A new perspective on the third country effect: The case of Malaysia-US industry level trade

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A new perspective on the third country effect: The case of Malaysia-US industry level trade

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Abstract

Cushman (1986) suggested that impact of exchange rate volatility declines after the inclusion of third country effect. Like Cushman, when we use a linear analysis, we confirm his results. However, when we engage in asymmetric effects of exchange rate volatility which requires including nonlinear adjustment of volatility measures, the findings show more support to both exchange rate volatility influence and the third country effect. Therefore, we propose that in examining exchange rate volatility effect on trade, consideration must be given to not just asymmetric effects of exchange rate volatility but also asymmetric effects of the third country effect. We demonstrate these findings using monthly data from 54 Malaysian industries that export to the U.S. and 63 Malaysian industries that import from the U.S.

Keywords: Malaysia-US trade, Exchange Rate Volatility, Third-Country Effect, Nonlinear ARDL, Industry Data.

JEL Classification: F31

1. Introduction

Under the current international monetary system exchange rate volatility is said to affect the trade flows in either direction. Some traders trade less due to uncertain future prices. Some trade more today in order to cover their loss of future income. The empirical literature that is reviewed by Bahmani-Oskooee and Hegerty (2007) supports both views. Some recent examples since last review are: are Arize et al. (2000), Hall *et al.* (2010), Baek (2013), Hooy *et al*. (2015), and Asteriou *et al.* (2016). There is another part of the literature which argues for the so called "third-country" effect. Studies in this literature argue that a country's trade flows with one partner could be affected by volatility of the exchange rate with another partner. Examples in this group include: Cushman (1983, 1986), Bahmani-Oskooee and Xu (2012), Bahmani-Oskooee and Bolhassani (2014), Bahmani-Oskooee et al. (2016), and Bahmani-Oskooee et al. (2017).

No matter which group and which study we consider, they all have assumed that the effects of exchange rate volatility on the trade flows are symmetric. Bahmani-Oskooee and Aftab (2017) recently broke this tradition by arguing and demonstrating that the effects of exchange rate volatility on the trade flows could be asymmetric. As they argued, traders' reaction of an increase in exchange rate volatility could be different than their reaction to a decrease in volatility. If traders react to volatility changes asymmetrically, clearly trade flows will react to exchange rate volatility in an asymmetric manner.

Bahmani-Oskooee and Aftab (2017) demonstrated the asymmetric effects of exchange rate volatility by examining the effects of exchange rate volatility on the exports of 54 Malaysian industries to USA and 63 Malaysian industries that import from the USA. Thus, the only measure of volatility that they included in their model was that of real ringgit-dollar. Since another major partner of Malaysia happens to be China, we wonder if the real ringgit-yuan volatility which we

consider to be the "third-country" effect has asymmetric effects on the Malaysia-U.S. commodity trade. Figure 1 shows significant exchange rate volatility based on two volatility measures of Malaysian ringgit against US dollar and Malaysian ringgit against Chinese yuan, respectively. Since this is the first study addressing asymmetric effects of the "third-country" effect, we are curious to determine if Bahmani-Oskooee and Aftab's (2017) findings will be altered when we take into account the asymmetric effects of third country volatility. To that end, we introduce the models and methods in Section 2. Empirical results are presented in Section 3 with a summary in Section 4. Finally, we define the variables and provide source of data in an Appendix.

Figure 1 about here

2. The models and methods

The generic model that examines the impact of exchange rate volatility on trade includes income, relative prices and exchange rate volatility. In formulating our models we closely follow Bahmani-Oskooee and Aftab (2017) and just add the third-country effect, i.e., the real Malaysian ringgit-Chinese yuan volatility to their specifications to arrive at:

$$LnX_{i,t}^{MY} = \alpha_o + \alpha_1 DM_{2008} + \alpha_2 LnIP_t^{US} + \alpha_3 LnREX_t + \alpha_4 LnVol_t^{US} + \alpha_5 LnVol_t^{CH} + \varepsilon_t \quad (1)$$

$$LnM_{i,t}^{MY} = \beta_o + \beta_1 DM_{2008} + \beta_2 LnIP_t^{MY} + \beta_3 LnREX_t + \beta_4 LnVol_t^{US} + \beta_5 LnVol_t^{CH} + \mu_t \quad (2)$$

where *X* and *M* represent Malaysian real exports of commodity i to the US and real imports of commodity i from the US, respectively. *DM* is a dummy variable to capture Global Financial Crisis effect (i.e. DM=1 when t=2008, otherwise, DM=0). IP^{US} and IP^{ML} are industrial production indexes of the US and Malaysia, respectively. These indexes measure the effect of economic activity. Since the data are monthly, these are the only measures that are available on a monthly frequency. *REX*

is real bilateral exchange rate between Malaysia and the US used as proxy to measure relative prices. Finally, Vol^{US} and Vol^{CH} are volatility measures for Malaysian ringgit- US dollar and Malaysian ringgit-Chinese yuan rates, respectively. The details of variables definitions are provided in the Appendix. Theoretically, the signs of α_1 and β_1 are expected to be negative implying that a crisis situation may hurt trade. The signs of α_2 and β_2 are expected to be positive, implying that improvement in economic activity in both Malaysia and US promotes the trade. As the Appendix reveals, the REX variable defined in a manner that an increase reflects appreciation of the dollar or depreciation of the ringgit. Thus, based on this definition if ringgit depreciation is to increase Malaysian exports, we expect an estimate of α_3 to be positive. On the other hand, if depreciation is to reduce imports, we expect an estimate of β_3 to be negative. Finally, the signs of α_4 and β_4 & α_5 and β_5 can be positive or negative. Increased ringgit-dollar volatility can motivate traders to decrease their trade due to expected losses to their future profits and earnings. Increased ringgit-dollar volatility can also trigger the traders to increase their trade to get compensation for increased exchange rate risk through high trade volume. Similarly increased ringgit-yuan exchange rate volatility provides a situation to traders to divert their trade from China to the US. Alternatively, increased volatility provides an opportunity to divert trade from US to China.

Estimating (1) and (2) by any method, only yields long-run coefficient estimates. In order to assess the short-run effects of exogenous variables, it is a common practice to specify (1) and (2) as error-correction models. To this end, we follow Bahmani-Oskooee and Aftab (2017) and Pesaran *et al.* (2001) and adopt the following specifications:

$$\Delta LnX_{i,t}^{MY} = \alpha_o + \alpha_1 DM_{2008} + \sum_{j=1}^{n1} \alpha_{2j} \Delta LnX_{t-j}^{MY} + \sum_{j=0}^{n2} \alpha_{3j} \Delta LnIP_{t-j}^{US} + \sum_{j=0}^{n3} \alpha_{4j} \Delta LnREX_{t-j}$$
$$+ \sum_{j=0}^{n4} \alpha_{5j} \Delta LnVol_{t-j}^{US} + \sum_{j=0}^{n5} \alpha_{6j} \Delta LnVol_{t-j}^{CH} + \theta_1 LnX_{t-1}^{MY} + \theta_2 LnIP_{t-1}^{US} + \theta_3 LnREX_{t-1}$$
$$+ \theta_4 LnVol_t^{US} + \theta_5 LnVol_t^{CH} + \varepsilon_t \qquad (3)$$

$$\Delta LnM_{i,t}^{MY} = \beta_o + \beta_1 DM_{2008} + \sum_{j=1}^{n6} \beta_{2j} \Delta LnM_{t-j}^{MY} + \sum_{j=0}^{n7} \beta_{3j} \Delta LnIP_{t-j}^{MY} + \sum_{j=0}^{n8} \beta_{4j} \Delta LnREX_{t-j}$$
$$+ \sum_{j=0}^{n9} \beta_{5j} \Delta LnVol_{t-j}^{US} + \sum_{j=0}^{n10} \beta_{6j} \Delta LnV_{t-j}^{CH} + \rho_1 LnM_{i,t-1}^{MY} + \rho_2 LnIP_{t-1}^{MY} + \rho_3 LnREX_{t-1}$$
$$+ \rho_4 LnVol_{t-1}^{US} + \rho_5 LnVol_{t-1}^{CH} + \varepsilon_t \qquad (4)$$

The error correction models (3) and (4) capture the short run effects through the first differenced variables and long run effects through the normalized coefficients θ_2-θ_5 on θ_1 in (3) and $\rho_2 - \rho_5$ normalized on ρ_1 in (4). The validity of long run estimates requires that there must exist cointegration. To test for cointegration, Pesaran *et al*. (2001) propose the F test with new critical values that they tabulate. For a given level of statistical significance and k number of independent variables, there is a pair of values termed as lower bound and upper bound. The null hypothesis of no cointegration is rejected if the calculated F-statistic is higher than the upper bound. Since the critical values account for degree of integration of variables, there is no need for unit root testing and indeed, variables could be a combination of I(0) and I(1)[1].

As mentioned in the introduction, Bahmani-Oskooee and Aftab (2017) criticized the earlier literature for assuming the impact of exchange rate volatility on trade to be symmetric and showed

[1] We conduct unit root testing to make sure there is no second difference I(2) case. The results available with authors shows in fact no I(2) case was found.

that exchange rate volatility violates this assumption and in fact the exchange rate volatility can have asymmetric effects on the trade. We extend that path to the volatility of ringgit with currency of the third country, China. The approach here follows Shin et al. (2014) by separating an increase in any volatility measure from a decline in the same measures. Thus, we first form *ΔLnVol* that contains positive and negative changes. We then use partial sum concept to generate partial sum of positive changes as POS and partial sum of negative changes as NEG series as follows:

$$POS_t = \sum_{j=1}^{t} \Delta LnVol_j^{+} = \sum_{j=1}^{t} max(\Delta LnVol_j, 0),$$

$$NEG_t = \sum_{j=1}^{t} \Delta LnVol_j^{-} = \sum_{j=1}^{t} min(\Delta LnVol_j, 0) \qquad (5)$$

We use above construct to form POS and NEG series for ringgit-dollar rate volatility as POS^{US} and NEG^{US} and ringgit-yuan rate volatility as POS^{CH} and NEG^{CH}. We then shift back to (3) and (4) and replace each volatility measures by two newly constructed measures to arrive at:

$$\begin{aligned}\Delta LnX_{i,t}^{MY} = {} & \chi_o + \chi_1 DM_{2008} + \sum_{j=1}^{n1} \chi_{2j} \Delta LnX_{t-j}^{MY} + \sum_{j=0}^{n2} \chi_{3j} \Delta LnIP_{t-j}^{US} + \sum_{j=0}^{n3} \chi_{4j} \Delta LnREX_{t-j} \\ & + \sum_{j=0}^{n4} \chi_{5j} \Delta LnPOS_{t-j}^{US} + \sum_{j=0}^{n5} \chi_{6j} \Delta LnNEG_{t-j}^{US} + \sum_{j=0}^{n6} \chi_{7j} \Delta LnPOS_{t-j}^{CH} + \sum_{j=0}^{n7} \chi_{8j} \Delta LnNEG_{t-j}^{CH} \\ & + \vartheta_1 LnX_{t-1}^{MY} + \vartheta_2 LnIP_{t-1}^{US} + \vartheta_3 LnREX_{t-1} + \vartheta_4 LnPOS_t^{US} + \vartheta_5 LnNEG_t^{US} + \vartheta_6 LnPOS_t^{CH} \\ & + \vartheta_7 LnNEG_t^{CH} + \varepsilon_t \qquad (6)\end{aligned}$$

$$\Delta LnM_{i,t}^{MY} = \delta_o + \delta_1 DM_{2008} + \sum_{j=1}^{n8} \delta_{2j} \Delta LnM_{t-j}^{MY} + \sum_{j=0}^{n9} \delta_{3j} \Delta LnIP_{t-j}^{MY} + \sum_{j=0}^{n10} \delta_{4j} \Delta LnREX_{t-j}$$

$$+ \sum_{j=0}^{n11} \delta_{5j} \Delta LnPOS_{t-j}^{US} + \sum_{j=0}^{n12} \delta_{6j} \Delta LnNEG_{t-j}^{US} + \sum_{j=0}^{n13} \delta_{7j} \Delta LnPOS_{t-j}^{CH} + \sum_{j=0}^{n14} \delta_{7j} \Delta LnNEG_{t-j}^{CH}$$

$$+ \sigma_1 LnM_{i,t-1}^{MY} + \sigma_2 LnIP_{t-1}^{MY} + \sigma_3 LnREX_{t-1} + \sigma_4 LnPOS_{t-1}^{US} + \sigma_5 LnNEG_{t-1}^{US}$$

$$+ \sigma_6 LnPOS_{t-1}^{CH} + \sigma_7 LnNEG_{t-1}^{CH} + \varepsilon_t \qquad (7)$$

Since constructing the partial sum variables introduce nonlinearity into the models, error correction models (6) and (7) are called the nonlinear ARDL models whereas, (3) and (4) are called the linear ARDL models.

Shine *et al*. (2014) demonstrate that Pesaran et al.'s (2001) approach of estimating linear models are equally applicable to the nonlinear models. Once (6) and (7) are estimated by the OLS method, a few asymmetry hypothesis could be tested. First, short run adjustment asymmetry is established if POS takes different number of lags than NEG. Second, short run asymmetry effects can be observed if the sign or size of coefficients attached to POS and NEG are different at each lag j. Third, one can also test for short run cumulative or impact asymmetry if the sum of coefficients attached to POS is statistically different from the sum of coefficients attached to NEG (e.g. $\sum \hat{\chi}_{5j} \neq \sum \hat{\chi}_{6j}$ and $\sum \hat{\chi}_{7j} \neq \sum \hat{\chi}_{8j}$ in (6)). On similar fashion long run asymmetric effect is established if normalized coefficient attached to POS and NEG is statistically different. This is tested through the Wald test for model (6) such as $\hat{\vartheta}_4 / -\hat{\vartheta}_1 \neq \hat{\vartheta}_5 / -\hat{\vartheta}_1$ for Malaysian ringgit-US dollar rate volatility and $\hat{\vartheta}_6 / -\hat{\vartheta}_1 \neq \hat{\vartheta}_7 / -\hat{\vartheta}_1$ for Malaysian ringgit-Chinese yuan volatility. Similarly the long run asymmetry for model (7) is tested through $\hat{\sigma}_4 / -\hat{\sigma}_1 \neq \hat{\sigma}_5 / -\hat{\sigma}_1$ and $\hat{\sigma}_6 / -\hat{\sigma}_1 \neq \hat{\sigma}_7 / -\hat{\sigma}_1$. It should be noted that the Wald test is used to test these hypotheses. Note

also that in applying the F test for cointegration in the nonlinear models, the two partial sum variables must be treated as a single variable so that when we move from the linear model to nonlinear model, the critical values of the F test remains the same. Shin et al. (2014, p. 291) argue that this is due to dependency between partial sum variables.

3. The Results

Following Bahmani-Oskooee and Aftab (2017), estimations of nonlinear models (6) and (7) serve the study purpose. However, to have a linear vs nonlinear models comparison, we also estimate the linear models (3) and (4). Using the same data set for 54 Malaysian exporting industries to the US and 63 Malaysian importing industries from the US, we estimate the models using monthly data over the same period of April 2001 to December 2015. We impose maximum six time lags and use the Akaike's Information Criterion (AIC) to select an optimum model in each case. Due to the volume of results we use only 1% (5%) level of statistical significance denoted as ** (*) with critical values described in notes beneath the tables.

Firstly, we discuss the results for linear export model (3). From the short-run estimates (not reported but available upon request) we confirm that the Malaysian ringgit-US dollar rate volatility (ΔVol^{US}) carried with at least one significant lag coefficient in 30 cases. On the other hand, the third country effect that is captured through the coefficients attached to ΔVol^{CH} was only observable in nine cases where at least one lag was significant in each case. These results show that the third country effect is not dominant for Malaysian exports to the US in the short run. Do these results are transitory or persistent in the long run? Table 1 which reports the long-run estimates reveals that the long run coefficient of Vol^{US} is significant in five cases only. The effect is negative in three industries coded; 29, 51, 81 and positive in industries coded; 42, 59. Both positive (51- Organic Chemicals (.51% trade share)) and negative (42. Fixed vegetable oils and fats, crude, refined pr

fractionated (1.16 % trade share)) affected industries include each one large industry along others small industries. Thus the ringgit-dollar volatility effect sustains in few cases in the long run. Bahmani-Oskooee and Aftab (2017) have reported this effect in 13 export industries. We look into the coefficients attached to Vol^{CH} to examine that the decline in significant cases in the long run, may be due the third country effect. Interestingly, we observe the presence of third country effect in 19 industries. These industries includes eleven positive affected industries (i.e. 04, 08, 09, 29, 51, 53, 54, 55, 64, 69, 81) and the remaining negative affected industries (23, 24, 33, 42, 59, 63, 75, 76). Surprisingly these results show that the exchange rate volatility effect for industries such as 04, 09, 24, 33, 63, and 76, reported by Bahmani-Oskooee and Aftab (2017) was in fact, due to the third country effect and it vanished after the introduction of third country effect. This substantiates Cushman (1986). The effect of other variables in the linear export model is as; the influence of financial crisis is observable in just four cases being positive in industry coded 83 and negative in industries coded; 08, 11, 24. The expected positive effect of economic activity (IP^{US}) is observable in 14 industries; 05, 09, 11, 24, 51, 52, 63, 64, 66, 69, 73, 76, 81, 93. However, the negative effect of IP^{US} is also observable in industries 00, 06, 26 which implies that improvement in economic activity in the USA leads to substitution for these Malaysian industries products demand in the USA (Bahmani-Oskooee, 1986). The coefficient of relative price variable (REX) is in its positive expected direction in industries coded; 00, 05, 12, 53, 54, 63, 64, 76, 81. It is negative only in three industries coded; 08, 28, 33. These estimates for export model are only appropriate if they are supported through the diagnostic statistics that are reported in Table 2.

Tables 1-2 about here

The most important for the validity of long-run estimates is to establish cointegration. The F-test that is used to examine the cointegration, shows the presence of cointegration in 21 cases

out of total 54 cases where the F-statistic is higher than 4.01 critical value at 5% level of significance. Pesaran *et al.* (2001) also suggest t-statistics for lagged error correction term (ECM_{t-1}) to examine the cointegration alternatively[2]. Based on ECM_{t-1}, the cointegration is established in 45 industries using -3.99 critical value at 5% level of significance. In this way the cointegration is present in the majority of ringgit-dollar volatility and ringgit-yuan volatility affected industries. Other diagnostic tests like adjusted R^2 shows appropriate model fit. The Lagrange Multiplier (LM) test show no serial correlation issue in all cases based on 3.841 tabular value at 5% level of significance of chi-square distribution with one degree of freedom. The Ramsey's test that also bases on chi-square distribution with single degree of freedom, shows export model is appropriately specified in the majority of cases. CUSUM and CUSUM square tests gauge the stability of the short run and long run estimates. The stable cases are labeled as "S" and unstable cases are labeled as "U". The results show that the linear export model is stable in all the cases based on either CUSUM or CUSUM square results. Overall, the diagnostic results support the meaningfulness of our export model estimates.

Next, we move to the linear import model (4) estimates. Again, short-run estimates not reported but available upon request revealed that ΔVol^{US} carried at least one significant lag coefficient in 33 cases. On the other hand, ΔVol^{CH} carried at least one significant coefficient in 15 industries. Do these short run effects sustain in the long run? Long-run estimates reported in Table 3 reveal that ringgit-dollar volatility has significant long-run effects in 34 industries. This effect is positive in industries coded; 00, 07, 26, 28, 29, 51, 57, 59, 62, 64, 71, 72, 75, 77, 79, 82, 87, 97 and negative in industries coded; 09, 24, 25, 27, 32, 43, 56, 61, 63, 68, 76, 78, 81, 85, 88, 89. The large industries like 71, 72, 75, 77, 87 that collectively constitute around 24.5% share of

[2] For details on ECM_{t-1} operationalization see Aftab et al. (2016) and Bahmani-Oskooee and Tanku (2008).

Malaysia trade with the USA, are positively affected. More or less, this is in line with Bahmani-Oskooee and Aftab (2017). The third country effect is observable in 22 industries in the long run. It is positive in 11 cases and negative in 11 cases[3]. Moving to the other variables of the import model, the effect of 2008 financial crisis is observable only in seven cases. The effect of Malaysian economic activity (IP^{ML}) is encouraging for American goods demand in Malaysia for 22 industries out of total 31 significant cases. Finally, the effect of REX is positive in two cases and negative in six cases. This implies that the exchange rate depreciation discourages Malaysian imports from the US in the majority of the significant cases.

Tables 3 and 4 about here

Again, the meaningfulness of import model analysis requires that we pass the diagnostic tests that are reported in Table 4. Based on either the F test or ECM_{t-1} test, cointegration is established in any industry in which at least one of the variables carried a significant normalized long-run coefficient estimate. The LM and RESET test support the absence of serial correlation and appropriate model specifications, respectively in the majority of the cases. The CUSUM and CUSUM square denoted as CU and CUQ, respectively show that estimates are stable either in CU or CUQ in all the 63 import industries.

In a brief summary for the long run results so far, the effect of exchange rate volatility is observable in 5 out of total 54 Malaysian exporting industries to the US and 34 out of total 63 Malaysian importing industries from the US. On the other hand, third country effect is significant in 19 exporting and 22 importing industries.

[3] The positive effected cases are coded; 05, 08, 09. 27, 32, 42, 54, 56, 61, 84, 89 and negative affected cases are coded; 02, 11, 12, 24, 25, 28, 64, 66, 71, 75, 87 in Table 3.

Now we move to the extension of earlier linear model to nonlinear framework. We first consider the short run effects of exchange rate volatility and third country effect for our export model (6). Once again, the short-run effects not reported but available upon request revealed that either ΔPOS^{US} or ΔNEG^{US} carried at least one significant coefficient in 32 exporting industries. The short run significant cases were 30 in earlier linear analysis. Therefore segregation of exchange rate volatility increase from exchange rate volatility decrease exposes more significant effects. Similarly the third country effect was present either through either ΔPOS^{CH} or ΔNEG^{CH} in 23 industries. The linear model supported third country effect in nine cases only in the short run. Such increased number of significant cases must be attributed to nonlinear adjustment of the third country volatility measure. Towards the main motive of asymmetric analysis, we also found adjustment asymmetry in 26 industries coded; 05, 09, 08, 11, 28, 33, 43, 53, 54, 58, 59, 61, 64, 65, 68, 73, 74, 75, 76, 77, 78, 79, 81, 82, 85, 88 as ΔPOS^{US} and ΔNEG^{US} took different lag orders. Short run asymmetric effects are observable in almost all the export industries as coefficients attached to ΔPOS^{US} and ΔNEG^{US} were different in either size or sign in each industry case. Impact asymmetry - that is established through the Wald test denoted as Wald-S^{US} in Table 6 is supported in 15 export industries (i.e. 08, 09, 11, 26, 33, 42, 43, 55, 59, 64, 65, 66, 68, 76, 77). These includes large industries like 76-Telecommunications and sound recording, 77-Electrical machinery, apparatus and appliance that collectively constitute around 22% trade share. Similarly notable asymmetric effects were observable for third country effect. Adjustment asymmetry was present in 22 industries (03, 04, 08, 09, 12, 23, 24, 33, 51, 53, 58, 61, 63, 64, 66, 69, 73, 78, 79, 81, 83, 88) where ΔPOS^{CH} and ΔNEG^{CH} carried different lags. Short run asymmetric effects of third country were established in all the export industries due to the size or sign difference between ΔPOS^{CH} and

ΔNEG^{CH} for each industry case. However, third country short-run impact asymmetric effect (Wald-S^{CH}) is notable in 6 cases coded as 23, 33, 53, 63, 64, 66 (refer to Table 6 again).

Tables 5 and 6 here

Has the introduction of nonlinearity improved the long run results? The answer lies in the long run results for nonlinear export model reported in Table 5 and the diagnostics in Table 6. The effect of exchange rate volatility is observable in 31 cases where either the coefficient attached to POS^{US} or NEG^{US} is significant[4]. This asymmetric analysis reveals more detailed exposure to exchange rate volatility effects. For instance, Exchange rate volatility increase (POS^{US}) hampers the export of industry coded 77- Electrical machinery, apparatus and appliances - that is one of the largest industry in Malaysian trade with USA. However, the decrease in exchange rate volatility (NEG^{US}) show no effect on this industry. On the other hand, no such effect was observable in the linear export model analysis altogether for this industry. If we look into the size or sign of POS^{US} and NEG^{US} coefficients, asymmetric effects are present in all the cases. We move to Table 6 to look at Wald-L^{US} based asymmetry testing and find statistical significant exchange rate volatility asymmetric effects in 27 cases. Third country effect is also observable in 24 cases where POS^{CH} or NEG^{CH} is significant. Long run asymmetric effects for third country are observable in all cases based on sign or size difference between the POS^{CH} and NEG^{CH}. However, the statically significant effects tied with third country effect based on Wald-L^{CH} are observable in 23 cases as reported in Table 6. Other variables of nonlinear export model show about similar results to earlier linear

[4] Bahmani-Oskooee and Aftab (2017) reported 18 exchange rate affected industries based on their nonlinear export model. Therefore, one may conclude that decline in exchange rate volatility effect after the introduction of third country effect in linear export model was due to ignoring the nonlinearity in exchange rate volatility and third country effect variables. Once, the nonlinearity issue is dealt, the introduction of third country effect in the export model improves exchange rate volatility effect.

model. Being our focus on asymmetric effects of exchange rate volatility and third country effect, we are capering their discussion here.

Again the meaningfulness of the above long run estimates requires the support of diagnostic tests. Most important in this regard is the presence of asymmetry cointegration. F-test results reported in Table 6 show the support for cointegration in 22 cases. Alternatively based on $ECM_{t-1,}$ cointegration is established in 44 cases out of the total 54 cases. The industries where cointegration is not established are; 03, 55, 61, 67, 68, 71, 72, 73, 84, 89. We do not find the absence of cointegration as a serious issue for our results as all of these ten industries except 03-Fish, crustaceans and molluscs, and preparations thereof, do not respond to either exchange rate volatility or third country effect. Other diagnostic tests are supportive in the majority of cases. For instance, serial correlation is not an issue in all the cases based on LM test, model is well specified in many cases based on RESET, and stability of short run and long run estimates is well supported through either CUSUM or CUSUMQ in all the cases.

Finally, we discuss the counterpart of linear import model (4), the nonlinear import model (7) whose long-run estimates and diagnostics are reported in Tables 7 and 8. But first, summary of short-run estimates that are not reported but available upon request. The short run effects of exchange rate volatility were observed in 43 industries where either the ΔPOS^{US} or ΔNEG^{US} carried at least one significant coefficient. Thus, nonlinear model improves the number of volatility affected industries that were 33 based on the linear import model. Similarly, the nonlinear estimates for third country effect revealed that either ΔPOS^{CH} or ΔNEG^{CH} carried at least one significant coefficient in 23 industries. Given that comparable figure from the linear model was 15, the increase must be attributed to nonlinear adjustment of the third-country volatility measure. Short run asymmetric effects for exchange rate volatility and third country effect, based on

difference in sign or size of coefficients of ΔPOS and ΔNEG were observed in all the 63 import industries. The adjustment asymmetry for exchange rate volatility was present in 38 cases where the number of lags attached to ΔPOS^{US} were different than the ones attached to ΔNEG^{US}[5]. On the same fashion, third country adjustment asymmetry was observed in 17 cases[6]. The cumulative impact asymmetry for exchange rate volatility (Wald-S^{US}) was established in the results for industries coded as 27, 28, 42, 51, 58, 63, 68, 69, 71, as reported in Table 8. On the other hand, third country impact asymmetry is gathered for six cases coded; 01, 25, 33, 67, 68, 81 based on Wald-S^{CH} (refer to Table 8). Thus, in summary the short analysis based on segregation of exchange rate volatility and third country effect changes into increase (POS) and decrease (NEG) through the introduction of nonlinear adjustment establishes the short run asymmetric effects for both exchange rate volatility and third country effect. Do these short-run effects translate into the long run?

From Table 7 we gather that there are 45 cases where either POS^{US} or NEG^{US} coefficient is significant. Definitely the effect is observable in more cases than the linear analysis where it was observable only in 34 cases[7]. Moreover, we get more insight on this effect. For instance the effect was positive for industry coded 77- Electrical machinery, apparatus and appliances in linear analysis. However, through nonlinear analysis, we come to know that this effect is only due to the increase in exchange rate volatility (POS^{US}). However, on the basis of Wald test denoted as Wald-L^{US} in Table 8, the long-run asymmetry is established in twenty cases coded as; 02, 05, 22, 24, 29, 34, 43, 52, 53, 54, 58, 67, 68, 69, 79, 82, 83, 84, 85, 97. Similarly the cases where POS^{CH} or NEG^{CH}

[5] These industries codes are; 00, 04, 24, 25, 27, 28, 29, 32, 33, 41, 43, 51, 52, 55, 56, 57, 58, 59, 61, 63, 64, 66, 68, 71, 72, 73, 74, 75, 78, 79, 81, 82, 84, 85, 87, 88, 89, 93.
[6] The cases where ΔPOS^{CH} and ΔNEG^{CH} carry different lags are coded; 01, 02, 04, 05, 24, 29, 52, 53, 56, 58, 67, 68, 75, 76, 77, 81, 93.
[7] Bahmani-Oskooee and Aftab (2017) reported this effect in 37 industries without including the third country effect.

are significant are total of 31 industries. Again this third country effect is higher than that of 22 cases observed in the linear analysis. However, only in 14 industries coded; 05, 22, 24, 27, 29, 34, 52, 53, 54, 67, 68, 83, 85, 97 the long-run asymmetric effect so third-country effect is significant, as reflected by significant Wald-L^{CH} statistic in Table 8. Again we are skipping the discussion on the other variables of import model due to their resemblance to earlier linear results and our focus on asymmetric effects of exchange rate volatility and third country effect.

Table 7 & 8 about here

Once again, the meaningfulness of long run estimates requires that cointegration should be established. From Table 8 we gather that in any industry that there was at least one significant long-run coefficient, with the F or ECM_{t-1} test is significant. Other diagnostics also provide appropriate support. For instance, adjusted R^2 show the model fit in all cases. LM affirms the absence of residual serial correlation in all cases. RESET shows the appropriate specification of model in many cases. Finally CUSUM and CUSUM state the short run and long run estimates stability at least through anyone of these two tests in all cases.

4. Summary and Conclusion

The impact of exchange rate volatility on trade has been much important for traders and policy makers since the inception of free float exchange rate system in the early 1970s. Due to its relevance, there has been progression on the related literature in this area with a prime focus to have more refined findings[8]. Extant literature is rich in flourishing this area from initial aggregated level studies considering a country's total trade with the rest of the world to industry specific studies disaggregating trade into some particular trading partner(s). Over the period, the

[8] One IMF based comprehensive study by Clark et al. (2004) attributes failure to find significant exchange rate volatility effect on trade to the aggregation bias and ignoring exchange rate volatility asymmetries among other issues.

econometric of these studies has also advanced from simple regression and correlation to the more advanced error-correction modeling and cointegration approaches. These efforts can help in properly estimating the cost of exchange rate volatility for international trade.

This study examines the third country effect along the exchange rate volatility influence on Malaysia-US bilateral industry level trade. Cushman (1986) pointed that exchange rate volatility effect may be overstated in case of neglecting the third country effect and he supported his claim through an empirical evidence. We point out that the weak exchange rate volatility effect after third country effect inclusion may be due to ignoring the nonlinearity in the volatility variables. In fact, our results shows that when third country affect is included in the linear analysis, the effect of exchange rate volatility declines. For instance, Bahmani-Oskooee and Aftab (2017) reported that exchange rate volatility affects 13 Malaysian exporting industries to the US and 36 Malaysian importing industries from the US. Using the same data to make comparison, we find that after the inclusion of third country effect (i.e. Malaysian ringgit/Chinese yuan volatility), the exchange rate volatility effect declines to 5 Malaysian exporting industries to the US and 34 Malaysian importing industries. Based on linear model, we also find significant third country effect on 19 Malaysian exporting industries to the US and 22 Malaysian importing industries from the US.

In further analysis, we find that decline in the exchange rate volatility effect was not due to the inclusion of third country effect rather it was due to ignoring the asymmetric effects of exchange rate volatility and third country effect. Based on our nonlinear model, we find that exchange rate volatility effect is significant in 31 Malaysian exporting industries to the US and 45 Malaysian importing industries in the short run. These numbers are even higher than Bahmani-Oskooee and Aftab (2017) nonlinear analysis where they found the exchange rate volatility effect

in 18 Malaysian exporting industries to the US and 37 Malaysian importing industries. Similarly, based on nonlinear analysis, the impact of third country was also observed in more cases (i.e. 24 export industries and 31 import industries), again in the short run. The results are even stronger in the long run, in terms of significant asymmetry effects. Without third-country effect Bahmani-Oskooee and Aftab (2017) found significant long-run asymmetric effects in 15 exporting and 15 importing industries. These numbers increase to 27 and 20 respectively when we include third-country effect. The third country volatility itself had significant long-run asymmetric effects on 23 exporting and 14 importing industries. In summary, including third-country effect and introducing nonlinear adjustment of the exchange rate volatility improves the results in terms of finding more significant effects.

Appendix

Data definitions and sources

This study takes 54 Malaysian export and 63 Malaysian import industries involved in bilateral trade with the U.S. The sample is based on the Standard International Trade Classification (SITC) 2 digit level. The trade data are retrieved from Malaysian External Trade Statistics (METS). The data related to exchange rate and industrial production are sourced from Datastream. Monthly data are used over the period April 2001 to December 2015 (i.e. 177 observations for each variable).

Variables

X_i = Malaysian real export flows to US for each industry *i.* In the absence of the price level at the industry level on a monthly basis for our study period, nominal exports in terms of ringgit are deflated by Malaysian CPI.

M_i = Malaysian real import flows from US for each industry *i*. Again, in the absence of the price level at the industry level on a monthly basis, nominal imports in terms of ringgit are deflated by Malaysian CPI.

IP_t^{US} = US industrial production index is used as a measure of economic activity in the U.S.

IP_t^{MY} = Malaysian industrial production index,

REX_t = Real bilateral exchange rate calculated as $REX_t = \frac{NEX_t * CPI_t^{US}}{CPI_t^{ML}}$ where NEX_t is a nominal bilateral exchange rate defined as the number of Malaysian ringgit per U.S. dollar. CPI_t^{US} and CPI_t^{ML} are consumer price indices for the U.S. and Malaysia, respectively,

Vol^{US} = Volatility measure of REX_t based on Generalized Autoregressive Conditional Heteroskedasticity (GARCH 1, 1). See Aftab et al., (2016) for GARCH based volatility measurement details.

Vol^{CH} = Volatility measure of real ringgit-yuan rate based on Generalized Autoregressive Conditional Heteroskedasticity (GARCH 1, 1).

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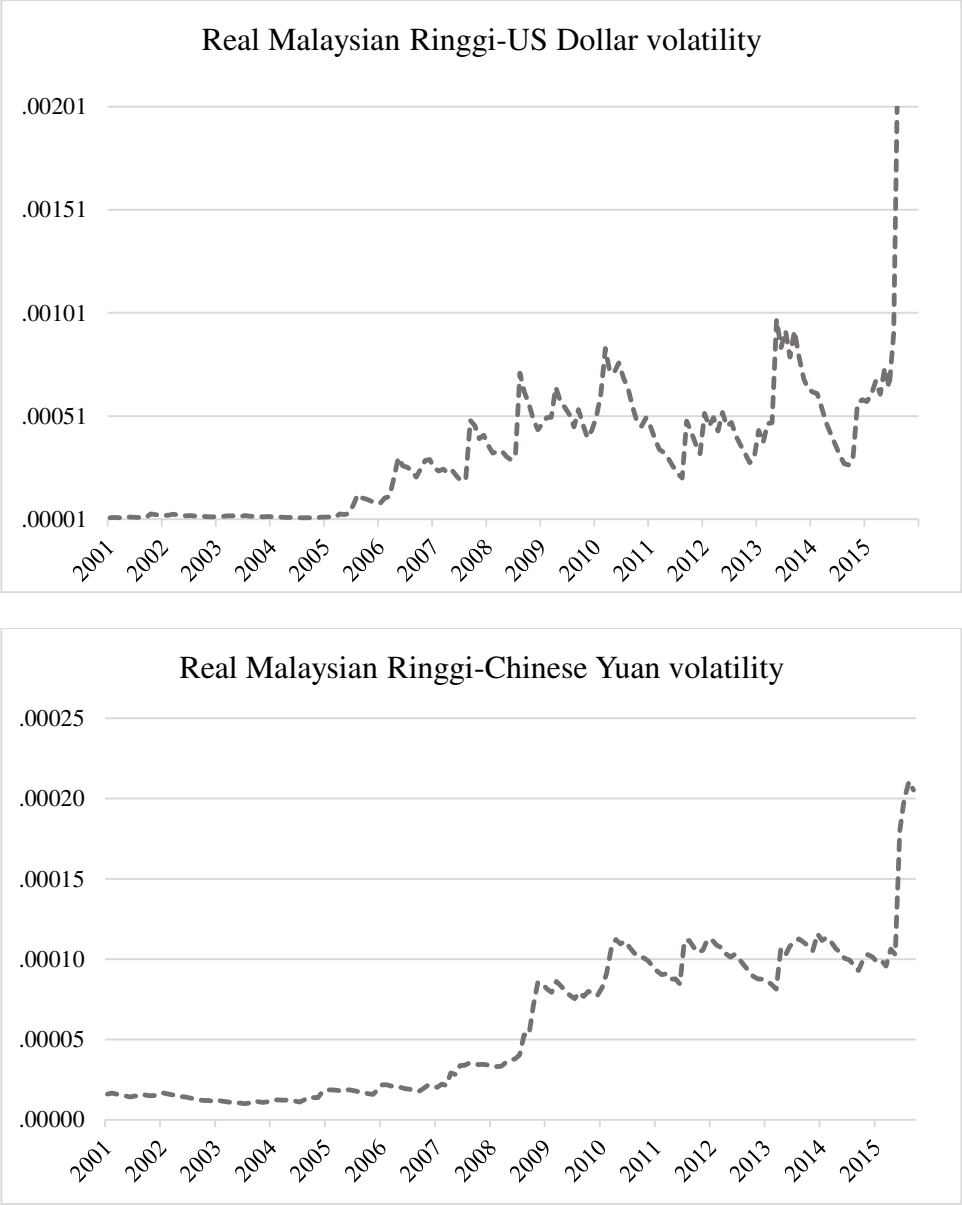

Figure 1: Two measures of Malaysian ringgit volatility

Table 1: Long-run coefficient estimates of linear ARDL export model (3)						
Industry	**Long-run coefficient estimates**					
	C	DUM_{08}	$LnIP_t^{US}$	$LnREX_t$	$LnVol_t^{US}$	$LnVol_t^{CH}$
00-Live animals	12.4719**	.2275	-6.1356**	3.4542**	-.0639	.3549
03-Fish, crustaceans and molluscs, and preparations thereof	.6919**	-.0882	1.2766	-5.9628	.1369	-.5872
04-Cereals and cereal preparations	5.0096**	.0291	.3996	.7199	-.0005	.2852**
05-Vegetables and fruits	1.2264**	.0502	1.7432**	1.8312**	.0223	-.0571
06-Sugars, sugar preparations and honey	8.8298**	.3012	-10.0231**	1.0907	.3866	.1518
07-Coffee, tea, cocoa, spices, and manufactures thereof	2.715**	.4583	-2.9018	2.2943	.2423	.1574
08-Feeding stuff for animals (not including un milled cereals)	.8875**	-.6455*	6.4077	-8.7687**	-.0095	1.0165*
09-Miscellaneous edible productsandpreparations	2.4943**	-.0796	2.0031*	-.1442	.0528	.4552**
11-Beverages	-.7949**	-.2949*	4.3842**	-1.2318	-.0636	.2350
12-Tobacco and tobacco manufactures thereof	.1182	.9072	-7.1416	3.1063**	.4159	.2705
23-Crude rubber (including synthetic and reclaimed)	2.8392**	.1859	-1.1785	-1.3694	.1391	-.4016**
24-Cork and wood	.0197**	-.2169**	2.7001**	.5652	.0246	-.2783**
26-Textile fibres (other than wool tops) n.e.s.	15.9566**	-.7942	-11.6701**	-4.7947	-.0261	.6088
28-Metalliferous ores and metal scrap	4.4694**	-.2311	2.0684	-8.3244**	.1226	-.3799
29-Crude animal and vegetable materials, n.e.s.	.5229**	-.1050	3.4963	1.2798	-.4404**	1.17562**
33-Petroleum, petroleum products and related materials	9.4422**	-.1995	-2.3481	-5.0967*	-.0814	-1.1497**
42-Fixed vegetable oils and fats,crude, refined or fractionated	7.5396**	-.5904	-15.8809	-9.9131	1.63**	-2.6029*
43-Animal or vegetable oils and fats, processed n.e.s.	2.6758**	.1113	1.9514	-1.2461	-.0153	.2700
51-Organic chemicals	-.3758**	-.0460	4.6553**	.3571	-.2824**	.4205*
52-Inorganic chemicals	-6.438**	.6137	12.9984*	6.4283	-.5584	1.4727
53-Dyeing, tanning and colouring materials	.1625**	.1996	2.9449	6.683*	-.3079	1.1092**
54-Medicinal and pharmaceutical products	1.5473**	.1605	2.3378	11.0667**	-.1906	1.7811**
55-Essential oils and resinoids and perfume materials n.e.s.	1.9883**	.0971	.9860	2.3435	-.0850	.6796**
57-Plastics in primary forms	.5707**	-.0904	2.7291	1.8448	-.1145	.2752
58-Plastics in non-primary forms	1.3853**	.3718	-.3371	2.9664	.1236	-.0704
59-Chemical materials and products,n.e.s.	4.3494**	.0580	-2.7043	-.6337	.3811**	-.5275*
61-Leather, leather manufactures, n.e.s.	-3.3705**	-.7792	7.9920	1.0501	.7179	-1.3993
62-Rubber manufactures, n.e.s.	2.3725**	.0966	-2.9197	.1667	.2197	-.4546
63-Cork and wood manufactures(excluding furniture)	.3538**	-.1521	2.12592**	2.5212**	-.0445	-.2968**
64-Paper, paperboard, and articles of paper pulp n.e.s.	-2.3985**	.1047	5.7403**	2.955**	-.0577	.5966**
65-Textile yarn, fabrics, made-up aricles, n.e.s.	1.5516**	-.2600	.6282	-.3834	-.0597	-.0688

66-Non-metallic mineral manufactures n.e.s.	-.3387**	.1135	3.6403*	2.2120	-.2109	.1655
67-Iron and steel	-1.8011**	.1987	5.9858	.7654	.1455	-.4632
68-Non-ferrous metals	-.2784**	-.0598	5.0295	-3.3225	.1487	-.1145
69-Manufactures of metal, n.e.s.	1.4891**	-.1028	2.895**	.1981	-.0162	.139*
71-Power generating machinery and equipment	2.2464**	.2430	-.2601	-.1994	-.0540	.0092
72-Machinery specialized for particular industries	1.0345**	-.2973	1.0225	1.1833	.1444	-.2932
73-Metalworking machinery	-2.5258**	.0540	8.0562**	1.4800	.1739	.0951
74-General industrial machinery and equipment, n.e.s.	1.1419**	-.0198	1.0822	-.2338	.1540	-.1799
75-Office machines and automatic data processing equipment	1.3701**	.0464	-4.1833	3.2021	.2904	-1.1355*
76-Telecommunications and sound recording n.e.s.	2.0839**	-.0288	1.1406*	1.6596**	-.0157	-.2932**
77-Electrical machinery, apparatus and appliances, n.e.s.	1.0965**	-.1445	1.5947	.8661	-.0572	-.0734
78-Road vehicles (including air-cushion vehicles	-1.4273**	-.1543	9.3911	.0330	-.2881	1.0037
79-Others transport equipment	3.3654**	.0084	1.0534	.5735	.0405	.0771
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s.	-4.1297**	.1566	9.8596**	5.1243**	-.4838**	1.6536**
82-Furniture and parts thereof	1.9996**	.1224	-3.7630	2.8660	.1753	-.2937
83-Travel goods, handbags and similar containers	-4.7342**	.134**	14.8807	-4.9555	-.5429	-.0244
84-Articles of apparel and clothing accessories	4.0555**	.2910	-8.8649	-1.3084	.1560	-.7045
85-Footwear	-1.0435**	.1415	7.1037	-5.8306	-.2412	.4715
87-Professional instruments and apparatus, n.e.s.	2.5808**	.2738	-6.9930	4.2930	.2607	-.2459
88-Photographic apparatus, equipment and supplied and optical goods, n.e.s.,	1.1367**	.5865	.8359	6.2614	-.3334	.6810
89-Miscellaneous manufactured articles, n.e.s.	2.0257**	.0608	-1.1428	2.7936	.0753	.1844
93-Special transactions and commodities	-5.6672**	-.3956	13.3689**	1.8004	-.2397	-.1092
97-Gold, non-monetary	-1.1398**	.6952	5.3886	5.1982	-.2168	1.1568
Notes: ** and * show the significance level at 1% and 5%, respectively. The critical values of standard t-distribution, i.e., 2.32 and 1.96 are used to arrive at ** and * , respectively. Abbreviation n.e.s. refers to not elsewhere defined.						

Table 2: Diagnostic statistics associated with estimates of linear export models in Table 3							
Industry (Trade Share)	**Diagnostics**						
	F_{PSS}[a]	ECM_{t-1}	Adj. R^2	LM	RESET	CU	CUQ
00-Live animals (.0003)	17.7935**	-.7728(10.3361)**	.2203	.2609	6.5192*	S	S
03-Fish, crustaceans and molluscs, and preparations thereof (.3562)	1.6814	-.1174(8.5684)**	.8085	.4909	.0282	S	S
04-Cereals and cereal preparations (.0272)	17.8354**	-.7809(10.3208)**	.4135	.3374	.1740	U	S
05-Vegetables and fruits (.0235)	17.1677**	-.7686(10.3204)**	.3950	.0155	.6777	S	U
06-Sugars, sugar preparations and honey (.0136)	2.8839	-.3251(4.2414)*	.5882	.9248	.3792	S	U
07-Coffee, tea, cocoa, spices, and manufactures thereof (.4406)	2.9282	-.2016(4.1942)*	.7410	.2943	2.3727	S	S
08-Feeding stuff for animals (not including un milled cereals) (.0153)	4.6761*	-.8664(9.8965)**	.8664	3.0708	.7118	S	U
09-Miscellaneous edible products and preparations (.0355)	8.0142**	-.5406(6.9918)**	.7367	.4383	1.1482	U	S
11-Beverages (.0161)	8.0572**	-.6219(6.9883)**	.4405	.1195	.0595	S	S
12-Tobacco and tobacco manufactures thereof (.0022)	3.9847	-.4326(4.9698)**	.5452	.9117	3.2181	S	U
23-Crude rubber (including synthetic and reclaimed) (.2603)	4.18*	-.3134(5.0558)**	.6614	1.8256	2.9285	S	S
24-Cork and wood (.096)	4.6349*	-.54(5.4049)**	.6974	.1162	.3025	S	S
26-Textile fibres (other than wool tops) n.e.s. (.0036)	6.8446**	-.4706(6.4738)**	.4518	.5018	2.3110	U	S
28-Metalliferous ores and metal scrap (.0577)	20.8678**	-.2173(7.876)**	.2173	.0327	.0628	S	U
29-Crude animal and vegetable materials, n.e.s. (.003)	2.4757	-.3619(4.1009)*	.6037	.2562	3.7496	S	S
33-Petroleum, petroleum products and related materials (.6436)	16.6971**	-.9846(10.1128)**	.3782	.4605	1.6538	S	S
42-Fixed vegetable oils and fats,crude, refined or fractionated (1.1625)	3.3791	-.1976(4.4113)*	.7394	.5825	3.917*	S	U
43-Animal or vegetable oils and fats, processed, n.e.s. (.7122)	3.7214	-.4745(4.7683)**	.5918	.2533	2.4487	S	S
51-Organic chemicals (.5114)	2.5812	-.4176(3.8781)	.3969	.8666	.1455	S	S
52-Inorganic chemicals (.0967)	3.1431	-.3431(4.3567)*	.4374	.1152	3.7143	S	S
53-Dyeing, tanning and colouring materials (.0151)	4.9634*	-.3749(5.4897)**	.3594	.0483	.0375	S	S
54-Medicinal and pharmaceutical products (.0387)	7.9593**	-.5646(6.9989)**	.4186	1.3236	1.6421	S	S
55-Essential oils and resinoids and perfume materials, n.e.s. (.0352)	1.8237	-.3355(3.3064)	.5844	.5645	.3274	U	S
57-Plastics in primary forms (.048)	7.1983**	-.5983(6.7096)**	.1494	.5507	3.6810	S	U
58-Plastics in non-primary forms (.0702)	3.2409	-.2389(4.4575)*	.6374	1.7041	.4744	S	S
59-Chemical materials and products,n.e.s. (.2566)	3.7693	-.3683(5.0323)**	.4672	1.6215	2.8728	S	S
61-Leather, leather manufactures, n.e.s. (.0301)	2.8682	-.2239(4.1678)*	.6180	.0923	5.1816*	S	U
62-Rubber manufactures, n.e.s. (.1966)	3.0180	-.2066(4.3089)*	.7743	.5001	2.7126	S	U
63-Cork and wood manufactures(excluding furniture) (.5116)	4.502*	-.6722(5.2682)**	.7689	.6503	1.6271	S	S
64-Paper, paperboard, and articles of paper pulp n.e.s. (.0706)	7.7805**	-.5986(6.9485)**	.6129	1.0955	2.4041	S	U
65-Textile yarn, fabrics, made-up aricles, n.e.s. (.1601)	4.3417*	-.277(5.1924)**	.6296	.0403	2.4293	S	U

66-Non-metallic mineral manufactures n.e.s. (.1257)	2.3933	-.241(3.8167)	.7493	.7385	.7179	S	S
67-Iron and steel (.3253)	2.8829	-.2648(4.0232)*	.4828	1.3045	.0017	U	S
68-Non-ferrous metals (.3182)	2.2767	-.2604(3.4265)	.6332	.0470	2.4150	S	S
69-Manufactures of metal, n.e.s. (.3953)	6.2686**	-.6906(6.1709)**	.4810	.9798	3.1914	S	S
71-Power generating machinery and equipment (.2085)	3.1430	-.2921(4.3195)*	.3853	.1346	2.7132	S	S
72-Machinery specialized for particular industries (.4686)	2.7930	-.2589(4.0185)*	.5229	.0042	3.2956	S	U
73-Metalworking machinery (.1271)	2.8015	-.2731(4.0669)*	.6997	.7185	2.1587	S	U
74-General industrial machinery and equipment, n.e.s. (.371)	2.8107	-.2266(4.1225)*	.6312	.4580	6.111*	S	U
75-Office machines and automatic data processing equipment (17.5867)	2.2491	-.1195(3.7318)	.9492	.0002	2.2857	S	U
76-Telecommunications and sound recording n.e.s. (8.7946)	6.6957**	-.4813(6.2516)**	.8748	.2102	.0115	S	S
77-Electrical machinery, apparatus and appliances, n.e.s. (13.2484)	3.3757	-.2239(4.5992)*	.8279	1.0286	.3747	S	S
78-Road vehicles (including air-cushion vehicles) (1.0835)	2.7221	-.1754(4.1551)*	.8422	.1793	4.3385*	S	U
79-Others transport equipment (.3994)	7.0953**	-.0976(6.6243)**	.2138	1.2156	.1194	S	S
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s. (.0607)	3.5437	-.3966(4.7977)**	.7346	2.9088	2.022	S	S
82-Furniture and parts thereof (1.5841)	2.3789	-.1508(3.8342)	.7958	.7147	4.7424*	S	U
83-Travel goods, handbags and similar containers (.1279)	2.6487	-.2061(3.9315)	.6756	.3752	5.2048*	S	U
84-Articles of apparel and clothing accessories (3.4603)	2.5778	-.1682(4.0503)*	.7967	.0340	1.3948	S	U
85-Footwear (.2857)	3.0337	-.2644(4.2796)*	.5453	.5453	6.1754*	S	U
87-Professional instruments and apparatus, n.e.s. (1.8153)	2.0305	-.1335(3.5358)	.7853	1.3562	.1388	S	U
88-Photographic apparatus, equip. and supplied and optical goods, n.e.s. (.5148)	4.3144*	-.2588(5.0991)**	.6942	.8742	2.9151	S	S
89-Miscellaneous manufactured articles, n.e.s .(1.1955)	2.4692	-.2073(3.8826)	.6155	.8031	3.1636	S	U
93-Special transactions and commodities (.3909)	3.3410	-.2618(4.6044)**	.8741	.0596	2.4819	S	U
97-Gold, non-monetary (.0125)	2.7613	-.3153(3.9888)*	.3772	.3399	.5673	S	S

Notes:

a. The F test due to Pesaran te al. (2001) is denoted by $F_{PSS.}$ At the 1% (5%) significance level when there are three exogenous variables (k=4), its critical value is 5.06 (4.01). This comes from Pesaran et al. (2001, Table CI-Case III, page 300).

b. 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 1% (5%) level is 6.635 (3.841).

c. RESET is Ramsey's test for misspecification. It is distributed as χ^2 with one degree of freedom and its critical value at 1% (5%) level is 6.635 (3.841).

d. CU and CUQ are CUSUM and CUSUMQ respectively to test stability of all coefficients.

e. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio, denoted by t_{BDM} in the text. Its critical value of -4.60 (-3.99) at 1% (5%) significance when k=4, comes from Pesaran et al. (2001, Table CII-Case III, page 303).

f. Abbreviation n.e.s. stands for not elsewhere defined.

g. Trade share is in percentage calculated over the sample period.

h. Abbreviation n.e.s. refers to not elsewhere defined.

Table 3: Long-run coefficient estimates of linear ARDL import model (4)						
Industry	**Long-run coefficient estimates**					
	C	DUM_{08}	$LnIP_t^{MY}$	$LnREX_t$	$LnVol_t^{US}$	$LnVol_t^{CH}$
00-Live animals	9.1563**	.0742	-3.3921**	2.9103	.34*	.2264
01-Meat and meat preparations	10.1727**	.1561	-6.6993**	3.3222	.2056	.2161
02-Dairy products and birds' eggs	-1.4885**	-.2097	5.886**	-8.9997**	.0806	-.6319*
03-Fish, crustaceans and molluscs, and preparations thereof	-2.3588**	-.3839*	4.5135**	-2.0709	.0262	-.3296
04-Cereals and cereal preparations	7.6225**	.0558	.2137	-2.6532**	.1372	-.0504
05-Vegetables and fruits	2.5588**	.0801	1.0077**	.7863	-.0708	.4543**
06-Sugars, sugar preparations and honey	2.4876**	-.0031	1.5212**	-3.1319**	-.0173	-.0115
07-Coffee, tea, cocoa, spices, and manufactures thereof	3.8137**	-.0563	.8295*	.8019	.1073*	.1785
08-Feeding stuff for animals (not including un milled cereals)	5.7783**	.0634	-.3651	-.0520	-.0223	.3017*
09-Miscellaneous edible productsandpreparations	3.0739**	.0615	1.2484**	.6304	-.1122**	.4323**
11-Beverages	-1.1936**	.4689**	3.0342**	-1.1414	-.0648	-.2964**
12-Tobacco and tobacco manufactures thereof	13.4389**	.1506	-4.6441**	-2.4467	.1396	-.4771**
22-Oil seeds and oleaginous fruits	6.9971**	.0104	1.3686	-2.6595	.1869	.1538
23-Crude rubber (including synthetic and reclaimed)	-.6237**	.4611	5.9800	11.2151	-.6031	.9566
24-Cork and wood	.5434**	-.0956	2.1725**	-.4085	-.1288**	-.2185*
25-Pulp and waste paper	.5675**	-.0998	2.1865**	-.4326	-.1654**	-.2364*
26-Textile fibres (other than wool tops) n.e.s.	3.7548**	-.0478	.1744	.0078	.1676**	.1111
27-Crude fertilizers and crude minerals n.e.s.	-.0941**	.1782	3.2366**	.6471	-.6977**	.5481*
28-Metalliferous ores and metal scrap	4.4875**	-.1809	-2.1745	-9.4613*	.9413**	-1.5801**
29-Crude animal and vegetable materials, n.e.s.	2.9316**	-.1767	-2.8573	3.9639	.9402**	-.1581
32-Oil seeds and oleaginous fruits	-2.5954**	1.1096	7.8226	8.2580	-2.4597**	2.8274*
33-Petroleum, petroleum products and related materials	5.1161**	-.7686	-1.4648	4.0868	.4925	.4491
34-Gas, natural and manufactured	-4.2078**	.4369	3.7879*	3.8159	-.4021	.2323
41-Animal oils and fats	-.08*	-.2274	2.4495**	-1.4736	-.1112	-.1087
42-Fixed vegetable oils and fats,crude, refined or fractionated	12.2311**	-.0030	-3.4343*	2.0189	.0741	.8409*
43-Animal or vegetable oils and fats, processed n.e.s.	-1.1977**	.8364	4.5715	-2.7575	-1.3442**	.4895
51-Organic chemicals	6.5844**	-.275**	-2.5567**	-.2021	.2932**	-.1812
52-Inorganic chemicals	4.4154**	-.1836	.3452	-3.0471**	.0542	-.0367
53-Dyeing, tanning and colouring materials	.3282**	.6865	1.5918	1.6593	.1132	.1304
54-Medicinal and pharmaceutical products	3.1899**	-.0297	1.1955**	.4707	-.0872	.3894**
55-Essential oils and resinoids and perfume materials n.e.s.	3.0028**	.0885	-1.6550	4.0079	.5155	.1376

56-Fertilizers, manufactured	-6.4494**	.4170	6.6424**	4.2430	-1.4644**	1.6043**
57-Plastics in primary forms	2.3245	-.1166	-.6150	.5833	.2449**	-.0496
58-Plastics in non-primary forms	.9255**	.2588	1.4976*	3.0723**	-.234	.4269
59-Chemical materials and products,n.e.s.	2.8792**	-.3316	-4.0570	3.8707	1.4525**	-.6136
61-Leather, leather manufactures, n.e.s.	-.0351	.9409*	3.0069	3.1769	-1.2498**	1.4496*
62-Rubber manufactures, n.e.s.	3.4696**	.1265	-1.09714	.9178	.3969**	.0501
63-Cork and wood manufactures(excluding furniture)	.1599**	0.135728	2.0761	1.4119	-.5414**	.1845
64-Paper, paperboard, and articles of paper pulp n.e.s.	3.8432**	-.0733	-1.89**	-.4938	.262**	-.2945**
65-Textile yarn, fabrics, made-up aricles, n.e.s.	1.5131**	-.1595*	1.6016**	1.3248*	-.0976	.0907
66-Non-metallic mineral manufactures n.e.s.	3.5512**	-.2238**	1.1432*	-4.4701**	.1122	-.3388**
67-Iron and steel	1.7319**	.0638	.9403	-2.4362	.1962	-.3313
68-Non-ferrous metals	1.0517**	-.0978	1.6827	-1.5677	-.3138*	.0919
69-Manufactures of metal, n.e.s.	.0941**	.0030	2.8217	-.7634	-.1674	-.2635
71-Power generating machinery and equipment	4.6061**	-.0233	-.4320	-.6491	.2264**	-.5213**
72-Machinery specialized for particular industries	3.1271**	-.0475	-1.9897	-1.7996	.4099**	-.3762
73-Metalworking machinery	1.2703**	.4050	-1.1852	3.4019	-.0959	.2070
74-General industrial machinery and equipment, n.e.s.	1.3031**	.0206	1.4721*	.6443	-.1628	.1067
75-Office machines and automatic data processing equipment	5.1397**	-.0378	-2.2445**	-.8025	.3584**	-.4456**
76-Telecommunications and sound recording n.e.s.	-1.2635**	.1635	6.0455*	6.0009	-.838**	.7928
77-Electrical machinery, apparatus and appliances, n.e.s.	4.1137**	-.2157	-10.6536	4.9101	2.1011**	-.9689
78-Road vehicles (including air-cushion vehicles)	-1.2272**	.2850	6.3113**	-2.0518	-1.0424**	.8731
79-Others transport equipment	6.5018**	-.2233	-3.7932	-2.9678	.8057*	-.1494
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s.	.9668**	-.2020	2.1913*	-.9481	-.3109*	.1502
82-Furniture and parts thereof	2.6835**	-.0356	.5210	.9382	.321**	-.0832
83-Travel goods, handbags and similar containers	.7292**	.8424	1.4237	1.5284	.1602	.4983
84-Articles of apparel and clothing accessories	8.4808**	.0589	-2.4678**	-1.4351	.0503	.5775**
85-Footwear	-1.1754**	.3955	7.3089	-5.4395	-1.522*	1.1846
87-Professional instruments and apparatus, n.e.s.	3.7249**	-.3435	-3.4495**	-3.1217	.8422**	-.9867**
88-Photographic apparatus, equipment and supplied and optical goods, n.e.s.,	.7167**	.0786	2.2916	-1.3781	-.4679**	.2162
89-Miscellaneous manufactured articles, n.e.s.	4.3158**	.101**	.3372	-.0840	-.1101**	.1743**
93-Special transactions and commodities	3.9348**	-.1880	-.8889	.3689	.0453	-.3956
97-Gold, non-monetary	-2.9071**	.4578	3.6196*	4.7391	.4574*	-.5552
Notes: ** and * show the significance level at 1% and 5%, respectively. The critical values of standard t-distribution, i.e., 2.32 and 1.96 are used to arrive at ** and * , respectively. Abbreviation n.e.s. refers to not elsewhere defined.						

Table 4: Diagnostic statistics associated with estimates of nonlinear import models in Table 3							
Industry (Trade Share)	**Diagnostics**						
	F_{PSS}[a]	ECM_{t-1}	Adj. R^2	LM	RESET	CU	CUQ
00-Live animals (.0104)	5.7664**	-.6894(6.0259)**	.1534	.2635	6.8762**	S	S
01-Meat and meat preparations (.009)	9.8119**	-.5188(7.5479)**	.4523	.6288	.2357	S	U
02-Dairy products and birds' eggs (.1949)	7.3023**	-.4733(6.9989)**	.7326	1.5692	1.3402	U	S
03-Fish, crustaceans and molluscs, and preparations thereof (.0331)	14.9697**	-.6742(9.5145)**	.4278	.9575	1.2665	S	S
04-Cereals and cereal preparations (.2136)	23.3992**	-.9205(11.8648)**	.2139	.5907	.0994	S	S
05-Vegetables and fruits (.2832)	3.5589	-.3885(4.7185)**	.8494	.0356	1.7788	S	S
06-Sugars, sugar preparations and honey (.0423)	9.4606**	-.5076(7.4966)**	.6715	.2458	3.4909	S	S
07-Coffee, tea, cocoa, spices, and manufactures thereof (.0342)	7.3861**	-.7187(6.6654)**	.5234	.3500	.0198	S	U
08-Feeding stuff for animals (not including un milled cereals) (.1584)	12.1777**	-.6294(8.5072)**	.4720	1.2375	.1926	S	U
09-Miscellaneous edible products and preparations (.2037)	4.1173*	-.5293(5.0357)**	.7476	.7476	2.3413	U	S
11-Beverages (.0182)	27.0906**	-.9893(12.9138)**	.4168	1.6228	2.8770	S	U
12-Tobacco and tobacco manufactures thereof (.1242)	17.5963**	-.8215(10.6709)**	.4270	1.4748	3.7522	S	S
22-Oil seeds and oleaginous fruits (.3005)	8.2711**	-1.0333(7.1146)**	.1599	1.2029	.4927	U	S
23-Crude rubber (including synthetic and reclaimed) (.0691)	.8897	-.0645(2.3899)	.6821	1.3223	.0370	S	S
24-Cork and wood (.0696)	8.0189**	-.5686(7.5777)**	.5348	.5826	2.8564	S	S
25-Pulp and waste paper (.1162)	7.0199**	-.5126(6.5447)**	.6370	.5826	2.8564	S	S
26-Textile fibres (other than wool tops) n.e.s. (.0879)	7.0452**	-.4964(6.5585)**	.5072	.3667	2.5856	S	S
27-Crude fertilizers and crude minerals n.e.s. (.0845)	6.6668**	-.4379(6.7005)**	.6268	.8989	6.8615**	S	S
28-Metalliferous ores and metal scrap (.6639)	4.3898*	-.3475(5.1649)**	.4848	.2989	2.3736	S	S
29-Crude animal and vegetable materials, n.e.s. (.0184)	5.1122**	-.2444(5.5077)**	.6552	1.1174	3.2713	S	S
32-Oil seeds and oleaginous fruits (.0449)	4.1754*	-.2334(5.0288)**	.6852	.0413	4.7941*	S	S
33-Petroleum, petroleum products and related materials (.463)	6.1951**	-.4416(6.1597)**	.4478	.4452	3.8989*	S	S
34-Gas, natural and manufactured (.0023)	17.858**	-4.2078(10.4095)**	.1325	.9352	1.6705	S	S
41-Animal oils and fats (.0021)	23.9554**	-.9021(11.6342)**	.0526	.7433	.0008	S	S
42-Fixed vegetable oils and fats, crude, refined or fractionated (.0209)	9.5244**	-.7773(7.6587)**	.1029	.4584	2.0294	S	S
43-Animal or vegetable oils and fats, processed n.e.s. (.0521)	3.3782	-.2777(4.7221)**	.6375	.0413	4.1753*	S	S
51-Organic chemicals (.6092)	6.8962**	-.4959(6.5195)**	.4901	.2515	1.6585	S	S
52-Inorganic chemicals (.3137)	5.4436**	-.5311(5.6128)**	.5713	1.7714	.1119	S	S
53-Dyeing, tanning and colouring materials (.2111)	1.3984	-.0869(2.8492)	.9163	.2150	.9969	S	S
54-Medicinal and pharmaceutical products (.2404)	6.6112**	-.5349(6.5373)**	.7034	1.8002	.0770	S	S
55-Essential oils and resinoids and perfume materials n.e.s. (.2233)	4.6762*	-.2834(5.3741)**	.6751	3.2665	4.7763*	U	S

56-Fertilizers, manufactured (.0748)	24.7325**	-.9043(12.3974)**	.4020	.1448	2.0517	S	S
57-Plastics in primary forms (.5285)	4.8075*	-.2549(5.5172)**	.7595	.3554	2.4357	S	S
58-Plastics in non-primary forms (.2386)	3.3488	-.252(4.5784)*	.5774	.8552	1.2724	S	S
59-Chemical materials and products, n.e.s. (.6385)	3.8141	-.1861(4.9044)**	.7615	.2762	.2640	U	S
61-Leather, leather manufactures, n.e.s. (.0063)	5.7514**	-.4415(6.0205)**	.4550	.0041	2.2460	S	S
62-Rubber manufactures, n.e.s. (.0965)	5.9943**	-.3453(6.2754)**	.7389	.7058	2.7353	S	S
63-Cork and wood manufactures(excluding furniture) (.0385)	5.3860**	-.6324(6.5763)**	.6943	.2243	3.2125	U	S
64-Paper, paperboard, and articles of paper pulp n.e.s. (.2117)	5.2274**	-.3496(5.6793)**	.6242	.2573	3.9393*	S	S
65-Textile yarn, fabrics, made-up aricles, n.e.s. (.1046)	6.1189**	-.5107(6.348)**	.3981	.4684	2.4768	S	S
66-Non-metallic mineral manufactures n.e.s. (.3119)	11.3353**	-.5693(8.2089)**	.5615	.4711	1.2832	U	S
67-Iron and steel (.2968)	2.3146	-.3013(3.6578)	.6436	.2547	.2661	S	S
68-Non-ferrous metals (.3302)	2.6462	-.2473(4.142)*	.5649	3.0056	3.5269	S	S
69-Manufactures of metal, n.e.s. (.7574)	1.8049	-.1548(3.3453)	.6591	.3271	.1231	S	S
71-Power generating machinery and equipment (1.2394)	7.2103**	-.6049(6.6059)**	.9865	.3949	.5893	U	S
72-Machinery specialized for particular industries (1.2239)	4.3409*	-.2469(5.155)**	.6144	.2114	3.0285	S	S
73-Metalworking machinery (.4158)	1.9644	-.1461(3.3577)	.6861	.0371	1.1795	S	S
74-General industrial machinery and equipment, n.e.s. (1.6125)	2.9620	-.2782(4.306)*	.4128	.1319	3.3428	S	S
75-Office machines and automatic data processing equipment (1.7692)	6.2433**	-.4138(6.1981)**	.6829	.0286	1.6365	S	S
76-Telecommunications and sound recording n.e.s. (2.1885)	3.7919	-.1778(4.9343)**	.7849	.3973	5.6898*	S	U
77-Electrical machinery, apparatus and appliances, n.e.s. (17.9377)	3.8706	-.1343(4.9204)**	.8114	.1877	1.7834	U	S
78-Road vehicles (including air-cushion vehicles) (.1427)	5.1336**	-.2614(5.6566)**	.6919	.4687	3.8755*	U	S
79-Others transport equipment (2.1479)	5.2875**	-.3385(5.6804)**	.5695	.9905	5.1087*	S	S
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s. (.0233)	8.3541**	-.5393(7.2219)**	.3177	1.9569	4.299*	U	S
82-Furniture and parts thereof (.036)	10.4202**	-.5046(7.9399)**	.5041	.5589	.1879	S	S
83-Travel goods, handbags and similar containers (.0365)	1.2430	-.1473(2.8505)	.8027	1.7430	3.5106	S	U
84-Articles of apparel and clothing accessories (.0252)	11.0827**	-.5669(8.3222)**	.5859	1.3376	2.1375	S	S
85-Footwear (.1554)	3.4453	-.2039(4.7183)**	.6867	.7510	3.3033	U	S
87-Professional instruments and apparatus, n.e.s. (2.1926)	7.3145**	-.2434(6.7854)**	.8149	.2103	3.2958	U	S
88-Photographic apparatus, equip. and supplied and optical goods, n.e.s. (.1656)	5.3893**	-.2759(5.7144)**	.6053	2.1286	3.6042	S	U
89-Miscellaneous manufactured articles, n.e.s. (.778)	6.7972**	-.567(6.4507)**	.4142	.3754	1.2738	S	S
93-Special transactions and commodities (.4538)	6.4564**	-.5138(6.2972)**	.6199	1.9552	6.0428*	S	S
97-Gold, non-monetary (.0443)	4.6835*	-.5618(5.3522)**	.3195	1.2139	2.1710	S	U

Notes:
a. The F test due to Pesaran te al. (2001) is denoted by $F_{PSS.}$ At the 1% (5%) significance level when there are three exogenous variables (k=4), its critical value is 5.06 (4.01). This comes from Pesaran et al. (2001, Table CI-Case III, page 300).
b. 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 1% (5%) level is 6.635 (3.841).
c. RESET is Ramsey's test for misspecification. It is distributed as χ^2 with one degree of freedom and its critical value at 1% (5%) level is 6.635 (3.841).

d. CU and CUQ are CUSUM and CUSUMQ respectively to test stability of all coefficients.
e. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio, denoted by t_{BDM} in the text. Its critical value of -4.60 (-3.99) at 1% (5%) significance when k=4, comes from Pesaran et al. (2001, Table CII-Case III, page 303).
f. Abbreviation n.e.s. stands for not elsewhere defined.
g. Trade share is in percentage calculated over the sample period.
h. Abbreviation n.e.s. refers to not elsewhere defined.

Table 5: Long-run coefficient estimates of nonlinear ARDL export model (6)								
Industry	**Long-run coefficient estimates**							
	C	DM_{08}	$Ln\ IP_t^{US}$	$Ln\ REX_t$	POS_t^{US}	NEG_t^{US}	POS_t^{CH}	NEG_t^{CH}
00-Live animals	7.6529**	.2468	-3.7459	4.5175**	.1429	-.2703	.3751	2.6342*
03-Fish, crustaceans and molluscs, and preparations thereof	-.2369**	-.1674	5.5480	-4.4495	-.5593	1.1945**	1.2817	-5.9565**
04-Cereals and cereal preparations	11.8041**	.0258	-.9239	.7395**	-.062**	.0997**	.2446**	-.6969**
05-Vegetables and fruits	.2195**	.0413	2.4221*	2.0359**	-.1005	.2176**	.3143	-.9657**
06-Sugars, sugar preparations and honey	11.0577**	.2242	-8.902*	-.1663	-.0559	1.0506**	1.0569	-3.6779**
07-Coffee, tea, cocoa, spices, and manufactures thereof	8.2987**	.3179**	-6.0615**	1.2239	-.1286	.626**	.2220	-3.8668**
08-Feeding stuff for animals (not including un milled cereals)	3.3354**	-.776**	3.2213	-12.6233**	-.2537	.0298	.6520	-1.3437
09-Miscellaneous edible productsandpreparations	1.9608**	-.0592	1.3805	.3516	-.0207	.1458	.5514	-.3302
11-Beverages	-2.9952**	-.276**	5.0115**	-1.6282*	.2548**	-.4538**	-.3476	2.8619**
12-Tobacco and tobacco manufactures thereof	-23.7769**	.4440	11.1980	27.492**	-1.070*	2.4045**	4.9015**	-7.0449*
23-Crude rubber (including synthetic and reclaimed)	1.3506**	-.0006	2.2660	-.8761	-.0564	.5043**	.3222	-1.7549**
24-Cork and wood	-.6022**	-.2347	3.9846	.4008	.0579	-.0616	-.2085	.5467
26-Textile fibres (other than wool tops) n.e.s.	7.326**	-.7415	-22.3396**	-8.2988**	.1427	-.4944	-1.7078	-.9368
28-Metalliferous ores and metal scrap	15.2503**	-.3239	-2.8714	-10.8804**	-.2042	.8481**	-.3605	-5.6403**
29-Crude animal and vegetable materials, n.e.s.	7.4**	-.1015	-2.9467	1.6726	.0236	-.9698**	-.6049	2.5774**
33-Petroleum, petroleum products and related materials	10.0982**	-.2105	.5936	.0982	-.347**	.4433**	.1020	-2.9758**
42-Fixed vegetable oils and fats,crude, refined or fractionated	11.6188**	-.5332	-23.8272	-10.0182	1.4959	1.6873	-3.4438	-5.6678
43-Animal or vegetable oils and fats, processed n.e.s.	2.7623**	.0884	2.2657	-2.0426**	-.1446	.3838**	.5705*	-1.6256**
51-Organic chemicals	-1.0305**	-.0792	4.6753*	.5388	-.1356	-.5157**	.1820	1.933**
52-Inorganic chemicals	.9776**	.6478	.0827	4.9702	-.4903	-.6252	-.3497	-1.9466
53-Dyeing, tanning and colouring materials	5.7088**	.3221	-3.9412	6.6705**	-.641**	-.0024	.6473	-3.6888**
54-Medicinal and pharmaceutical products	3.6819**	-.3053	-16.0268**	4.1849	.0915	-.2752	-1.2206	-2.2284
55-Essential oils and resinoids and perfume materials n.e.s.	3.4485**	.0876	-1.7712	2.2932	-.1546	.0292	.4004	-.9361
57-Plastics in primary forms	3.4776**	-.0705	-.0976	1.5555	.0031	-.2745	-.3119	.4551
58-Plastics in non-primary forms	-.0337	.0639	2.1998	4.1374*	-.0979	.4586*	.6594	-1.5733
59-Chemical materials and products,n.e.s.	6.4109**	.0610	-4.0823	-2.0010	.2403	.4748*	-.4897	-1.7452
61-Leather, leather manufactures, n.e.s.	-.7225**	-.3993	3.1040	2.9020	-.1302	.8497	-1.0590	-7.0798
62-Rubber manufactures, n.e.s.	.5092**	.0433	1.9211	1.4299	-.2494	.9776*	1.1612	-3.4635
63-Cork and wood manufactures(excluding furniture)	2.2209**	-.169**	2.3689**	1.8386**	-.0269	.0226	-.3713**	-.5689
64-Paper, paperboard, and articles of paper pulp n.e.s.	2.0456**	-.2202	1.0553	1.5115	.2255	-.2205	-.4967	.8383
65-Textile yarn, fabrics, made-up aricles, n.e.s.	1.8945**	-.2596	.3483	-.7076	-.0173	-.0545	-.1255	.0261

66-Non-metallic mineral manufactures n.e.s.	-1.1798**	.2188*	4.1338*	2.9679**	-.0076	-.517**	-.1429	2.2089**
67-Iron and steel	-1.9159**	.1668	6.3070	1.0540	-.2275	.6779	.3614	-3.5739
68-Non-ferrous metals	2.0605**	-.0793	1.7248	-5.4496*	-.1727	.3766	-.0474	-3.1249
69-Manufactures of metal, n.e.s.	5.8323	-.122**	.8970	-.1205	-.0624	.0975*	-.0544	-1.11**
71-Power generating machinery and equipment	.8522**	.1957	2.0436	.4894	-.0424	-.0394	.2939	.6508
72-Machinery specialized for particular industries	1.4924**	-.2897	.5991	1.4811	-.0288	.4079	.0047	-2.0118
73-Metalworking machinery	-6.0759**	-.0778	14.4785*	-.2925	.0984	.0241	.6605	1.7941
74-General industrial machinery and equipment, n.e.s.	1.9841**	.0076	-.2660	.4955	-.1442	.6023**	.2736	-3.2728**
75-Office machines and automatic data processing equipment	1.5991**	-.1127	.3470	-1.1461	-.0649	1.295**	.1954	-4.7136**
76-Telecommunications and sound recording n.e.s.	2.9152**	-.0060	2.0158**	.9062*	-.0046	-.0340	-.1645	.2153
77-Electrical machinery, apparatus and appliances, n.e.s.	.4537**	-.0920	3.2978*	1.1024	-.2425**	.1129	.4548	-.9337
78-Road vehicles (including air-cushion vehicles)	.3069**	-.3397	3.7258	-2.5704	.3904	-1.2687**	-1.2849	5.0854
79-Others transport equipment	1.7411**	.0342	1.9590	1.1685	-.1272	.2658	.5563	-1.0455
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s.	-1.3573**	-.2813	3.9287	2.8613	.3491**	-1.2991	-.5433	6.1965**
82-Furniture and parts thereof	2.6338**	-.1110	-2.1115	-3.9940	-.2162	1.1079**	.4544	-4.7896*
83-Travel goods, handbags and similar containers	-4.0915**	-.1499	13.4949	-7.3377	.0637	-1.4923*	-1.7165	4.8585
84-Articles of apparel and clothing accessories	1.851**	.1737	-2.1888	3.2043	-.4210	1.3579	1.5690	-5.2605
85-Footwear	-.595**	-.1359	5.6697	-5.7685	.3498	-.7539	-1.0885	3.2087
87-Professional instruments and apparatus, n.e.s.	2.333**	-.3496	1.9821	-10.9717	-.3547	2.5688**	1.8750	-8.5328*
88-Photographic apparatus, equipment and supplied and optical goods, n.e.s.,	5.6573**	.7932*	-7.0629	2.6762	.2273	-1.227**	-1.5672	3.7298
89-Miscellaneous manufactured articles, n.e.s.	1.8396**	-.0960	.2566	-.5626	-.0903	.6735**	.6209	-2.2964
93-Special transactions and commodities	-4.8653**	-.3684	12.3325**	1.5861	-.0598	-.5213*	-.5839	1.3017
97-Gold, non-monetary	4.1601**	.7566	-3.2397	4.3454	.5287	-1.5311**	-1.2071	6.87*

Notes: ** and * show the significance level at 1% and 5%, respectively. The critical values of standard t-distribution, i.e., 2.32 and 1.96 are used to arrive at ** and * , respectively. Abbreviation n.e.s. refers to not elsewhere defined.

Table 6: Diagnostic statistics associated with estimates of nonlinear export models in Table 5.											
Industry (Trade Share)	**Diagnostics**										
	F_{PSS}[a]	ECM_{t-1}	Adj. R^2	LM	RESET	CU	CUQ	Wald-S^{US}	Wald-S^{CH}	Wald-L^{US}	Wald-L^{CH}
00-Live animals (.0003)	14.1076**	-.7995(10.6528)**	.2329	.3366	2.4393	S	S	2.2033	.3922	1.9982	3.3245
03-Fish, crustaceans and molluscs, and preparations thereof (.3562)	2.2531	-.1494(4.1644)	.8165	.9276	.0931	S	S	.4648	.3918	6.5918**	6.7881**
04-Cereals and cereal preparations (.0272)	7.6869**	-1.567(8.0186)**	.4914	1.7423	.9386	S	S	.1276	2.2240	14.43**	26.7026**
05-Vegetables and fruits (.0235)	14.5314**	-.8472(11.0154)**	.4149	.1186	.1711	S	U	3.4868	.9480	10.4409**	8.9695**
06-Sugars, sugar preparations and honey (.0136)	3.1570	-.4816(4.9069)*	.5952	.3893	.0057	S	S	.1274	.3963	7.5126**	8.0132**
07-Coffee, tea, cocoa, spices, and manufactures thereof (.4406)	4.8053*	-.4547(6.4485)**	.7693	.4729	2.2992	S	S	1.6168	.2111	23.2205**	37.7895**
08-Feeding stuff for animals (not including un milled cereals) (.0153)	4.6817*	-.5764(6.1935)**	.8723	2.5738	1.4863	S	S	8.1879**	.6607	.4214	1.2390
09-Miscellaneous edible products and preparations (.0355)	9.8660**	-.6265(9.0249)**	.7384	.4341	1.7946	S	S	4.7326*	.1126	.6818	1.2817
11-Beverages (.0161)	7.8831**	-1.0541(8.3745)**	.5065	.5650	.0016	S	S	5.2454*	.0403	27.2625**	31.0574**
12-Tobacco and tobacco manufactures thereof (.0022)	3.9120	-.7076(5.7857)**	.5583	1.3122	6.024*	S	U	.1535	2.6155	13.5468**	9.3519**
23-Crude rubber (including synthetic and reclaimed) (.2603)	5.0765**	-.4098(6.4682)**	.6869	.7546	1.2522	S	S	.1226	23.3305**	10.3535**	8.8946**
24-Cork and wood (.096)	4.0844*	-.579(5.7646)**	.7315	2.0441	3.3444	S	S	.0683	1.0527	1.5986	3.9044*
26-Textile fibres (other than wool tops) n.e.s. (.0036)	6.2420**	-.6956(7.2873)**	.4931	.5662	.2110	S	S	8.3344**	.1957	1.4425	.1885
28-Metalliferous ores and metal scrap (.0577)	17.5013**	-.8764(11.6014)**	.2798	.1382	.0326	S	U	.1131	2.1007	7.4642**	9.8724**
29-Crude animal and vegetable materials, n.e.s. (.003)	3.9420	-.7321(5.8551)**	.6179	.3001	1.8980	S	S	.1197	1.1089	20.9614**	11.9164**
33-Petroleum, petroleum products and related materials (.6436)	10.0083**	-1.5253(8.9736)**	.5024	.2142	3.8293	S	S	4.9707*	5.1624*	10.8488**	10.3789**
42-Fixed vegetable oils and fats,crude, refined or fractionated (1.1625)	2.6128	-.1955(4.4279)*	.7397	.6002	19.749**	S	U	3.9052*	1.3177	.2507	.4385
43-Animal or vegetable oils and fats, processed, n.e.s. (.7122)	4.3044**	-.6973(5.963)**	.6071	.6264	10.55**	S	S	5.9539**	.0453	14.9965**	15.0102**
51-Organic chemicals (.5114)	3.2712	-.5729(5.2182)**	.4197	.8910	.8825	S	S	.8618	.1243	2.2381	3.1528
52-Inorganic chemicals (.0967)	2.6695	-.3991(4.5908)*	.4375	.2752	6.2674*	S	S	.0702	.0131	.0225	.1450
53-Dyeing, tanning and colouring materials (.0151)	5.5078**	-.6095(6.8581)**	.4209	.4323	8.2725**	S	S	3.0187	3.8338*	1.1532	5.3349*
54-Medicinal and pharmaceutical products (.0387)	10.8576**	-.676(9.3803)**	.4244	.9749	.9518	S	U	.0381	1.1173	.5657	.2983
55-Essential oils and resinoids and perfume materials, n.e.s. (.0352)	1.9379	-.4244(3.8133)	.5940	.1873	.7123	S	S	3.6172*	1.0802	.4229	1.5089
57-Plastics in primary forms (.048)	5.542**	-.5971(6.6952)**	.1447	.6038	11.299**	S	U	.2103	.7366	.5005	.2471
58-Plastics in non-primary forms (.0702)	2.5641	-.2892(4.4027)*	.6463	.9635	1.6007	S	S	1.5835	.0028	3.9554*	4.255*
59-Chemical materials and products,n.e.s. (.2566)	3.4841	-.3903(5.3881)**	.4773	2.1448	8.2938**	S	S	5.9407**	.0827	.1688	.5023
61-Leather, leather manufactures, n.e.s. (.0301)	2.4356	-.2505(4.2794)	.6264	.0566	11.365**	S	U	3.417	.1779	.2856	.7917

62-Rubber manufactures, n.e.s. (.1966)	2.5679	-.2319(4.6065)**	.7762	.6644	7.274**	S	U	.1547	1.4679	4.3656*	3.3337
63-Cork and wood manufactures(excluding furniture) (.5116)	22.6183**	-1.04485(13.755)**	.7738	.1154	1.6105	S	S	.3914	7.6585**	.1203	.1558
64-Paper, paperboard, and articles of paper pulp n.e.s. (.0706)	7.5971**	-.5269(7.9898)**	.6468	1.4165	1.1962	S	S	16.0587**	10.2873**	3.826*	2.2007
65-Textile yarn, fabrics, made-up aricles, n.e.s. (.1601)	3.0763	-.2659(5.0741)**	.6327	.6406	1.6665	S	U	7.5808**	.6762	.0708	.0586
66-Non-metallic mineral manufactures n.e.s. (.1257)	3.7449	-.4239(5.2772)**	.7787	1.3461	3.1207	S	S	6.8755**	4.618*	10.4054**	12.8539**
67-Iron and steel (.3253)	2.5351	-.3072(4.35)	.4840	1.2291	.0013	U	S	.0014	.0822	2.8355	3.0432
68-Non-ferrous metals (.3182)	2.4344	-.3045(4.2842)	.6387	1.3244	1.3688	S	S	8.6028**	1.1756	2.1199	3.2733
69-Manufactures of metal, n.e.s. (.3953)	13.7621**	-1.0405(10.5776)**	.5546	1.1838	1.5079	S	S	.4295	1.7548	6.8689**	15.4321**
71-Power generating machinery and equipment (.2085)	2.3810	-.2997(4.3019)	.3843	.0710	2.6315	S	S	1.3369	.4358	.0612	.1742
72-Machinery specialized for particular industries (.4686)	2.2194	-.2763(4.2093)	.5219	.0004	9.6155**	S	U	.7039	.0339	.8992	1.2119
73-Metalworking machinery (.1271)	1.8669	-.2774(3.8263)	.6996	1.2534	4.3735*	S	U	1.0912	.3916	.0894	.4848
74-General industrial machinery and equipment, n.e.s. (.371)	2.8745	-.2763(4.8001)*	.6417	.5762	5.9931*	S	U	.0140	1.2498	5.1101*	6.6782**
75-Office machines and automatic data processing equipment (17.5867)	2.6069	-.1733(4.5395)*	.9520	.0045	9.4496**	S	U	3.3911	.3572	8.5945**	6.6858**
76-Telecommunications and sound recording n.e.s. (8.7946)	6.7031**	-.6248(7.362)**	.8836	.8247	.2575	S	S	10.4135**	.4781	.3270	2.2096
77-Electrical machinery, apparatus and appliances, n.e.s. (13.2484)	2.7003	-.2228(4.7617)*	.8404	.6521	.1635	S	S	12.8375**	.9508	3.4338	3.2857
78-Road vehicles (including air-cushion vehicles) (1.0835)	2.3162	-.1906(4.4153)*	.8463	.1502	5.6545*	S	U	.0022	1.8552	4.2188*	3.8153*
79-Others transport equipment (.3994)	5.4497**	-.6491(6.8971)**	.2347	.8656	.3098	S	S	1.0793	.2461	5.1976*	4.9659*
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s. (.0607)	4.2929*	-.4971(6.2577)**	.7710	.2045	3.6613	S	S	.2927	.6356	19.0715**	19.627**
82-Furniture and parts thereof (1.5841)	2.7312	-.1812(4.7102)*	.8080	.3926	6.2852*	S	U	.3457	.3419	4.2573*	1.3760
83-Travel goods, handbags and similar containers (.1279)	3.0464	-.2584(5.0973)**	.6825	1.1088	6.1452*	S	U	.1066	.9175	3.6631*	3.3705
84-Articles of apparel and clothing accessories (3.4603)	1.9657	-.1738(4.0219)	.7944	.8006	.6212	S	U	.2470	.2764	1.5206	1.3157
85-Footwear (.2857)	2.5641	-.2807(4.553)*	.5581	.4446	7.3597**	S	U	.0680	1.0326	1.4234	1.1355
87-Professional instruments and apparatus, n.e.s. (1.8153)	2.9581	-.2334(4.9961)**	.8000	.2538	4.4031*	S	U	.0449	.3460	7.8596**	5.8098**
88-Photographic apparatus, equip. and supplied and optical goods, n.e.s. (.5148)	3.9654	-.2781(5.6935)**	.6988	.5206	2.1065	S	U	.3371	.5787	.0020	.0014
89-Miscellaneous manufactured articles, n.e.s .(1.1955)	2.2585	-.2432(4.3393)	.6242	.0366	4.0485*	S	U	.2279	.6266	4.2936*	3.4827
93-Special transactions and commodities (.3909)	2.6968	-.2725(4.779)*	.8739	.2514	4.3505*	S	U	.1551	.0008	1.5401	1.2919
97-Gold, non-monetary (.0125)	3.3685	-.4219(5.1722)**	.3802	.9889	.2759	S	S	.0248	.1898	3.7839*	3.4174

Notes:
a. The F test due to Pesaran te al. (2001) is denoted by $F_{PSS.}$ At the 1% (5%) significance level when there are three exogenous variables (k=4), its critical value is 5.06(4.01). This comes from Pesaran et al. (2001, Table CI-Case III, page 300).
b. 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 1% (5%) level is 6.635 (3.841).

c. RESET is Ramsey's test for misspecification. It is distributed as χ^2 with one degree of freedom and its critical value at 1% (5%) level is 6.635 (3.841).

d. CU and CUQ are CUSUM and CUSUMQ respectively to test stability of all coefficients.

e. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio, denoted by t_{BDM} in the text. Its critical value of -4.99(-4.38) at 1% (5%) significance when k=6, comes from Pesaran et al. (2001, Table CII-Case III, page 303).

f. Abbreviation n.e.s. stands for not elsewhere defined.

g. Trade share is in percentage calculated over the sample period.

h. Abbreviation n.e.s. refers to not elsewhere defined.

Table 7: Long-run coefficient estimates of nonlinear ARDL import model (7)								
Industry	**Long-run coefficient estimates**							
	C	DM_{08}	$Ln\ IP_t^{MY}$	$Ln\ REX_t$	Vol_t^{US+}	Vol_t^{US-}	Vol_t^{CH+}	Vol_t^{CH-}
00-Live animals	5.2924**	.0054	-1.7447	2.7133	.4902	.2899	.1810	1.5827
01-Meat and meat preparations	1.8418**	.0919	1.1460	1.4797	.0959	.2117	1.4556**	3.2887
02-Dairy products and birds' eggs	-12.5513**	-.3063*	14.8893**	-7.3127**	-.0558	-.1495	.5033	2.9626
03-Fish, crustaceans and molluscs, and preparations thereof	-1.7171**	-.3862*	4.8449	-2.1389	.0389	-.0136	-.3414	-.0406
04-Cereals and cereal preparations	1.5921**	-.0206	3.3745**	-2.3776**	.1216	.0079	.2192	1.4310
05-Vegetables and fruits	2.6242**	.0549	1.0771	.2047	.0123	-.2146**	.1987	1.1721*
06-Sugars, sugar preparations and honey	.9453**	-.0111	3.1574**	-3.0881**	.0214	-.1397	.0838	1.2051
07-Coffee, tea, cocoa, spices, and manufactures thereof	2.6619**	-.0591	1.0830	.6370	.164**	.0038	.0503	.7903
08-Feeding stuff for animals (not including un milled cereals)	5.9049**	.0839	-1.2524	.0326	-.0200	.0211	.2311	-.1604
09-Miscellaneous edible productsandpreparations	2.924**	.0464	.4081	.8271	-.0739	-.0960	.2769	.1498
11-Beverages	4.3129**	.4679**	1.0277	-.9005	-.0434	-.0107	-.5064**	-1.1295
12-Tobacco and tobacco manufactures thereof	4.2151**	-.1068	3.0885	-5.3216**	.1759	.1561	.2129	2.4548*
22-Oil seeds and oleaginous fruits	16.7909**	.0860	-4.0770	-1.3647	-.1836	1.0571**	.6885	-5.9041*
23-Crude rubber (including synthetic and reclaimed)	-4.4271**	-.1606	11.0029**	-2.4536	-.2578	.3277	1.3448**	1.3256
24-Cork and wood	1.1109**	-.0621	2.9989**	-.5765	.0361	-.4032**	-.5621**	1.4935**
25-Pulp and waste paper	.7623**	-.1182	2.6629**	.2367	.2185**	-.0029	.2327	1.7893*
26-Textile fibres (other than wool tops) n.e.s.	5.6179**	.0309	-3.7359	1.3960	.0137	.3318	.6882	-.9306
27-Crude fertilizers and crude minerals n.e.s.	-1.9849**	.0261	7.1939**	-2.7813	-.8117**	-.7168**	1.1788*	1.9894
28-Metalliferous ores and metal scrap	-4.899**	-.7555	15.7983*	-13.7174**	1.2272**	.4911	-.4008	7.2796
29-Crude animal and vegetable materials, n.e.s.	-.7215**	-.4113	3.6223	2.5327	1.5777**	-.2001	-1.3259	7.7453
32-Oil seeds and oleaginousfruits	-9.7764*	.1967	21.0687	-1.0951	-3.2007**	-1.1420	5.6423**	.5891
33-Petroleum, petroleum products and related materials	5.076**	-.8606*	-2.7516	4.3033	.7933*	.1358	-.4911	1.8203
34-Gas, natural and manufactured	-13.5434**	.2077	8.9732**	3.4827	-.9777**	.4566	2.2369**	-2.3771
41-Animal oils and fats	5.2769**	-.1960	-.0746	-1.3445	-.1462	.0228	-.3346	-1.7571
42-Fixed vegetable oils and fats,crude, refined or fractionated	9.4708**	.0016	-3.9178	2.1005	.0593	.1172	.8304	.4549
43-Animal or vegetable oils and fats, processed n.e.s.	-2.4275**	.5819	6.9502	-1.6398	-1.8986**	-.1050	2.5883**	-4.0030
51-Organic chemicals	6.3176**	-.259**	-1.6191	.3348	.2213**	.3369**	.1317	-.1115
52-Inorganic chemicals	5.6898**	-.2078	.7994	-2.8059**	.3037**	-.2556**	-.51876**	2.0223**
53-Dyeing, tanning and colouring materials	.6267**	.4181	1.0141**	2.7417*	-.1301	.7104**	1.2088**	-2.2151
54-Medicinal and pharmaceutical products	1.7995**	-.0296	2.0915**	.5763	.0415	-.3855**	.0937	2.0547**
55-Essential oils and resinoids and perfume materials n.e.s.	3.0085**	.1032	-2.0670	2.6869	.8838*	-.1564	-.9307	3.3137

56-Fertilizers, manufactured	-5.1599**	.5983**	5.0332	3.5828	-1.5971**	-1.3694**	1.6749**	.2642
57-Plastics in primary forms	3.0407**	-.1444	-.4476	-1.2649	.1824*	.3454**	.0224	-.5608
58-Plastics in non-primary forms	.5191**	.1370	2.1709	2.6556**	-.335**	-.0190	.7734**	-.3880
59-Chemical materials and products,n.e.s.	6.0913**	-.0848	-10.2566	.9673	2.2599**	-.0873	-3.4625*	4.9360
61-Leather, leather manufactures, n.e.s.	-.2585**	.4879	3.2030	.2657	-.9004	-.7828	1.2716	1.5932
62-Rubber manufactures, n.e.s.	4.0851**	.0974	-1.8906	-.6325	.4654**	.0936	-.5244	.7539
63-Cork and wood manufactures(excluding furniture)	-1.1383**	.0214	4.6335	2.1741	-.5232*	-.4712	.7856	1.4248
64-Paper, paperboard, and articles of paper pulp n.e.s.	3.6272**	-.0835	-1.2191	-.3052	.3004**	.1786	-.3067	.3801
65-Textile yarn, fabrics, made-up aricles, n.e.s.	-.6272**	-.188**	3.7402**	1.2212	-.0165	-.2792**	.1379	1.8322**
66-Non-metallic mineral manufactures n.e.s.	1.0943**	-.315**	4.1821**	-4.8741**	.1417	.1355	.0156	.9314
67-Iron and steel	6.3285**	-.0901	-.1654	-3.0993**	-.0426	.8002**	.3827	-3.1908**
68-Non-ferrous metals	2.6424**	-.0328	1.5261	-1.5273	-.5645**	.1705	.7822**	-2.3285**
69-Manufactures of metal, n.e.s.	-.4307**	-.0861	4.668**	-.7764	-.1686*	.1787	.4249*	-.2440
71-Power generating machinery and equipment	1.5682**	-.0678	2.9782**	-.0508	.2368**	.1366	-.1960	1.0637
72-Machinery specialized for particular industries	.9618**	-.3245	2.8452	-2.4797	.5118**	-.0126	-.3569	2.9547
73-Metalworking machinery	-1.604**	-.2374	6.4279*	-1.3280	-.3494*	.3830	1.1824**	-.0686
74-General industrial machinery and equipment, n.e.s.	-.4827**	-.0177	4.6786**	.2720	-.2356*	-.0680	.6087**	.7265
75-Office machines and automatic data processing equipment	3.6677**	-.0649	-.6738	-1.0627	.3916**	.3398*	-.3372	.2824
76-Telecommunications and sound recording n.e.s.	-2.7959**	-.0202	10.0864*	5.4441	-1.0517**	-.6766	1.8373	1.5803
77-Electrical machinery, apparatus and appliances, n.e.s.	5.8419**	.3695	-13.8029	-3.5330	2.4341**	.6854	-3.7175	2.1479
78-Road vehicles (including air-cushion vehicles)	-1.9698**	.2602	7.3380	-1.3417	-1.4428**	-.4201	2.0459*	-1.9023
79-Others transport equipment	12.5244**	-.0043	-10.4244	-4.5781	1.2901**	-.3327	-2.6374	2.1209
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s.	.0683	-.2618	3.0741	.0456	-.3644**	-.0556	.4922	-.5581
82-Furniture and parts thereof	.4292**	-.0334	2.2159	1.4461	.2719	.3335	.3219	.5557
83-Travel goods, handbags and similar containers	2.4547**	.599**	.2230	-.0943	-.4455**	1.4059**	2.6746**	-4.6467**
84-Articles of apparel and clothing accessories	5.7726**	.0217	-1.1854	-1.2871	.2737**	-.2458	.1864	2.665*
85-Footwear	.2208**	.1615	1.8611	1.0127	-2.5305**	1.0416	4.0108**	-12.1875*
87-Professional instruments and apparatus, n.e.s.	4.5786**	.0025	-7.774	1.7964	.7982**	.4149	-1.3944*	-1.2549
88-Photographic apparatus, equipment and supplied and optical goods, n.e.s.,	-5.0528**	-.1079	10.0756**	-.9139	-.4922**	-.1870	1.3959**	2.2612
89-Miscellaneous manufactured articles, n.e.s.	4.5097**	.1004**	.3962	-.2406	-.0822**	-.1324**	.1080	.3326
93-Special transactions and commodities	5.4221**	-.2341	-1.1877	.2404	.1047	.0138	-.5453	-.2559
97-Gold, non-monetary	6.3653**	.5924	-3.9425	5.1614*	.0498	1.3762**	-.1039	-7.4739**

Notes: ***, **, * show the significance at 1%, 5% and 10% respectively. The critical values of standard t-distribution, i.e., 1.64, 1.96, and 2.32 are used to arrive at *, **, and ***, respectively. Abbreviation n.e.s. refers to not elsewhere defined.

Table 8: Diagnostic statistics associated with estimates of nonlinear import models in Table 7.											
Industry (Trade Share)	**Diagnostics**										
	F_{PSS}[a]	ECM_{t-1}	Adj. R^2	LM	RESET	CU	CUQ	Wald-S^{US}	Wald-S^{CH}	Wald-L^{US}	Wald-L^{CH}
00-Live animals (.0104)	4.2053*	-.6759(5.8341)**	.1866	.6730	11.713**	S	S	.9032	.2318	.1169	.3311
01-Meat and meat preparations (.009)	5.4328**	-.6332(6.5252)**	.4918	.0184	2.1767	S	U	1.6518	4.6721*	.4932	.0236
02-Dairy products and birds' eggs (.1949)	12.2245**	-.6529(9.9599)**	.7585	.7441	1.6120	S	U	.1627	1.2660	4.0791*	1.2711
03-Fish, crustaceans and molluscs, and preparations thereof (.0331)	11.1252**	-.6743(9.4552)**	.4203	1.0446	1.9164	S	S	.1308	.1104	.5731	.4945
04-Cereals and cereal preparations (.2136)	12.1994**	-1.0354(10.206)**	.2503	1.3667	.2139	S	S	2.7147	.3459	.1814	.7778
05-Vegetables and fruits (.2832)	3.2647	-.5305(5.2378)**	.8531	.2203	.5507	S	S	.4185	.2555	5.8558**	3.7578*
06-Sugars, sugar preparations and honey (.0423)	7.1345**	-.5129(7.672)**	.6727	.1477	1.9976	S	U	1.6061	.0703	2.0422	2.7159
07-Coffee, tea, cocoa, spices, and manufactures thereof (.0342)	5.7608**	-.7321(6.6948)**	.5223	.3936	.0207	S	U	.4427	.6452	1.2211	.7069
08-Feeding stuff for animals (not including un milled cereals) (.1584)	9.058**	-.6231(8.2851)**	.4668	1.0861	.0575	S	U	.0351	.1626	.1584	.1518
09-Miscellaneous edible products and preparations (.2037)	2.9542	-.5089(4.8891)*	.7440	1.4022	5.4797**	S	S	.0236	.0352	1.0440	1.3752
11-Beverages (.0182)	22.8211**	-1.0018(13.525)**	.3862	.2320	2.8473	S	U	2.2823	2.4737	.0011	.1299
12-Tobacco and tobacco manufactures thereof (.1242)	19.4215**	-.9359(11.7847)**	.4606	.7784	.0001	S	S	.2517	.0085	.0007	2.708
22-Oil seeds and oleaginous fruits (.3005)	6.9044**	-1.1217(7.5193)**	.1859	1.2244	.4081	U	S	2.0563	2.0909	5.4868**	5.0081*
23-Crude rubber (including synthetic and reclaimed) (.0691)	1.6606	-.3157(5.3622)**	.7025	1.0809	.0006	S	S	.0012	.3190	.0019	.0389
24-Cork and wood (.0696)	4.9492*	-.9232(7.6565)**	.5867	.2665	.8028	S	S	.0447	.0001	23.7925**	18.9663**
25-Pulp and waste paper (.1162)	5.7137**	-.5349(6.9484)**	.6427	.0275	7.0697**	S	S	.0679	6.4339**	.9745	1.6430
26-Textile fibres (other than wool tops) n.e.s. (.0879)	5.5629**	-.4216(6.7027)**	.5031	1.3895	4.3216*	S	S	.1004	.0046	.4561	.3505
27-Crude fertilizers and crude minerals n.e.s. (.0845)	5.6867**	-.3796(7.0525)**	.6446	.0976	6.0272*	S	S	20.2881**	.3245	1.8144	6.7845**
28-Metalliferous ores and metal scrap (.6639)	3.8243	-.3183(5.5485)**	.5085	.0418	7.6747**	S	S	10.6486**	.0350	.3515	1.1576
29-Crude animal and vegetable materials, n.e.s. (.0184)	4.1476**	-.3006(5.6309)**	.6702	.7343	5.1848*	S	S	.2536	.7254	5.9046**	4.4279*
32-Oil seeds and oleaginous fruits (.0449)	3.8521	-.2729(5.5871)**	.7004	.6329	4.1127*	S	S	1.3516	.0196	1.8572	.4315
33-Petroleum, petroleum products and related materials (.463)	5.6484**	-.4936(6.8256)**	.4638	.5265	4.5246*	S	S	.3361	5.4445**	.5903	.1811
34-Gas, natural and manufactured (.0023)	17.579**	-.8805(11.492)**	.1861	.1641	.5153	S	S	.1706	.4969	13.5234**	8.1658**
41-Animal oils and fats (.0021)	18.8761**	-.9237(11.7011)**	.0516	.3976	.5289	S	S	.8226	.0046	.5782	.0001
42-Fixed vegetable oils and fats, crude, refined or fractionated (.0209)	7.4214**	-.7671(7.5868)**	.0920	.4720	4.4893*	S	U	4.4577*	.8513	.1779	.2808
43-Animal or vegetable oils and fats, processed n.e.s. (.0521)	3.2489	-.3406(4.9032)*	.6419	.0251	4.5302*	S	S	1.3034	.0053	4.1412*	2.6272
51-Organic chemicals (.6092)	5.9436**	-.5796(6.8787)**	.5046	.4308	2.1774	S	S	3.8306*	1.9967	.0773	.0247

52-Inorganic chemicals (.3137)	6.1627**	-.7576(7.1417)**	.6203	.2189	.1551	S	S	1.0749	1.4987	15.8762**	11.1071**
53-Dyeing, tanning and colouring materials (.2111)	1.6772	-.2092(3.8348)	.9184	.3112	1.8302	S	S	.6878	.0041	9.1716**	3.8469*
54-Medicinal and pharmaceutical products (.2404)	6.7933**	-.6661(7.5095)**	.7254	1.1807	1.3155	S	S	.5771	1.2930	13.1286**	7.5343**
55-Essential oils and resinoids and perfume materials n.e.s. (.2233)	4.1299*	-.3085(5.8306)**	.6772	3.0875	5.3645*	U	S	.8859	.0050	2.6515	1.4945
56-Fertilizers, manufactured (.0748)	18.9957**	-.9246(12.7546)**	.3930	.2882	4.2511*	S	U	.3285	1.1648	.5000	.4233
57-Plastics in primary forms (.5285)	4.5703*	-.3322(6.1349)**	.7592	1.0781	2.7561	S	S	2.8815	.2402	.1545	.0034
58-Plastics in non-primary forms (.2386)	3.6542	-.3463(5.4623)**	.6201	1.1757	8.8858**	S	S	7.5116**	.3283	3.6489*	1.4956
59-Chemical materials and products, n.e.s. (.6385)	3.6061	-.2271(5.5497)**	.7674	.2506	1.8985	U	S	.0181	.6816	3.1062	1.1857
61-Leather, leather manufactures, n.e.s. (.0063)	2.9350	-.3714(4.9694)*	.4162	.5992	4.2266*	S	U	.1077	.3423	.0005	.0224
62-Rubber manufactures, n.e.s. (.0965)	4.4875*	-.3762(6.1284)**	.7465	1.1305	3.1576	U	S	.3988	1.1513	2.7421	1.0792
63-Cork and wood manufactures(excluding furniture) (.0385)	3.6222	-.341(5.6063)**	.6929	.7446	4.3624*	S	S	6.1328**	.2503	.2314	.1314
64-Paper, paperboard, and articles of paper pulp n.e.s. (.2117)	4.1254*	-.3639(5.9527)**	.6253	.0109	2.1955	S	S	.0067	1.4330	.6897	.8088
65-Textile yarn, fabrics, made-up aricles, n.e.s. (.1046)	4.5561*	-.5308(6.7197)**	.4109	.1740	2.3437	S	S	.0847	.0005	2.1219	2.6681
66-Non-metallic mineral manufactures n.e.s. (.3119)	8.0894**	-.6464(8.9647)**	.5896	.9992	4.0725*	S	U	.5670	.4276	.0076	.8466
67-Iron and steel (.2968)	7.4375**	-.6875(7.7326)**	.6806	.5014	2.8610	S	S	3.1697	10.2824**	25.9733**	14.0202**
68-Non-ferrous metals (.3302)	7.8342**	-.5272(8.1874)**	.6241	.3178	5.173*	S	S	6.7095**	4.8191*	20.5063**	12.9056**
69-Manufactures of metal, n.e.s. (.7574)	5.4464**	-.3801(6.5655)**	.6793	.5823	7.1907**	S	S	5.831**	.3989	4.2074*	.2989
71-Power generating machinery and equipment (1.2394)	7.8654**	-.7801(8.3213)**	.4577	.0336	.2549	S	S	9.7489**	.0389	.6299	3.2131
72-Machinery specialized for particular industries (1.2239)	3.4518	-.2493(5.4224)**	.6123	.0351	3.1001	U	S	.0573	.9684	2.3502	2.8286
73-Metalworking machinery (.4158)	3.7710	-.3662(5.6683)**	.7153	.1271	2.4472	S	S	2.9592	.9375	.1667	.1467
74-General industrial machinery and equipment, n.e.s. (1.6125)	4.0835*	-.3806(5.8386)**	.4801	.1216	2.4039	S	S	.1356	2.4777	.8046	.0476
75-Office machines and automatic data processing equipment (1.7692)	3.3841	-.3611(5.2518)**	.6765	.2117	2.5264	S	S	.9097	.3097	.0618	.2390
76-Telecommunications and sound recording n.e.s. (2.1885)	3.0577	-.1863(5.1686)**	.7910	.7990	5.5877*	S	U	.3885	.2729	.1438	.0075
77-Electrical machinery, apparatus and appliances, n.e.s. (17.9377)	3.5139	-.1565(5.3033)**	.8151	.2677	2.1383	S	S	.6477	3.2958	1.6254	.7272
78-Road vehicles (including air-cushion vehicles) (.1427)	4.2530*	-.2629(5.9754)**	.6919	.4045	3.5084	S	S	1.0828	.0017	1.2762	.3020
79-Others transport equipment (2.1479)	5.224**	-.4025(6.4472)**	.5838	.8084	5.0584*	S	S	.1293	.0926	3.8606*	1.0905
81-Prefabricated buildings, sanitary, plumbing, heating n.e.s. (.0233)	10.7742**	-.6752(9.4919)**	.3325	1.4619	2.4923	S	S	1.5593	4.8201*	.7332	.1150
82-Furniture and parts thereof (.036)	8.3477**	-.5108(7.7809)**	.5011	.5302	.8752	S	S	2.0633	.0016	21.2566**	.0240
83-Travel goods, handbags and similar containers (.0365)	3.4530	-.5033(5.4741)**	.8231	.4379	.8769	S	U	1.0041	.5303	30.8724**	16.4662**
84-Articles of apparel and clothing accessories (.0252)	9.4642**	-.609(8.8002)**	.6032	.9410	2.2687	S	S	.0783	.7579	4.7412**	3.2747

85-Footwear (.1554)	3.6903	-.2543(5.5239)**	.7003	.8169	4.8768*	U	S	.7520	1.0204	7.5549**	5.0032*
87-Professional instruments and apparatus, n.e.s. (2.1926)	2.8638	-.2049(4.9074)**	.8137	.2477	3.6096	U	S	.3802	.0104	.4191	.0197
88-Photographic apparatus, equip. and supplied and optical goods, n.e.s. (.1656)	5.5223**	-.4122(6.6207)**	.6049	.4371	3.0547	S	S	.2779	.0030	1.1352	.4939
89-Miscellaneous manufactured articles, n.e.s. (.778)	10.439**	-.6245(9.3031)**	.4336	.0043	.6794	S	S	.8576	.5558	.3261	.3241
93-Special transactions and commodities (.4538)	5.1066**	-.5277(6.4887)**	.6243	2.6985	6.3706*	S	S	3.318	.7687	.0447	.0283
97-Gold, non-monetary (.0443)	4.2169*	-.6266(5.8711)**	.3518	.5062	1.0939	S	U	2.4369	.5494	6.1902**	6.1119**

Notes:

a. The F test due to Pesaran te al. (2001) is denoted by $F_{PSS.}$ At the 1% (5%) significance level when there are three exogenous variables (k=4), its critical value is 5.06(4.01). This comes from Pesaran et al. (2001, Table CI-Case III, page 300).

b. 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 1% (5%) level is 6.635 (3.841).

c. RESET is Ramsey's test for misspecification. It is distributed as χ^2 with one degree of freedom and its critical value at 1% (5%) level is 6.635 (3.841).

d. CU and CUQ are CUSUM and CUSUMQ respectively to test stability of all coefficients.

e. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio, denoted by t_{BDM} in the text. Its critical value of -4.99(-4.38) at 1% (5%) significance when k=6, comes from Pesaran et al. (2001, Table CII-Case III, page 303).

f. Abbreviation n.e.s. stands for not elsewhere defined.

g. Trade share is in percentage calculated over the sample period.

h. Abbreviation n.e.s. refers to not elsewhere defined.