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Impact of Currency Reform on Chinese External Trade

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Abstract

This paper discusses the impact of Chinese authorities' 2005 decision to abandon the fixed exchange rate regime on China's international trade. After such reform, exchange rate volatility tend to arise and that can affect a country's international trade. As the Chinese economy is highly reliant on international trade, the consequences of exchange rate reform may be serious. Our findings reveal that the influence of exchange rate changes is negative only on China's imports. There is no such influence for its exports. Therefore, the exchange rate fluctuations after the 2005 reform are encouraging for China's trade balance. On the other hand, there is no significant effect on exchange rate volatility.

Keywords: *exchange rate, volatility, trade, China*

1. Introduction

In the absence of a fixed exchange rate regime, the exchange rate is an important issue for a country's international trade position. At the international level, the exchange rate can affect a country's trade competitiveness. It can cause uncertainty to a firm's cash flows and subsequently, its profitability. To manage these challenges, for example, the European Union introduced a common currency. China has followed a fixed exchange rate regime for a long time after the breakdown of the Bretton Woods agreement. Frequent central bank interventions is a common feature in the currency markets to ensure exchange rate stability.

Given the importance of exchange rate volatility effects on international trade, there exists a vast literature on the issue. However, available evidence on the influence of exchange rate volatility on trade is inconclusive. A long list of empirical studies is available that shows positive, negative, or no effects.

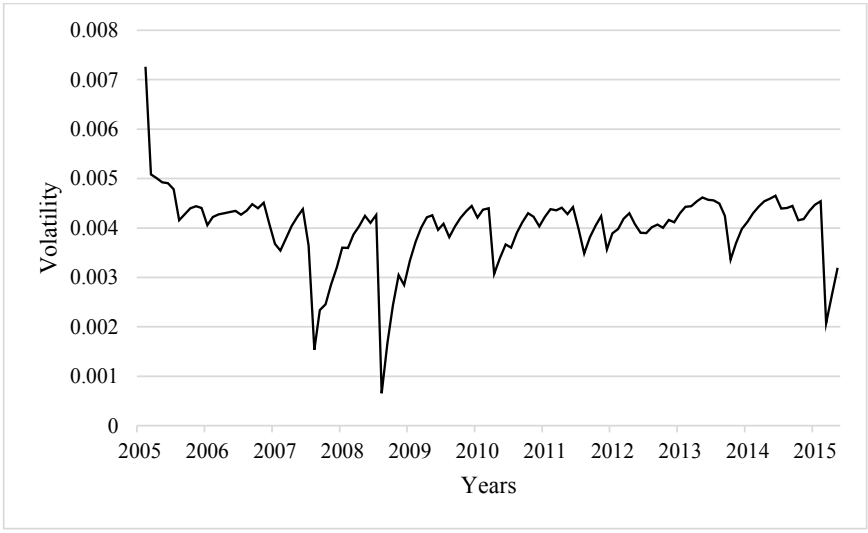
Theoretically, the literature is also supportive of the possibility of positive or negative, or even no effects. For example, loss averse traders divert their international trade to domestic trade to avoid currency risk. On the other hand, risk loving traders increase their international trade to compensate themselves to possible losses due to exchange rate uncertainty (De Grauwe, 1988). Risk neutral traders may not care about exchange rate risk due to exchange rate appreciation or depreciation. Moreover, the availability of hedging mechanisms like forward or swap contracts may help traders and firms avoid exchange rate risk. Therefore, even the theory opens up exchange rate uncertainties' influence over trade to further empirical evidence.

With the passage of time, China is opening up to the world. Previously a centrally controlled economy, Chinese authorities have now started to move towards market-based mechanisms. Within this line of reforms, China has abandoned the fixed exchange rate regime since 21st July 2005. Currently, China is on a managed float exchange rate regime. After the introduction of this new regime, fluctuations in the renminbi's exchange rate are notable (refer to Figures 1 and 2). Being a highly export-based economy, any uncertainty in the exchange rate can have serious effects on China's external trade.[1]

After the liberalization of the exchange rate, exchange rate risk may be a challenge for China's international trade position. This can affect the overall profitability of Chinese firms and their competitiveness in the global market. This issue is quite relevant for firm managers as well as for policymakers. Being more informed about exchange rate uncertainty's links with trade, a manager may be in a better position to decide either to opt for a forward

Figure 1 Renminbi/Dollar Real Exchange Rate, 2005-2015

Figure 2 Renminbi/Dollar Real Exchange Rate Volatility, 2005-2015



currency contract or leave the firm's position unhedged. This knowledge not only helps the manager to craft a proper and cost effective strategy to currency risk but it also maintains the firm's future profits at an optimal level relative to its international trade. On the other hand, policymakers can design suitable exchange rate policies that caters to domestic and international economic interests that are very important for China's export-based economy.

The primary objective of this paper is to build an understanding over the possible renminbi exchange rate risk effects on China's external trade. To this end, we examine the possible adverse effects on both China's exports and imports.

The rest of the paper is organized as follows: The next section provides a literature survey. Section 3 elaborates on the paper's methodology. Section 4 discusses the results and finally Section 5 concludes the paper.

2. Literature Review

Starting with the initial work of Hooper and Kohlhagen (1978), the extant literature on the effect of exchange rate volatility on international trade is voluminous.[2] However, the literature is still inconclusive on the topic. The findings can be categorized into at least three categories.

The first category of literature reported the negative effect of exchange rate volatility on trade. For instance, Bahmani-Oskooee and Wang (2007) examined bilateral trade between China and the US on an annual basis over the period 1978-2002. They reported the sensitivity of trade to exchange rate

volatility in half of their sample industries. Similarly, Yuan and Jianxiang (2011) studied the effect of exchange rate volatility on China's exports on a quarterly basis over the period Q1-1995 to Q1-2010. Based on cointegration approach, they found that exchange rate volatility had a significant negative effect on China's exports in the long-run. However, no such effects are observable in the short-run. In the same line, Nishimura and Hirayama (2013) examined the effect of exchange rate volatility on bilateral trade between China and Japan. They found that Japanese exports to China are not affected by exchange rate volatility. On the other hand, Chinese exports to Japan are negatively affected by the exchange rate volatility. Bahmani-Oskooee, Hegerty and Zhang (2014) studied the impact of exchange rate risk on bilateral trade between the UK and China. They reported that exchange rate volatility affected a few industries and this effect was negative. Wong and Tang (2014) researched the consequences of exchange rate variability on the top five Malaysian exports over the period 1990-2001 which found a negative effect on their considered exports industries. Doğanlar (2002) studied the effect of exchange rate volatility on the Asian economies' exports (i.e. Indonesia, Malaysia, Pakistan, South Korea, Turkey) and reported a reduction in exports due to exchange rate volatility. Arize, Osang and Slottje (2000) pondered on the exchange rate variability effect on thirteen less developed countries (LDCs) over the period 1973-1996. Their findings suggested that exchange rate volatility had a negative effect on their considered LDCs export flows. Sauer and Bohara (2001) used a panel approach to study regional countries' response to exchange rate risk. They showed that the effects on exports of LDCs in America and Africa are negative to the exchange rate risk. On the other hand, there was no such case for export's response for industrialized countries and LDCs of Asia.

The second category of literature reported positive effects of exchange rate volatility on trade. For instance, Soleymani and Chua (2014) studied the effect of exchange rate volatility on bilateral trade between Malaysia and China. Based on cointegration approach, they reported that exchange rate volatility influenced the majority of industries positively. Similarly, Poon, Choong and Habibullah (2005) studied the effect of exchange rate volatility in five Asian countries, namely, Indonesia, Japan, South Korea, Singapore and Thailand. Based on their analysis, they reported a positive effect of exchange rate volatility on the exports of Indonesia and Thailand in the long-run, as well as a positive response on Singapore's exports in the short-run. Choudhry (2008) found positive effects of exchange rate volatility on the exports of Canada, Japan, and New Zealand to the UK over the period 1980-2003.

The third category of literature reported ambiguous results over the effect of exchange rate volatility on trade. Examples of such include Aristotelous (2001), Tenreyro (2007), etc.

Based on this literature survey, the issue of exchange rate volatility effect on trade is still inconclusive and it is a topic that needs further investigation. This paper attempts to fill this gap by examining the effect of exchange rate volatility considering the liberal exchange rate regime in the context of China's international trade position.

3. Research Model and Econometrics

We model the export demand and import demand following recent research where they are modeled as a function of economic activity, exchange rate and exchange rate volatility (e.g. Bahmani-Oskooee & Aftab, 2017; Soleymani & Chua, 2014). These functions in an econometric form are as below:

$$LnExp_t^{CH} = \alpha_o + \alpha_1 Fc_t + \alpha_2 LnEA_t^{US} + \alpha_3 Ln\,\mathrm{Re}x_t + \alpha_4 LnVol_t + \varepsilon_t \qquad (1)$$

$$LnMpt_t^{CH} = \beta_o + \beta_1 Fc_t + \beta_2 LnEA_t^{CH} + \beta_3 Ln\,\mathrm{Re}x_t + \beta_4 LnVol_t + \mu_t \qquad (2)$$

where Exp and Mpt are Chinese exports and imports, respectively, with the rest of the world, Fc is a dummy variable for 2008 financial crisis, EA^{US} and EA^{CH} are proxies for economic activity in the US and China, respectively. Rex is real exchange rate defined as Chinese renminbi per unit of US dollar and Vol is real exchange rate volatility. Based on theory, the coefficient sign for EA^{US} and EA^{CH} is expected to be positive. The coefficient sign for Rex is expected to be positive in (1) and negative in (2). Finally, the sign for the coefficient of Vol is not clear in theory and thus, will be the main focus of our analysis.

Equations (1) and (2) are estimates for long-run effects. In order to estimate the short-run effects, the error correction specification is required. Given the fact that our model variables are of mixed order (i.e. stationary at level I(0) and stationary at first difference I(1)), we follow the bound testing approach suggested by Pesaran, Shin and Smith (2001).[3] The specification is as follows:

$$\Delta LnExp_t^{CH} = \alpha_o + \alpha_1 Fc_t + \sum_{i=1}^{n1} \alpha_{2,i} \Delta LnExp_{t-i}^{CH} + \sum_{i=0}^{n2} \alpha_{3,i} \Delta LnEA_{t-i}^{US} +$$

$$\sum_{i=0}^{n3} \alpha_{4,i} \Delta Ln\,\mathrm{Re}x_{t-i} + \sum_{i=0}^{n4} \alpha_{5,i} \Delta LnVol_{t-1} + \beta_o LnExp_{t-1}^{CH} +$$

$$\beta_1 LnEA_{t-1}^{US} + \beta_2 Ln\,\mathrm{Re}x_{t-1} + \beta_3 LnVol_{t-1} + \mu_t \qquad (3)$$

$$\Delta LnMpt_t^{CH} = \chi_o + \chi_1 Fc_t + \sum_{i=1}^{n5} \chi_{2,i} \Delta Mpt_{t-i}^{CH} + \sum_{i=0}^{n6} \chi_{3,i} \Delta EA_{t-i}^{CH} + \sum_{i=0}^{n7} \chi_{4,i} \Delta \mathrm{Re}x_{t-i} + \sum_{i=0}^{n8} \chi_{5,i} \Delta Vol_{t-1} + \delta_o LnMpt_{t-1}^{CH} + \delta_1 LnEA_t^{CH} + \delta_2 Ln\mathrm{Re}x_t + \delta_3 LnVol_t + \nu_t \quad (4)$$

Equations (3) and (4) are tested to examine whether cointegration exist among the variables. To do this, Pesaran et al. (2001) suggested new critical values. If the calculated F-statistic through the Wald test is greater than the upper tabulated critical value, one can establish the presence of cointegration. Once cointegration is established, one can gather the short-run estimates and long-run estimates through the coefficient attached to the first differenced variables and the estimates of normalized variables $\beta_1 - \beta_3$ on β_0 in (3) and $\delta_1 - \delta_3$ on δ_0 in (4), respectively.

In the case where cointegration is not established through the F-statistic, there is an alternative test to examine the presence of cointegration (i.e. the lagged error correction term, ECM_{t-1}). To calculate the ECM_{t-1}, lagged level variables are replaced through normalization in (3) and (4). For instance in the case of Equation (3);

$$ECM_{t-1} = LnExp_{t-1}^{CH} - \frac{\beta_1}{\beta_o} LnEA_{t-1}^{US} + \frac{\beta_2}{\beta_o} Ln\mathrm{Re}x_{t-1} + \frac{\beta_3}{\beta_o} LnVol_{t-1} \quad (5)$$

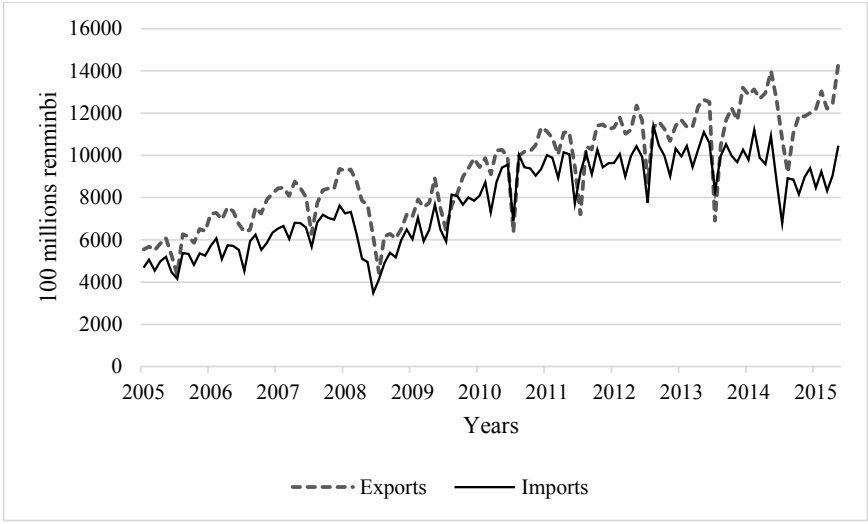
In the same fashion, ECM_{t-1} is calculated for Equation (4). Pesaran et al. (2001) provided critical tabulated t-statistic values for ECM_{t-1} as well. If the estimated ECM_{t-1} is negative and the t-statistic attached to the estimated ECM_{t-1} is higher than the upper tabulated t-statistics value, cointegration is established.

4. Results

Figures 2 and 3 show fluctuations in the exchange rate volatility and China's exports and imports. Is there any influence from exchange rate volatility on China's external trade after the 2005 exchange rate reform? To answer this question, we move to some systematic analysis. Based on bound testing approach, the analysis results are reported in Tables 1 and 2 for export and import models, respectively.

We examine, first of all, the presence of cointegration through the F-statistic and ECM_{t-1}. We do this by taking maximum eight lags and putting Akaike information criterion (AIC) to select optimal lag length. The estimates

Figure 3 Chinese Imports and Exports Over the Period 2005-2015



based on these tests and reported in Tables 1 and 2, reveal the presence of cointegration for both export and import models.

Before we interpret the results, it is necessary to check both export and import models through a set of diagnostic tests. The results of these tests are reported in the lower parts of Tables 1 and 2. We discuss these tests one by one. The adjusted R^2 show model fit. Lagrange Multiplier (LM) test examines the serial correlation. It is based on a chi-squared distribution with one degree of freedom. Its critical value is 2.70 (3.84) at the 10 per cent (5 per cent) level of significance. The estimates show that both export and import models have no serial correlation issues. To test the model specification, we use Ramsey's RESET test. This test also follows a chi-squared distribution with one degree of freedom. Its critical value is 2.70 (3.84) at 10 per cent (5 per cent) level of significance. The estimates show that both export and import models are rightly specified. To examine the stability of our estimates, we use CUSUM and CUSUM square tests. The stability graphs show that estimates are stable in both export and import models. These diagnostic tests ensures confidence in the validity of the results that follow.

Now we move on to discuss our main estimates. Table 1 reveals no effects of exchange rate changes as well as exchange rate volatility on China's export trade. This implies that recent Chinese exchange rate reform has not led to exchange rate influence on China's exports. This may also reveal some pertinent information where Chinese authorities are able to manage the exchange rate in favour of their export trade. Similar to our results, Bélanger,

Gutiérrez, Racette and Raynauld (1992) found that the free float exchange rate regime has no effect on Canada and the US trade. On the other hand, Table 2 reveals that exchange rate volatility has also no influence on China's imports. However, the change in exchange rate affects China's imports negatively.[4] This indicates the current response of international trade to yuan exchange rate is in favour of China's trade balance.[5] These findings may corroborate the view that Chinese authorities manipulate the exchange rate to their economy's favour.

Table 1 Long-run Estimates for Exports Demand Model

Dependent variable: Exports

Variable	*Coefficient*
C	2.0552(5.4525)***
DM	-.0847(-.4107)
$LnEA^{US}$	-.4437(-.4222)
LnRex	-1.6598(-1.423)
LnVol	.1636(1.3943)
Diagnostic Statistics	
F-test	5.4051
ECM_{t-1}	-.3027(5.3894)
Adj. R^2	.9261
LM	2.2573
RESET	1.5916
CUSUM	Stable
CUSUMQ	Stable

Notes: *, ** and *** indicate significance at 10%, 5% and 1% level respectively. At the 10% (5%) significance level when there are three exogenous variables (k=3), the upper bound critical value of the F-test is 3.77 (4.35). These come from Pesaran et al. (2001, Table CI Case III, page 300). Numbers in parentheses next to ECM_{t-1} are the absolute values of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is -3.46 (-3.78) when k=3 and these come from Pesaran et al. (2001, Table CII-Case III, page 303). LM is Lagrange Multiplier test of residual serial correlation. It is distributed as χ^2 with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have an χ^2 distribution with one degree of freedom. RESET is Ramsey's test for misspecification. It is distributed as χ^2 with one degree of freedom.

Table 2 Long-run Estimates for Imports Demand Model

Dependent variable: Imports

Variable	*Coefficient*
C	8.466(5.2701)***
DM	-.3827(-3.0632)***
$LnEA^{CH}$	-2.0756(-1.9984)**
LnRex	-3.8599(-11.6688)***
LnVol	-.3696(-.8998)
Diagnostic Statistics	
F-test	5.1291
ECM_{t-1}	-.8025(5.2628)
Adj. R^2	.9179
LM	1.8852
RESET	.2152
CUSUM	Stable
CUSUMQ	Stable

Notes: *, ** and *** indicate significance at 10%, 5% and 1% level respectively. At the 10% (5%) significance level when there are three exogenous variables (k=3), the upper bound critical value of the F-test is 3.77 (4.35). These come from Pesaran et al. (2001, Table CI Case III, page 300). Numbers in parentheses next to ECM_{t-1} are the absolute values of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is -3.46 (-3.78) when k=3 and these come from Pesaran et al. (2001, Table CII-Case III, page 303). LM is Lagrange Multiplier test of residual serial correlation. It is distributed as χ^2 with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have an χ^2 distribution with one degree of freedom. RESET is Ramsey's test for misspecification. It is distributed as χ^2 with one degree of freedom.

5. Conclusion

The influence of exchange rate on trade has been a hot topic since the debacle of the Bretton Woods fixed exchange rate regime. Therefore, it is no wonder there exists a huge literature on the topic. However, the findings to-date are still inconclusive. Although exchange rate liberalization is an old phenomenon in advanced economies, it is a quite a new phenomenon in many emerging and developing economies. Thus arise the need to collect new evidence over

exchange rate effects. Following this line of thought, our study examines the effect of exchange rate volatility on China's external trade. International trade has a substantial role in China's emergence as the second largest economy in the world. In July 2005, Chinese authorities decided to abandon their fixed exchange rate regime. We find that after this reform, the exchange rate effects on Chinese imports are negative while no influence is observable on Chinese exports. Therefore, the exchange rate changes are in favour of China's trade surplus. This may imply that reforms and liberalization in exchange rate regime favour China's external trade interests.

Notes

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1. The contribution of international trade is quite significant in China's emergence as the second largest global economy.
2. Two pertinent studies by McKenzie (1999) and Bahmani-Oskooee and Hegerty (2007) provide an extensive survey on the topic.
3. For details about this approach operationalization see Bahmani-Oskooee, Aftab and Harvey (2016).
4. Other studies that found the effect of exchange rate on trade are: Aftab, Abbas and Kayani (2012), Aliyu (2010), Asseery and Peel (1991), Cho, Sheldon and McCorriston (2002), etc.
5. In emerging and developing economies, exchange rate regimes are still not freely floating. The exchange rate is often used to maintain international competitiveness. The mechanism is such that any devaluation or depreciation in the exchange rate makes the exports of an economy cheaper in the international markets while imports of an economy expensive in its domestic market (Bahmani-Oskooee and Hegerty, 2010).

References

Aftab, M., Abbas, Z., & Kayani, F.N. (2012). Impact of exchange rate volatility on sectoral exports of Pakistan: An ARDL investigation. *Journal of Chinese Economic and Foreign Trade Studies*, 5(3), 215-231. doi: 10.1108/17544401211263973

Aliyu, S.U.R. (2010). Exchange rate volatility and export trade in Nigeria: An empirical investigation. *Applied Financial Economics, 20*(13), 1071-1084. doi: 10.1080/09603101003724380

Asseery, A., & Peel, D.A. (1991). The effects of exchange rate volatility on exports: Some new estimates. *Economics Letters, 37*(2), 173-177. doi: 10.1016/0165-1765(91)90127-7

Aristotelous, K. (2001). Exchange-rate volatility, exchange-rate regime, and trade volume: Evidence from the UK–US export function (1889–1999). *Economics Letters, 72*(1), 87-94. doi: 10.1016/S0165-1765(01)00414-1

Arize, A.C., Osang, T., & Slottje, D.J. (2000). Exchange-rate volatility and foreign trade: Evidence from thirteen LDC's. *Journal of Business & Economic Statistics, 18*(1), 10-17. doi: 10.2307/1392132

Bahmani-Oskooee, M., & Aftab, M. (2017). On the asymmetric effects of exchange rate volatility on trade flows: New evidence from US-Malaysia trade at the industry level. *Economic Modelling, 63*(June), 86-103. doi: 10.1016/j.econmod.2017.02.004

Bahmani-Oskooee, M., & Hegerty, S., & Zhang, R. (2014). Exchange-rate risk and UK-China trade: Evidence from 47 industries. *Journal of Chinese Economic and Foreign Trade Studies, 7*(1), 2-17. doi: 10.1108/JCEFTS-04-2013-0011

Bahmani-Oskooee, M., & Hegerty, S.W. (2007). Exchange rate volatility and trade flows: A review article. *Journal of Economic Studies, 34*(3), 211-255. doi: 10.1108/01443580710772777

Bahmani-Oskooee, M., & Hegerty, S.W. (2010). The J-and S-curves: A survey of the recent literature. *Journal of Economic Studies, 37*(6), 580-596. doi: 10.1108/01443581011086639

Bahmani-Oskooee, M., & Wang, Y. (2007). The impact of exchange rate volatility on commodity trade between the US and China. *Economic Issues, 12*(1), 31-52.

Bahmani-Oskooee, M., Aftab, M., Harvey, H. (2016). Asymmetry cointegration and the J-curve: New evidence from Malaysia-Singapore commodity trade. *The Journal of Economic Asymmetries, 14*(Part B), 211-226. doi: 10.1016/j.jeca.2016.10.001

Bélanger, D., Gutiérrez, S., Racette, D., & Raynauld, J. (1992). The impact of exchange rate variability on trade flows: Further results on sectoral US imports from Canada. *The North American Journal of Economics and Finance, 3*(1), 61-82. doi: 10.1016/1062-9408(92)90013-H

Choudhry, T. (2008). Exchange rate volatility and United Kingdom trade: Evidence from Canada, Japan and New Zealand. *Empirical Economics, 35*(3), 607-619. doi: 10.1007/s00181-008-0185-2

Cho, G., Sheldon, I.M., & McCorriston, S. (2002). Exchange rate uncertainty and agricultural trade. *American Journal of Agricultural Economics, 84*(4), 931-942.

De Grauwe, P. (1988). Exchange rate variability and the slowdown in growth of international trade. *IMF Staff Papers, 35*(1), 63-84. doi: 10.2307/3867277

Doğanlar, M. (2002). Estimating the impact of exchange rate volatility on exports: Evidence from Asian countries. *Applied Economics Letters, 9*(13), 859-863. doi: 10.1080/13504850210150906

Hooper, P., & Kohlhagen, S.W. (1978). The effect of exchange rate uncertainty on the prices and volume of international trade. *Journal of International Economics, 8*(4), 483-511. doi: 10.1016/0022-1996(87)90001-8

McKenzie, M.D. (1999). The impact of exchange rate volatility on international trade flows. *Journal of Economic Surveys, 13*(1), 71-106. doi: 10.1111/1467-6419.00075

Nishimura, Y., & Hirayama, K. (2013). Does exchange rate volatility deter Japan-China trade? Evidence from pre-and post-exchange rate reform in China. *Japan and the World Economy, 25*, 90-101. doi: 10.1016/j.japwor.2013.03.002

Pesaran, M.H., Shin, Y., & Smith, R.J. (2001). Bounds testing approaches to the analysis of level relationships. *Journal of Applied Econometrics, 16*(3), 289-326. doi: 10.1002/jae.616

Poon, W.C., Choong, C.K., & Habibullah, M.S. (2005). Exchange rate volatility and exports for selected East Asian countries: Evidence from error correction model. *ASEAN Economic Bulletin, 22*(2), 144-159.

Sauer, C., & Bohara, A.K. (2001). Exchange rate volatility and exports: Regional differences between developing and industrialized countries. *Review of International Economics, 9*(1), 133-152. doi: 10.1111/1467-9396.00269

Soleymani, A., & Chua, S.Y. (2014). Effect of exchange rate volatility on industry trade flows between Malaysia and China. *The Journal of International Trade & Economic Development, 23*(5), 626-655. doi: 10.1080/09638199.2013.803146

Tenreyro, S. (2007). On the trade impact of nominal exchange rate volatility. *Journal of Development Economics, 82*(2), 485-508. doi: 10.1016/j.jdeveco.2006.03.007

Wong, K.N., & Tang, T.C. (2008). The effects of exchange rate variability on Malaysia's disaggregated electrical exports. *Journal of Economic Studies, 35*(2), 154-169. doi: 10.1108/01443580810870146

Yuan, X., & Jianxiang, W. (2011). *The effects of exchange rate volatility on exports: Evidence from China*. In Proceedings of Fifth International Conference on Management of e-Commerce and e-Government, 5-6 November, Hubei, China. IEEE, pp. 43-45. doi: 10.1109/ICMeCG.2011.11