in a biased and non normal distribution of the residuals. The problem is amplified in a panel setting by the potential dynamic heterogeneity over the cross sectional dimension. Two types of estimators have been suggested in panel settings: within dimension estimator and between-dimension (group-mean) estimator. While the former pools the observations along the within dimension of the panel, the latter pools them along the between dimension.

4. The model and methodology

Following Rose and Yellen (1989), we use the following model for Vietnam:

$$TB_{\mathrm{it}} = \beta_{0\mathrm{i}} + \beta_{1\mathrm{i}}\mathrm{RER}_{\mathrm{it}} + \beta_{2\mathrm{i}}\mathrm{Y}_{\mathrm{it}} + \beta_{3\mathrm{i}}\mathrm{Y}^{*}_{\mathrm{it}} + \varepsilon_{\mathrm{it}} \qquad \mathrm{i} = 1, \ldots, \mathrm{N};\ \mathrm{t} = 1, \ldots, \mathrm{T}.$$

where TB_{it} is the trade balance of Vietnam with major trading partners, measured by the ratio of exports to imports; RER_{it} is the real effective exchange rate; Y_{it} is the real domestic income (Vietnam); Y^{*}_{it} is the real income of foreign partners; ε_{it} is the disturbance term; T is the number of observations; and N is the number of individual members. All variables are in logged form. The attractive feature of the log-linear model is that the slope coefficient measures the elasticity of the dependent variable with respect to the independent variable. The important advantage of using export to import ratio is that it is insensitive to the unit of measurement as it can be easily interpreted as either nominal or real.

The coefficient of real exchange rate, β1 could take any sign, positive or negative because the effect of changes in real effective exchange rate on balance of trade is ambiguous. The theoretical literature suggests that the exports and imports increases as the real income of the trade partners and domestic income rises respectively, and vice versa. In that case we could expect $\beta 2 < 0$ and $\beta 3 > 0$. However, imports may decline as income increases if the real income rises due to an increase in the production of import-substitute goods, and in that case we would expect $\beta 2 > 0$ and $\beta 3 < 0$.

In this study, we use quarterly data from 1999:1 to 2012:4 to estimate the impact of exchange rate on trade balance. Data for export and import values are taken from IMF's International Financial Statistics (IFS). Data on average-period nominal exchange rate of VND against major partners' currencies; Consumer Price Index (CPI); and Index of Industrial Production (IIP - proxy of trade partners' income) are mainly taken from IFS and OECD Statistics (for China, India and Indonesia). Real income for Vietnam is obtained from General Statistics Office of Vietnam. For all seasonally unadjusted data, we used Census X12 to seasonally adjust the data.

It is important to examine the stationarity characteristic of variables before proceeding to the estimation. Many economic and financial time series exhibit trending behavior or non-stationarity in the mean. The stationarity of a series can strongly influence its behaviour and properties. If two variables are trending over time, a regression of one on the other could have a high R-square even if the two are totally unrelated (Spurious regressions). Thus, an important econometric task is determining the most appropriate form of the trend in the data. If the data are trending, then some form of trend removal is required. Unit root tests can be used to determine if trending data should be first differenced or regressed on deterministic functions of time to render the data stationary.

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The panel unit root has several benefits as compared to a conventional time series approach. First, by pooling time series and cross sections, the finite sample power of the test is significantly improved. The univariate unit root tests, such as the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP), are broadly reported to have low power performance when the sample size is small. Levin, Lin, and Chu (LLC, 2002) and Im, Persaran, and Shin (IPS, 2003), among others, prove that the power of unit root tests that use panel data is a substantial improvement over univariate testing procedures. Thus, taking into consideration the advantages and disadvantage of each method, this study uses all above panel unit root techniques, namely, ADF, PP, LLC, and IPS. Unit root testing results are reported in Table 3.

Table 3. Panel Unit Root test - Level

Variables	ADF	PP	LLC	IPS
LnTB	56.3055*	65.7545*	-2.88204*	-3.19066*
LnRER	64.4226*	51.7447*	-3.16245*	-3.47215*
LnY	0.33634	643.024	42.9510*	8.69893
LnY^*	66.7455*	50.2522*	-1.18345	-3.56128*

* indicates the rejection of the null hypothesis of unit root at least at the 5 percent significant level

Table 4. Panel Unit Root test – 1st Difference

Variables	ADF	PP	LLC	IPS
LnTB	585.569*	617.966*	-26.6091*	-33.1094*
LnRER	246.845*	260.134*	-14.6082*	-14.9836*
LnY	725.081*	294.731*	59.7502*	-42.3684*
LnY^*	327.422*	334.534*	-16.6874*	-19.4018*

* indicates the rejection of the null hypothesis of unit root at least at the 5 percent significant level

As shown in Tables 3 and 4, the null hypothesis of a unit root is rejected for most of the variables in levels at 5% significance except domestic income variable (LnY). To confirm these variables' integration of order 1, I(1), the null of a unit root is examined for the first difference variables. According to Table 4, most of the results reject the null hypothesis of a unit root, suggesting that all variables are integrated of order one.

While each variable is non-stationary, the next step is to test whether there is a cointegrating relationship among these variables. This study uses the Pedroni (1999, 2004) method to test for panel cointegration. Pedroni (2004) constructed the seven statistics on the basis of regression residuals of the integration function. There are two groups in Pedroni's seven statistics tests. One is described by the with-dimension measure, such as Panel v, Pane1 rho, Panel PP and Panel ADF statistics, and the other is described by the between-dimension measure, such as Group rho, Group PP and Group ADF statistics. The null hypothesis of these tests is no cointegration or the long-run relationships between variables do not exist. If the null hypothesis is rejected, there are long-run relationships between variables. The results of Pedroni's panel cointegration tests are presented in table 5.

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Table 5. Panel Cointegration Test

	Intercept		Intercept and trend	
Within-dimension	***Statistic***	***Prob.***	***Statistic***	***Prob.***
Panel v-Statistic	2.206	0.0137	2.663	0.0039
Panel rho-Statistic	-22.934	0.0000	-27.140	0.0000
Panel PP-Statistic	-27.434	0.0000	-87.507	0.0000
Panel ADF-Statistic	-6.619	0.0000	-21.844	0.0000
Between-dimension				
Group rho-Statistic	-24.990	0.0000	-25.906	0.0000
Group PP-Statistic	-42.534	0.0000	-101.296	0.0000
Group ADF-Statistic	-9.775	0.0000	-23.322	0.0000

The results in table 5 show that, the null hypothesis of no cointegration is rejected at the 1% significant level for all groups of tests, indicating a long-run relationship between trade balance, real exchange rate, domestic and foreign income, which is consistent with most of previous studies for Vietnam.

As cointegration has been found, the next step is to estimate cointegrating coefficients in order to investigate the long-run relationship among variables using Pedroni's between-dimension FMOLS and DOLS techniques. These techniques can be summarized as follows.

Consider following panel cointegration model:

$$y_{it} = \alpha_i + x'_{it}\beta + \varepsilon_{it} \quad i = 1, \dots, N;\ t = 1, \dots, T. \qquad (1)$$

$$x_{it} = x_{it-1} + \epsilon_{it}$$

where the variables y_{it} and x_{it} are non-stationary, and the vector error terms $\mu_{it} = (\varepsilon_{it}\ \epsilon_{it})' \sim I(0)$ have asymptotic covariance matrix $\Omega_i = L_i L_i'$ (L_i is a lower triangular decomposition of Ωi). This covariance matrix can be decomposed as $\Omega_i = \Omega_i^0 + \Gamma_i + \Gamma_i'$, where Ω_i^0 is the contemporaneous covariance and Γ_i is a weighted sum of autocovariances. The panel FMOLS estimator for the coefficient β is given as:

$$\hat{\beta}^*_{GFM} = N^{-1} \sum_{i=1}^{N} \left(\sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2\right)^{-1} \left(\sum_{t=1}^{T} (x_{it} - \bar{x}_i)^2\right) y^*_{it} - T\hat{\tau}_i, \qquad (2)$$

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where $y_{it}^{*} = (y_{it} - \bar{y}_i) - \frac{\hat{L}_{21i}}{\hat{L}_{22i}}\Delta x_{it}$, $\hat{\tau}_i = \hat{\Gamma}_{21i} + \hat{\Omega}_{21i}^{0} - \frac{\hat{L}_{21i}}{\hat{L}_{22i}}(\hat{\Gamma}_{22i} + \hat{\Omega}_{22i}^{0})$ and the associated t-statistic follows standard normal distribution[2].

The DOLS regression can be employed by augmenting the cointegrating regression with lead and lagged differences of the regressors to control for endogenous feedback effects. Thus, we can obtain from the following regression:

$$y_{it} = \alpha_i + \beta_i x_{it} + \sum_{k=-K_i}^{K_i} \gamma_{it} x_{it-k} + \varepsilon_{it} \quad (3)$$

where the estimated coefficient β is given as:

$$\hat{\beta}_{GD}^{*} = N^{-1} \sum_{i=1}^{N} (\sum_{t=1}^{T} Z_{it} Z_{it}')^{-1} (\sum_{t=1}^{T} Z_{it} y_{it}^{*}), \quad (4)$$

where Z_{it} is the $2(K+1) \times 1$ vector of regressors and $Z_{it} = (x_{it} - \bar{x}_i, \Delta x_{it-k}, \ldots \Delta x_{it+k})$

According to Pedroni (2001), the important advantages of the between-dimension estimators over within-dimension estimators are as follows3.

The form in which the data is pooled in the between-dimension estimators allow for greater exibility in the presence of heterogeneity of the cointegrating vectors. Test statistics constructed from the within-dimension estimators are designed to test H0 :i = 0 for all i against HA : i = A = 0 where the value A is the same for all i. Test statistics constructed from the between-dimension estimators are designed to test H0 : i = 0 for all i against HA : i = 0 so that the values for i are not constrained to be the same under the alternative hypothesis. This is an important advantage for applications, because there is no reason to believe that, if the cointegrating slopes are not equal, they necessarily take on some other arbitrary common value

The point estimates of the between-dimension estimators have a more useful interpretation in the event that the true cointegrating vectors are heterogeneous. Specifically, point estimates for the between-dimension estimator can be interpreted as the mean value for the cointegrating vectors. This is not true for the within-dimension estimators.

The test statistics constructed from the group mean estimators appear to have another advantage even under the null hypothesis when the cointegrating vector is homogeneous. Specifically, Pedroni (2000) shows that they appear to suffer from much lower small-sample size distortions than the within-dimension estimators.

5. Results and discussion

The results of the panel FMOLS and DOLS estimation are reported in table 6 and table 7.

Past cross-country studies typically show very different outcomes across countries. In particular, the existence (or not) of a cointegration relationship between trade and growth may depend on particular country characteristics.

[2] See Pedroni (2001) for further details
[3] See Pedroni (2001) for further details

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Table 6. Results of Between-Dimension Panel FMOLS

	LRER	LIIP	LGDP
Australia	0.94	-0.50	-1.51
	(1.38)	(-0.12)	(-1.49)
China	2.62	-1.03	-1.52***
	(1.74)	(-0.50)	(-7.69)
France	0.24	0.28	-0.23
	(0.51)	(0.16)	(-0.28)
Germany	0.55**	1.31**	-1.54***
	(2.87)	(2.52)	(-4.07)
India	-1.57	6.01***	-4.59**
	(-1.39)	(4.07)	(-3.00)
Indonesia	0.50	0.77	-0.78
	(0.88)	(0.43)	(-1.02)
Italy	0.89*	1.58	-0.70
	(1.99)	(1.50)	(-0.96)
Japan	0.03	0.17	-0.15
	(0.11)	(0.68)	(-1.22)
Korea	-0.85***	0.75*	-0.29
	(-5.70)	(1.95)	(-0.79)
Malaysia	-2.61**	0.57	-0.85
	(-2.36)	(0.56)	(-1.25)
Netherlands	1.06**	-1.12	-2.08**
	(2.97)	(-0.55)	(-2.75)
South Africa	-1.41	-12.03**	2.73**
	(-1.13)	(-2.79)	(2.38)
Switzerland	-11.05***	-7.34*	2.78*
	(-5.94)	(-1.93)	(1.98)
Thailand	-0.24	-0.79	0.19
	(-0.22)	(-1.16)	(0.29)
UK	1.22*	-0.28	0.72*
	(1.83)	(-0.10)	(1.95)
US	4.19***	2.10*	2.34***
	(7.48)	(1.77)	(7.42)
Panel	**-0.38**	**-0.63**	**-0.31****
	(**1.08**)	(**1.54**)	(**-2.46**)

Note: t-statistics are in parentheses, ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively.

As can be seen from table 6, for individual cases, the coefficients of real exchange rate, real domestic income and foreign income are statistically significant in 8, 6 and 8 out of 16 cases, respectively. However, the signs of coefficients vary among countries. In term of real exchange rate, Vietnam's trade balance with, so called, Western countries (Germany, Italy, Netherland, UK and U.S.) is improved by a depreciation of Vietnam's currency, whereas this depreciation leads to a deterioration in Vietnam's trade balance with Asian countries such as Korea and Malaysia. This can be explained by the dependence of Vietnam's production inputs on major Asian trading partners. For the variables domestic and foreign income, the results are inconclusive. Moreover, the FMOLS estimation result for panel is insignificant for exchange rate and foreign income variables. This may well be that the relationship among investigated variables is not strong in the

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case of Vietnam. The absence of significant results for long-run trade balance-exchange rate relationship is in line with the individual mixed results is also existed in the empirical literature about this relationship.

The study processed further by employing panel DOLS techniques, which results are presented in table 7. The results are different from those of the panel FMOLS. The panel estimators of the real exchange rate, domestic and foreign income are statistically significant at the 1 percent level and carry expected signs. The real exchange rate and domestic income have negative effect on trade balance (-3.11 and -2.59, respectively), which is consistent with literature and our prediction. This suggests that, Vietnam's currency depreciation would lead to her trade balance deficit; and an increase in the Vietnam's real income raises her demand for import goods and thus also leads to a deterioration in her trade balance.

Table 7. Results of Between-Dimension Panel DOLS

	LRER	LIIP	LGDP
Australia	-0.70	-10.27	1.82
	(-0.83)	(-1.46)	(1.08)
China	-4.75	6.25	-2.63***
	(-1.73)	(1.44)	(-8.89)
France	-3.45*	-8.32**	5.64*
	(-2.06)	(-2.71)	(1.83)
Germany	1.62***	-0.68	-2.89***
	(4.77)	(-1.18)	(-4.56)
India	3.26	30.02***	-28.69***
	(1.88)	(8.01)	(-7.66)
Indonesia	0.90	-0.47	-0.40
	(0.67)	(-0.10)	(-0.29)
Italy	-2.62***	0.45	5.69***
	(-4.22)	(0.38)	(5.36)
Japan	0.02	1.58**	-0.33**
	(0.04)	(2.82)	(-2.14)
Korea	-0.80*	3.73*	-3.02
	(-1.84)	(1.87)	(-1.61)
Malaysia	-3.70	4.77**	-3.30*
	(-0.95)	(2.04)	(-1.70)
Netherlands	-1.83	5.07	2.39
	(-1.10)	(1.35)	(0.74)
South Africa	-3.70***	-13.39***	4.44***
	(-4.24)	(-3.05)	(3.63)
Switzerland	-9.66***	-11.69***	4.70***
	(-5.91)	(-3.93)	(4.10)
Thailand	-4.41***	0.38	-0.80
	(-3.04)	(0.30)	(-0.59)
UK	0.63	9.02**	1.67***
	(1.49)	(2.80)	(4.15)
US	3.57***	10.79***	0.35
	(3.14)	(9.04)	(0.52)
Panel	**-3.11*** **	**5.73*** **	**-2.59*** **
	(**-9.29**)	(**7.93**)	(**-7.35**)

Note: t-statistics are in parentheses, ***, **, and * indicate the 1%, 5%, and 10% significance levels, respectively.

For individual cases, though results are not significant for a few countries, but it is important that the coefficients of all variables are statistical significant in about 9 among 16 partners. The real exchange rate depreciation would worsen the Vietnam's trade balance with France, Italy, Korea,

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South Africa, Switzerland and Thailand, whereas improve her trade balance with Germany and the U.S. DOLS estimates indicate the highest real exchange rate effect in Switzerland followed by France. The lowest degree of effect is recorded in Germany and Korea. An increase in foreign real income is expected to improve Vietnam's bilateral trade balance with India, Japan, Korea, Malaysia, UK and the U.S. in the long run. This is reasonable because these countries are important export markets for Vietnam's key industries. In the case of domestic income, the results are mixed, however, as Vietnam's real income increases; there would be a trade diversion effect. Specifically, more imports would be expected from Asian countries such as China, Korea, Japan, Malaysia and Thailand rather than Western trading partners.

In summary, Vietnam's trade balance would significantly deteriorate after a permanent devaluation/depreciation. A 1 percent devaluation results in a decrease of 3.11 percent of trade ratio. The negative effect of domestic income on trade is also significant. Hence, before drawing conclusions from the results, one has to identify adverse effects on the trade balance owing to real depreciation. It is clear that Vietnam's production is highly dependent on imports, i.e. imported intermediate goods and raw materials. Hence, the increase in domestic producers' competitiveness evolving from real depreciation might be eroded by increases in import prices.

5. Conclusion

This paper attempts to estimate the effects of changes in the bilateral real exchange rates on the bilateral trade balances for Vietnam by employing panel FMOLS and DOLS techniques. The three major findings are summarized here. First, evidence favors long run relationship between real exchange rate changes and trade balance for Vietnam. Second, the statistically significant negative elasticities suggest that currency depreciation leads to deterioration in Vietnam's trade balance. Third, the effects of domestic and foreign income on trade balance are significant and in expected direction.

For individual trading partner, the FMOLS and DOLS results show that real exchange rates are significant determinants of the bilateral trade balance with eight of sixteen partners. The coefficients of the foreign income variable are statistically significant and carry the expected signs for three trading partners (India, Korea and US) in both estimation techniques. For the effect of domestic income, the coefficients are statistically significant and carry the expected signs for four and five trading partners in FMOLS and DOLS, respectively.

Based on the findings, the most important implication of this study is that the reliance on exchange rate depreciation to improve trade balance may worsen the situation in the case of Vietnam, which is due to her imports dependence. In order to achieve the desired effects on trade balance, the country should depend on policy that focusing on the other macroeconomic variables rather than the exchange rate. Vietnam should implement the policy that focuses on the production of imported-substituted goods. Import-substitution policy may work well in improving domestic income and trade balance. Efforts also should be made to improve the competitiveness of export goods in the international markets.

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