Do Inpayments and Outpayments Respond to Exchange Rate Changes Asymmetrically? Evidence from Malaysia

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Do Inpayments and Outpayments Respond to Exchange Rate Changes Asymmetrically? Evidence from Malaysia

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ABSTRACT

Since pass-through of exchange rate changes on import and export prices are asymmetric, we expect a country's inpayments (export earnings) and outpayments (cost of imports) to react to exchange rate changes asymmetrically too. We demonstrate this hypothesis by considering trade between Malaysia and each of her 11 largest trading partners. We find that while the short-run effects of exchange rate changes on Malaysia's inpayments and outpayments are asymmetric with all partners, the long-run asymmetric effects are present in less than half of the partners. The results are partner-specific.

JEL Classification: F31

Key Words: Malaysia, Trading Partners, Inpayments, Outpayments, Exchange Rate, Asymmetry Analysis

I. INTRODUCTION

The Marshall-Lerner (ML) condition in international economics asserts that if sum of a country's import and export demand price elasticities exceeds one, a devaluation or currency appreciation will improve that country's trade balance with the rest of the world. In estimating this consdition, usually import and export quantities are regressed on measures of economic activities and relative prices. Bahmani-Oskooee *et al*. (2013) provide the most recent review of the literature.

Estimating the Marshall-Lerner condition using aggregate trade flows of a country is said to suffer from aggregation bias. Suppose the ML condition is met. Clearly, what is true at the aggregate level, may not be true with each individual partner. While the condition could be satisfied with one partner, it may not be satisfied with another partner. Validating such claims requires estimating the ML condition using bilateral trade flows between two countries. However, import and export prices are not available at bilateral level as they are available between one country and the world. The literature here has followed a different path and regressed nominal value of imports and exports on the real bilateral exchange rate as a measure of relative prices. By doing so researchers directly assess the effects of exchange rate changes on a country's inpayments from and outpayments to its trading partners. Haynes *et al.* (1986), Bergstrand (1987), Cushman (1987), Bahmani-Oskooee and Goswami (2004), Bahmani-Oskooee et al. (2005a, 2005b), Bahmani-Oskooee and Harvey (2006) are some examples.

Concentrating on the last study, Bahmani-Oskooee and Harvey (2006) investigated the response of Malaysia's inpayments from and outpayments to several of its major trading partners. The real bilateral exchange rate had significant long-run effects on Malaysia's inpayment from five partners and on its outpayments to only one partner. We wonder if lack of significant link between the real bilateral exchange rate and inpayments and outpayments with most partners could be due to assuming the effects of exchange rate changes to be symmetric which requires using linear models. Could the outcome be different if we introduce asymmetric effects of exchange rate changes and rely upon estimating nonlinear models of inpayments and outpayments schedule? After all, there is now clear evidence by Bussiere (2013) who shows that import and export prices adjust to exchange rate changes in an asymmetric manner. Since these prices are used to calculate inpayments (export earnings) and outpayments (cost of imports), we can expect a country's inpayments and outpayments to react to exchange changes in an asymmetric manner too. Bahmani-Oskooee and Fariditavana (2016) have also argued that traders' reactions and expectations could be different to a depreciation as compared to an appreciation. They have then demonstrated that the trade balance reacts to exchange rate changes asymmetrically. To demonstrate out conjecture in this paper, we introduce both the linear and nonlinear models in Section II. We then report our empirical results in Section III. A summary is provided in Section IV that is followed by data Appendix.

II. The Models and the Methods

Since we are extending Bahmani-Oskooee and Harvey's (2006) linear models to nonlinear specifications, we begin with their specifications of the inpayments and outpayments first as follows:

$$LnVX_{i,t} = a + bLnY_{i,t} + cLnREX_{i,t} + \varepsilon_t \qquad (1)$$

$$LnVM_{i,t} = d + eLnY_{ML,t} + fLnREX_{i,t} + \mu_t \qquad (2)$$

Equation (1) is commonly referred to as an inpayment schedule where $VX_{j,t}$ is the nominal value of Malaysian exports to trading partner i or her export earnings paid by i. Two variables determine these earnings. Level of economic activity in partner i (Y_i), and real bilateral exchange rate between Malaysian ringgit and partner i's currency (REX_i). Since an increase in partner i's economic activity is expected to boost Malaysia's exports, we expect an estimate of b in (1) to be positive. From the Appendix we gather that the REXi is defined in a manner that a decline reflects depreciation of ringgit against i's currency. Therefore, if ringgit depreciation is to increase Malaysia's inpayments by partner i, we expect an estimate of c to be negative. Clearly, this is based on the assumption that partner i's import demand is price elastic. If it is inelastic, then inpayments could decline.

Similarly, specification (2) outlines determinants of Malaysia's outpayments to partner i where $VM_{j,t}$ is the value of Malaysian imports from partner i and is assumed to depend on the Malaysia's own income or economic activity (Y_{MY}) and the real bilateral exchange rate. Again, we expect income elasticity to be positive if an increase in Malaysian income leads to an increase in her imports and import costs. On the other hand, if a real depreciation of ringgit reduces Malaysia's imports, her outpayments or imports costs will decline. Again, this is under the assumption that Malaysian import demand is elastic. In this case we would expect an estimate of f to be positive. Otherwise, it could be negative.

Estimates of (1) and (2) only yield the long-run effects of independent variables on the dependent variables. In order to infer the short-run effects, we need to specify them as error-correction models. Again we follow Bahmani-Oskooee and Harvey (2006) and Pesaran *et al.*'s (2001) and rely upon the following specifications:

$$\Delta LnVX_{i,t} = \alpha + \sum_{j=1}^{n1} \beta_j \Delta LnVX_{i,t-j} + \sum_{j=0}^{n2} \delta_j \Delta LnY_{i,t-j} + \sum_{j=0}^{n3} \phi_j \Delta LnREX_{i,t-j} + \gamma_0 LnVX_{t-1} + \gamma_1 LnY_{i,t-1} + \gamma_2 LnREX_{i,t-1} + \xi_t \quad (3)$$

$$\Delta LnVM_{i,t} = \alpha' + \sum_{j=1}^{n1} \beta'_j \Delta LnVM_{i,t-i} + \sum_{j=0}^{n2} \delta'_j \Delta LnY_{MY,t-i} + \sum_{j=0}^{n3} \phi'_j \Delta LnREX_{i,t-j} + \gamma'_0 LnVM_{t-1} + \gamma'_1 LnY_{MY,t-1} + \gamma'_2 LnREX_{i,t-1} + \xi'_t \quad (4)$$

In both specifications, short-run effects are reflected in the estimates of coefficients attached to first-differenced variables and long-run effects are inferred by the estimates of γ_1 *and* γ_2 normalized on γ_0 in (3) and by the estimates of $\gamma_1^{'}$ *and* $\gamma_2^{'}$ normalized on $\gamma_0^{'}$ in (4). However, we must establish cointegration among the variables in each model if long-run effects are to be valid. Pesaran *et al* (2001) recommend applying the F test to establish joint significance of the lagged level variables. They tabulate new critical values for the F test which accounts for integrating properties of variables.[1]

The main assumption in estimating (3) and (4) is that response of inpayments in (3) and outpayments in (4) to changes in the exchange rate are symmetric, i.e., exchange rate elasticities are the same for a depreciation as compared to an appreciation. As discussed in the previous section, this need not be the case. Here we deviate from previous literature by engaging in an asymmetry analysis. We do this by following Shin *et al.* (2014) and modify both specifications (3) and (4). The modification involves simply separating currency depreciations from appreciations. For this purpose we first form *ΔLnREX* which reflects rate of change of the real exchange rate where positive values signify appreciations and negative values signify depreciations. Using the partial sum concept, we then construct two new series as follows:

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

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

In (5) the POS_t variable which is the partial sum of positive changes represents only ringgit appreciation and the NEG_t variable which is the partial sum of negative changes represents only ringgit depreciation. In the next step, we go back to (3) and (4) and replace *LnREX* variable by POS_t and NEG_t to arrive at two new models as follows:

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[1] Pesaran et al. (2001) show that their upper bound critical values are also good for models that have combination of I(0) and I(1) variables.

$$\Delta LnVX_{i,t} = \alpha + \sum_{j=1}^{n1} \beta_j \Delta LnVX_{i,t-j} + \sum_{j=0}^{n2} \delta_j \Delta LnY_{i,t-j} + \sum_{j=0}^{n3} \phi_j^{+} \Delta POS_{i,t-j} + \sum_{j=0}^{n4} \phi_j^{-} \Delta NEG_{i,t-j}$$

$$+ \gamma_0 LnVX_{t-1} + \gamma_1 LnY_{i,t-1} + \gamma_2^{+} POS_{i,t-1} + \gamma_2^{-} NEG_{i,t-1} + \xi_t \qquad (6)$$

and

$$\Delta LnVM_{i,t} = \alpha' + \sum_{j=1}^{n1} \beta_j' \Delta LnVM_{i,t-j} + \sum_{j=0}^{n2} \delta_j' \Delta LnY_{MY,t-j} + \sum_{j=0}^{n3} \phi_j^{'+} \Delta POS_{i,t-j} + \sum_{j=0}^{n4} \phi_j^{'-} \Delta NEG_{i,t-j}$$

$$+ \gamma_0' LnVM_{t-1} + \gamma_1' LnY_{MY,t-1} + \gamma_2^{'+} POS_{i,t-1} + \gamma_2^{'-} NEG_{i,t-1} + \xi_t' \qquad (7)$$

Since constructing the partial sum variables introduce nonlinearity in specifications (6) and (7), they are referred to as nonlinear ARDL models, whereas, specifications (3) and (4) are referred to as linear ARDL models. Shin *et al*. (2014) show that Pesaran *et al*.'s (2001) approach of estimating the linear models could be applied to (6) and (7). They even argue that due to dependency between the two partial sum variables, they should be treated as a single term in (6) and (7) so that the same critical values of the F test could be used in all models.[2]

Once (6) and (7) are estimated by the OLS method, a few hypothesis with regards to asymmetric effects of exchange rate changes on inpaymnets and outpayments could be tested. First, short-run "adjustment asymmetry" will be confirmed if n3 ≠ n4 in both (6) and (7). Second, short-run asymmetric effects will be observed if at each lag $\hat{\phi}_j^{+} \neq \hat{\phi}_j^{-}$ in (6) and $\hat{\phi}_j^{'+} \neq \hat{\phi}_j^{'-}$ in (7). Third, short-run cumulative or impact asymmetry will be established if $\sum \hat{\phi}_j^{+} \neq \sum \hat{\phi}_j^{-}$ in (6) and $\sum \hat{\phi}_j^{'+} \neq \sum \hat{\phi}_j^{'-}$ in (7). Finally, long-run asymmetry will be established if $-\frac{\hat{\gamma}_2^{+}}{\hat{\gamma}_0} \neq -\frac{\hat{\gamma}_2^{-}}{\hat{\gamma}_0}$ in (6) and $-\frac{\hat{\gamma}_2^{'+}}{\hat{\gamma}_0'} \neq -\frac{\hat{\gamma}_2^{'-}}{\hat{\gamma}_0'}$ in (7). To test all these inequalities, the Wald test is the recommended test.[3]

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[2] See Shin et al. (2014, p. 291).

[3] For more on the application of these methods see Delatte and Lopez-Villavicencio (2012), Verheyen (2013), Bahmani-Oskooee and Fariditavana (2015), Bahmani-Oskooee and Saha (2015), Gogas and Pragidis (2015),

III. Empirical Results

Although our intention is to demonstrate the asymmetric response of Malaysia's inpayments and outpayments to exchange rate changes which requires estimating (6) and (7) only, for comparison we also estimate the linear models (3) and (4). Quarterly data over the period 1991I-2015IV are used to estimate all models between Malaysia and each of her 11 major trading partners. In each case, a maximum of 12 lags are imposed on first-differenced variables and Akaike's Information Criterion (AIC) is used to select an optimum specification. The results are then reported in Table 1 for inpayment models and in Table 2 for outpayment models. Furthermore, since different critical values are used for different estimates and diagnostics, they are collected in several footnotes towards the end of each table. They are then used to identify an estimate by * if it is significant at the 10% level and by ** if it is significant at the 5% level. Additionally, since Asian Financial Crisis of 1997 may have some implication on Malaysian trade, especially with partners from Asia, a dummy is included to account for the Crisis.

Tables 1 and 2 go about here

Let us first consider the Malaysian inpayments schedule and Table 1. From the estimates of the linear model (3) that is indicated by L-ARDL and Panel A we gather that the real exchange rate has short-run effects on Malaysian inpayments in all models except in the bilateral model with the Philippines. This is because in each case, the real exchange rate carries at least one lagged significant coefficient. However, when we consider the short-run estimates from the nonlinear models (NL-ARDL) either the ΔPOS or ΔNEG variable carry at least one significant coefficient in all models. These

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Durmaz (2015), Baghestani and Kherfi (2015), Pal and Mitra (2016), Al-Shayeb and Hatemi-J.(2016), Lima et al. (2016), Nusair (2017), Aftab *et al*. (2017), and Gregoriou (2017).

results support the fact that exchange rate changes do have short-run effects on the inpayments of Malaysia from every trading partner.

The short-run estimates from the nonlinear models, however, yield additional information with regards to asymmetric effects of exchange rate changes. As can be seen, optimum lags on ΔPOS are different than those on ΔNEG in all models except the Malaysian-China and Malaysian-Singapore models. This supports presence of short-run "adjustment asymmetry" in most bilateral models. Furthermore, clearly the size of estimated coefficient attached to ΔPOS at lag j is different than the estimate attached to ΔNEG at the same lag, supporting short-run asymmetric effects. As for the short-run cumulative or impact asymmetry, we apply the Wald test to equality of sum of the short-run estimates attached to ΔPOS and to ΔNEG. This Wald test that is reported as Wald-S in Panel C reveals that there is evidence of impact asymmetry in the cases of only Indonesia, Japan, and Singapore, all partners from Asia. Do these short-run effects last into the long run?

Long-Run normalized coefficient estimates are reported in Panel B. Here we will look for significant long-run estimates that are supported by significant F test for cointegration. In case the F is insignificant, we rely upon an alternative test that is known as the t-test. Under this alternative test we use the normalized long-run estimates and the long-run model (e.g., equation 1) and generate the error term denoted by ECM. We then replace the linear combination of lagged level variables in (3) by $ECM_{t-1.}$ After imposing the same optimum lags from Panel A, this new specification is estimated. If estimate of the coefficient attached to ECM_{t-1} is negative and significant, cointegration will be supported. The t-test that is used to verify significance of this estimate has a new distribution and like the F test, Pesaran *et al*. (2001, p. 303) tabulate new critical values.

From the long-run estimates and diagnostic statistics in Panel C we gather that only in four linear models the exchange rate carries a significant coefficient that is validated by a significant F or ECM_{t-1} test. These are the Malaysian bilateral models with Asutralia, China (Mainland), Singapore, and U.K. Furthermore, while in the results with Australia and U.K. ringgit depreciation will increase Malaysian inpayments, in the cases of China and Singapore, it will decrease them. It appears that import demand of China and Singapore for Malaysian goods are inelastic.[4] However, when we consider the normalized long-run coefficient estimates from nonlinear models, there are five models in which either the POS or the NEG variable carries a significant coefficient that is supported by asymmetry cointegration. These are the bilateral inpyments models of Malaysia with Australia, Indonesia, Singapore, U.K. and the U.S.. In all of these models (except the case of U.K.), the long-run asymmetric effects of exchange rate changes are supported by the Wald test that is reported as Wald-L in Panel C.

Clearly, the results are partner-specific. For example, in the results with the U.S. in the linear model the real ringgit-dollar rate had no long-run effects on the Malaysian inpayments by the U.S. If we were to rely upon only the linear model, the process would have stopped right here and we would have concluded that the real exchange rate has no long-run effects. However, the nonlinear model reveals that appreciation of ringgit against the U.S. dollar will hurt Malaysian export earnings from the U.S. but ringgit depreciation will have no effect, a clear sign of long-run asymmetric effects. Or in the case of Singapore, while ringgit depreciation will hurt Malaysia's inpayments, ringgit appreciations will have no long-run effects.

A few other diagnostics are also reported in Panel C. To test for serial correlation among the residuals we report the Lagrange-Multiplier (LM) statistic. In most models it is insignificant, supporting autocorrelation free residuals. We also report Ramsey's specification test as RESET. That is also

[4] These results are more or less consistent with Bahmani-Oskooee and Harvey (2006).

insignificant in most models, implying that most models are correctly specified. We have also applied the well-known CUSUM and CUSUMSQ tests to the residuals of each optimum model to establish the stability of all estimated coefficients. These two tests are represented by CS and CS^2 respectively. Identifying stable estimates by "S" and unstable ones by "US", it is clear that most estimates are stable. Finally, the size of adjusted R^2 is reported to judge the goodness of fit in each model. It is higher in the nonlinear models relative to linear models.

Next we turn to Table 2 and estimates of outpayments schedules outlined by equations (4) and (7). Short-run results are similar to those of Malaysia's inpayments models in that they are significant in almost all linear and nonlinear models. However, the estimates of nonlinear models support short-run asymmetric effects of exchange rate changes in all models since at any given lag, the estimate attached to the ΔPOS variable is different than the one attached to the ΔNEG variable at the same lag. However, the sum of these estimates are significantly different from each other in the cases of Indonesia, Japan, Singapore, Thailand, U.K., and the U.S., supporting short-run impact asymmetry in these six cases. There is also evidence of short-run "adjustment asymmetry" in all nonlinear models except the cases of Hong Kong and the Philippines. Do these short-run asymmetric effects last into the long run?

From the long-run estimates of the linear model in Panel B, we gather that the real exchange rate has meaningful significant effects on Malaysia's outpayments to Australia, Hong Kong, and the U.S. However, in the nonlinear models, either the POS or the NEG variable carry a significant coefficient that is supported by either the F or ECM_{t-1} test in the cases of China (mainland), Japan, Singapore, and the U.S. In all these cases, long-run asymmetric effects is supported by Wald-L statistic, though in the case of China, the support is marginal. Although the results are partner-specific, they mostly favor the nonlinear model. For example, in the bilateral model with China (mainland) there was lack of symmetric cointegration whereas, in the nonlinear model there is evidence of asymmetric cointegration. This must be due to introducing nonlinear adjustment of the exchange rate. Or in the model with Japan, the long-run effects of the exchange rate was insignificant. However, this is not the case in the nonlinear model. Introducing nonlinearity not only has brought about asymmetric cointegration but also has yielded significant long-run effects of both ringgit appreciation and depreciation. The same is true of the outpayments with Singapore.[5]

IV. Summary and Conclusion

One area in international economics in which researchers have tried to assess the impact of currency depreciation on a country's external accounts is to directly relate export earnings (inpayments0 and import payments (outpayments) to the real exchange rate in addition to some scale variables. All previous studies that engaged in this sort of research assumed that exchange rate changes do have symmetric effects on a country's inpayments from and outpayments to a trading partner. However, this need not be the case. Indeed, there are evidences that point to asymmetric effects of exchange rate changes on inpayments and outpayments. Some recent studies have shown that import and export prices react to exchange rate changes in an asymmetric manner. Since import and export prices are used to calculate outpayments and inpayments respectively, we would expect outpayments and inpayments also to react asymmetrically to exchange rate changes.

To demonstrate out conjecture in this paper we concentrate on the Malaysian inpayments from and outpayments to her 11 largest partners. First, we assume the effects of exchange rate changes to be symmetric so that we can use Pesaran *et al.*'s (2001) linear ARDL approach to replicate a previous

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[5] All other diagnostic statistics are similar to those in Table 1 and need no detailed explanations. There is lack of serial correlation in most models, most optimum models are correctly specified, and estimates are stable.

study. Next we engage in asymmetry analysis and use Shin *et al.*'s (2014) nonlinear ARDL approach and asymmetry cointegration to show that this later approach yields useful results that were masked by the linear model. The findings that are partner-specific could be best summarized by saying that in some cases in which the exchange rate had no significant effects on Malaysian inpayments and outpayments in the linear model, it had significant asymmetric effects in the nonlinear models. Overall, the nonlinear models revealed that exchange rate changes have short-run asymmetric effects on Malaysian inpayments from and outpayments to most of her 11 partners. However, short-run asymmetric effects lasted into long-run asymmetric effects in less than half of the partners.

A major policy implication of our approach is that when currency depreciations are separated from appreciations, a country can determine if its inpayments and outpayments will respond to a depreciation and to an appreciation asymmetrically. Since import demand elasticities differ from one country to another, clearly inpayments and outpayments will react in an asymmetric manner to exchange rate changes. Such findings cannot be extracted from linear models in which the exchange rate enters into the model as a single entity and not as two separate entities. Therefore, we highly recommend applications of nonlinear models in which changes in the exchange rate are decomposed into appreciations and depreciations and their effects are inferred separately.

Appendix
Data Definition and Sources

Quarterly data over the period 1991(I)-2015(IV) are used to carry out the empirical analysis. They come from the following sources:

a. Direction of Trade Statistics by the IMF.
b. International Financial statistics (IFS)

Due to unavailability of data on some variables, however, the period was restricted to
Japan: 1994(I)-2015(IV), Singapore: 1991(I)-2015(II), Thailand: 1993(I)-2014(IV), China, mainland: 1996(I)-2014(IV).

Variables:

$VX_i =$ Malaysia export value to trading partners. [Data are collected from source (a)]

$VM_i =$ Malaysia import value from trading partners. [Data are collected from source (a)]

$Y_{MY} =$ Measure of Malaysia's income. It is proxied by index of real GDP. The data come from source b.

Y_i = Trading partner i's income. This is also proxied by the index of real GDP in country i and the data come from source b.

REX_i = The real bilateral exchange rate of the Malaysian Ringgit against the currency of partner i. It is defined as $REX_i = (P_{MY}. NEX_i/ P_i)$ where NEX_i is the nominal exchange rate defined as number of units of partner i's currency per Ringgit, P_{MY} is the price level in Malaysia. (measured by CPI) and P_i is the price level in country i (also measured by CPI). Thus, a decline in REX reflects a real depreciation of the ringgit. All nominal exchange rates and price levels data come from source.
Source: IFS, 2016.

	2015	2015	
Direction of Trade Statistics (DOTS)			
	exports	import	Net exports
Australia	$ 7,213,525,262.00	$ 4,501,109,060.00	$ 2,712,416,202.00
China, P.R.: Hong Kong	$ 9,482,420,396.00	$ 2,964,859,796.00	$ 6,517,560,600.00
China, P.R.: Mainland	$ 25,986,959,459.00	$ 33,155,162,002.00	$ (7,168,202,543.00)
Indonesia	$ 7,472,519,471.00	$ 7,949,546,576.00	$ (477,027,105.00)
Japan	$ 18,999,051,479.00	$ 13,785,387,000.00	$ 5,213,664,479.00
Korea, Republic of	$ 6,474,676,284.00	$ 7,968,249,507.00	$ (1,493,573,223.00)
Philippines	$ 3,369,081,281.00	$ 1,677,509,481.00	$ 1,691,571,800.00
Singapore	$ 27,807,726,249.00	$ 21,051,615,548.00	$ 6,756,110,701.00
Thailand	$ 11,403,360,102.00	$ 10,691,044,987.00	$ 712,315,115.00
United Kingdom	$ 2,386,763,662.00	$ 1,834,669,890.00	$ 552,093,772.00
United States	$ 18,879,767,165.00	$ 14,193,521,516.00	$ 4,686,245,649.00
World	$199,957,530,606.00	$ 175,976,965,135.00	$ 23,980,565,471.00

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Table 1: Full-Information Estimates of Both Linear ARDL (L-ARDL) and Nonlinear ARDL (NL-ARDL) Export Demand Model

	i = Australia		i = China, Mainland		i=Hong Kong		i = Indonesia	
	L – ARDL#	**NL - ARDL**	**L - ARDL**	**NL - ARDL**	**L – ARDL#**	**NL - ARDL**	**L - ARDL**	**NL - ARDL**
Panel A: Short–Run Estimates								
ΔlnY $_{i,t}$	-1.54(0.57)	-1.88(0.73)	2.59(2.93)**	2.05(1.79)*	1.37(4.18)**	1.26(3.81)**	0.18(1.07)	1.25(2.19)**
ΔlnY $_{i,t-1}$	0.63(0.22)		-0.74(0.72)	-2.11(1.40)	-0.78(4.13)**	-0.74(3.01)**		0.60(1.15)
ΔlnY $_{i,t-2}$	3.23(1.23)		1.23(1.31)	-1.99(1.15)	0.66(2.11)**	0.62(1.89)*		-0.75(1.72)*
ΔlnY $_{i,t-3}$			1.61(1.67)*	0.02(0.01)				-0.42(0.97)
ΔlnY $_{i,t-4}$			-0.55(0.55)	-3.14(1.81)*				-1.42(2.84)**
ΔlnY $_{i,t-5}$			1.97(2.18)**	-5.29(2.59)**				-0.98(1.76)*
ΔlnY $_{i,t-6}$				-4.81(2.89)**				
ΔlnY $_{i,t-7}$				-6.10(3.73)**				
ΔlnY $_{i,t-8}$				-3.86(3.01)**				
ΔlnY $_{i,t-9}$								
ΔlnREX$_{i,t}$	-0.37(1.22)		1.68(2.29)**		0.60(2.48)**		-0.43(3.49)**	
ΔlnREX$_{i,t-1}$	0.55(1.47)		-1.15(1.71)*					
ΔlnREX$_{i,t-2}$	0.49(1.39)							
ΔlnREX$_{i,t-3}$	-0.74(2.31)**							
ΔlnREX$_{i,t-4}$	0.62(2.04)**							
ΔlnREX$_{i,t-5}$								
ΔlnREX$_{i,t-6}$								
ΔPOS_t		-2.41(4.44)**		-8.25(1.69)*		0.97(1.61)		-0.99(1.76)*
ΔPOS_{t-1}				16.39(2.61)**				1.02(1.28)
ΔPOS_{t-2}				21.30(3.66)**				3.24(4.02)**
ΔPOS_{t-3}				5.49(0.87)				2.85(3.27)**
ΔPOS_{t-4}				16.12(2.69)**				3.07(3.58)**
ΔPOS_{t-5}				16.34(3.09)**				
ΔPOS_{t-6}				1.81(0.39)				
ΔPOS_{t-7}				16.72(3.45)**				
ΔPOS_{t-8}				12.03(2.87)**				
ΔPOS_{t-9}				-3.86(1.02)				
ΔPOS_{t-10}				-2.70(0.69)				
ΔPOS_{t-11}				-4.44(1.21)				
ΔPOS_{t-12}								
ΔNEG_t		-0.36(0.34)		7.57(2.55)**		1.63(2.01)**		0.79(0.66)
ΔNEG_{t-1}		2.17(1.89)		4.68(1.03)		-1.63(1.79)*		3.39(2.87)**
ΔNEG_{t-2}		0.28(0.27)		6.68(1.67)*		1.76(2.01)**		
ΔNEG_{t-3}		-2.09(2.09)**		4.29(1.35)				
ΔNEG_{t-4}				1.73(0.53)				
ΔNEG_{t-5}				8.44(2.58)**				
ΔNEG_{t-6}				15.13(4.93)**				
ΔNEG_{t-7}				2.84(0.93)				
ΔNEG_{t-8}				3.71(1.38)				
ΔNEG_{t-9}				9.53(3.83)**				
ΔNEG_{t-10}				0.84(0.34)				
ΔNEG_{t-11}				7.73(3.47)**				
ΔNEG_{t-12}								
Panel B: Long–Run Estimates								
ln Y_i	2.10(5.75)**	2.93(2.79)**	11.82(14.95)**	9.34(1.53)	1.14(3.08)**	-0.40(0.28)	0.96(2.06)**	0.79(4.02)**
ln REX_i	-1.75(5.06)**		2.78(2.05)**		0.74(1.37)		-2.32(1.93)*	
POS		-4.28(4.83)**		-68.84(1.23)		4.52(1.45)		-3.21(3.46)**
NEG		-3.46(4.17)**		5.35(0.71)		1.76(1.26)		-4.64(4.62)**
Constant	-36.63(3.90)**	-56.52(2.07)**	-12.43(1.60)	-61.09(1.19)	-9.93(1.05)	31.48(0.84)	10.00(0.43)	-4.01(0.69)
Panel C: Diagnostic Statistics								
F	6.12**	9.29**	4.07**	5.29**	3.48	3.75	1.82	7.58*
ECM_{t-1}	-0.56(4.17)**	-0.56(6.30)**	-0.39(2.49)	-0.36(1.43)	-0.21(3.14)	-0.21(3.23)	-0.18(1.99)	-0.58(4.42)
LM	6.99	3.94	1.13	19.21**	3.46	0.61	7.45	7.03
RESET	0.07	0.50	4.05	2.02	1.37	1.02	1.14	2.27
Adjusted R^2	0.28	0.33	0.44	0.51	0.37	0.39	0.24	0.37
CS (CS^2)	S(US)	S(S)	S(S)	S(S)	S(US)	S(US)	S(S)	S(S)
WALD – S		0.83		0.93		1.51		2.72*
WALD – L		3.85		0.48		0.18		25.13**

Notes: See end of the table.

Table 1 continued.

	i=Japan		i =Philippines		i = Singapore		i = South Korea	
	L – ARDL	**NL - ARDL**	**L - ARDL**	**NL - ARDL**	**L – ARDL#**	**NL - ARDL**	**L - ARDL**	**NL - ARDL**
Panel A: Short–Run Estimates								
$\Delta \ln Y_{i,t}$	3.66(3.39)**	3.20(2.89)**	-0.11(0.82)	-0.22(1.67)*	1.32(3.86)**	0.94(5.81)**	2.09(3.49)**	1.14(2.71)**
$\Delta \ln Y_{i,t-1}$		-0.94(0.68)	-0.28(2.38)**	0.32(1.38)			3.30(5.78)**	2.13(3.97)**
$\Delta \ln Y_{i,t-2}$		-2.78(2.17)**		0.59(2.51)**			2.86(4.88)**	1.79(4.54)**
$\Delta \ln Y_{i,t-3}$		0.35(0.26)		0.93(4.05)**			1.23(1.87)*	
$\Delta \ln Y_{i,t-4}$		-2.06(1.66)		0.58(2.69)**				
$\Delta \ln Y_{i,t-5}$		-0.79(0.65)		0.39(1.76)*				
$\Delta \ln Y_{i,t-6}$		-0.79(0.65)		0.49(2.23)**				
$\Delta \ln Y_{i,t-7}$		1.03(0.95)		0.69(3.39)**				
$\Delta \ln Y_{i,t-8}$		-1.97(1.83)*		0.58(2.98)**				
$\Delta \ln Y_{i,t-9}$		-1.59(1.50)		0.56(3.46)**				
$\Delta \ln Y_{i,t-10}$		-1.52(1.46)						
$\Delta \ln REX_{i,t}$	-0.70(2.98)**		0.79(1.34)		0.28(1.81)*		-0.44(1.34)	
$\Delta \ln REX_{i,t-1}$	0.45(1.71)*						0.57(1.80)*	
$\Delta \ln REX_{i,t-2}$	-0.31(1.13)						-0.46(1.39)	
$\Delta \ln REX_{i,t-3}$	-0.15(0.52)							
$\Delta \ln REX_{i,t-4}$	0.06(0.21)							
$\Delta \ln REX_{i,t-5}$	-0.47(1.78)*							
$\Delta \ln REX_{i,t-6}$	0.31(1.21)							
$\Delta \ln REX_{i,t-7}$	0.31(1.21)							
$\Delta \ln REX_{i,t-8}$	-0.22(0.93)							
$\Delta \ln REX_{i,t-9}$	-0.33(1.47)							
ΔPOS_t		-0.99(1.08)		7.91(1.76)*		0.06(0.13)		-3.32(2.85)**
ΔPOS_{t-1}		-1.11(1.06)		7.14(2.15)**				2.10(1.69)*
ΔPOS_{t-2}		-0.17(0.18)		-4.56(1.38)				-1.53(1.23)
ΔPOS_{t-3}		1.96(1.92)*						-0.99(0.84)
ΔPOS_{t-4}		3.05(2.67)**						-0.16(0.14)
ΔPOS_{t-5}		0.62(0.52)						2.76(2.66)**
ΔPOS_{t-6}		1.58(1.30)						-0.76(0.68)
ΔPOS_{t-7}		1.35(1.25)						2.76(2.88)**
ΔPOS_{t-8}		0.77(0.74)						-0.89(0.95)
ΔPOS_{t-9}		-1.71(1.75)*						1.85(2.02)**
ΔNEG_t		-2.58(2.94)**		0.08(0.03)		2.69(2.79)**		-0.09(0.06)
ΔNEG_{t-1}		3.44(3.62)**		-3.96(1.34)				-2.56(1.55)
ΔNEG_{t-2}		-0.12(0.11)		-2.63(0.99)				4.48(2.75)**
ΔNEG_{t-3}		-0.89(0.79)		-2.09(0.98)				-3.16(1.79)*
ΔNEG_{t-4}		-1.08(1.07)		0.49(0.20)				
ΔNEG_{t-5}		-2.02(1.98)*		6.47(2.57)**				
ΔNEG_{t-6}		1.78(1.89)*		0.36(0.16)				
ΔNEG_{t-7}		-2.23(2.66)**		-2.51(1.16)				
ΔNEG_{t-8}				-7.47(3.32)**				
ΔNEG_{t-9}				0.24(0.10)				
ΔNEG_{t-10}				-1.25(0.52)				
ΔNEG_{t-11}				-4.63(2.08)**				
ΔNEG_{t-12}								
Panel B: Long–Run Estimates								
$\ln Y_i$	11.41(4.07)**	73.65(0.59)	0.29(0.99)	-0.96(1.14)	1.06(14.28)**	1.49(8.72)**	1.98(3.85)**	6.57(0.59)
$\ln REX_i$	-0.95(0.77)		-1.75(1.54)		0.61(1.89)*		-1.37(0.71)	
POS		-36.43(0.57)		14.24(1.44)		0.09(0.13)		-12.62(0.47)
NEG		-27.89(0.60)		2.91(0.73)		2.11(3.58)**		-3.98(0.30)
Constant	-361.02(3.91)**	-2468.2(0.59)	16.47(1.70)*	42.76(1.99)*	-3.37(2.03)**	-14.03(3.42)**	-37.82(1.70)*	-194.04(0.54)
Panel C: Diagnostic Statistics								
F	3.47	2.92	2.29	5.98**	6.82*	8.28**	0.71	1.22[0.23]
ECM_{t-1}	-0.14(2.67)	-0.04(0.62)	-0.17(2.19)	1.65	-0.46(4.74)**	-0.63(6.96)**	-0.12(0.89)	-0.07(0.47)
LM	3.78	2.05	4.73	2.89	12.24**	8.24**	0.54	2.62
RESET	20.80**	14.25**	3.39	8.59**	7.16**	7.86**	0.48	3.51*
AdjustedR^2	0.25	0.48	0.13	0.26	0.33	0.37	0.52	0.60
CS (CS^2)	S(US)	S(S)	S(S)	S(S)	S(US)	S(S)	S(S)	S(S)
WALD – S		27.84**		0.75		3.63*		1.46
WALD – L		0.22		0.04		5.02**		0.43

Notes: see end of the table.

Table 1 continued.						
	i = Thailand		**i = United Kingdom**		**i = United States of America**	
	L - ARDL	**NL - ARDL**	**L - ARDL**	**NL – ARDL**	**L – ARDL**	**NL - ARDL**
Panel A: Short–Run Estimates						
$\Delta \ln Y_{i,t}$	1.93(5.59)**	2.03(3.81)**	1.67(1.08)	-0.28(0.91)	5.18(3.14)**	2.58(1.38)
$\Delta \ln Y_{i,t-1}$	0.83(1.77)*	0.03(0.04)	0.40(0.26)			-2.94(1.49)
$\Delta \ln Y_{i,t-2}$	1.59(3.56)**	0.30(0.41)	2.99(2.02)**			-2.75(1.36)
$\Delta \ln Y_{i,t-3}$	1.06(2.41)	0.69(0.87)				-0.62(0.29)
$\Delta \ln Y_{i,t-4}$	0..63(1.45)	-0.27(0.33)				3.81(1.89)*
$\Delta \ln Y_{i,t-5}$	-0.36(0.96)	-1.40(1.82)*				
$\Delta \ln Y_{i,t-6}$	1.01(2.81)**	0.74(0.95)				
$\Delta \ln Y_{i,t-7}$	-0.06(0.15)	-0.64(0.77)				
$\Delta \ln Y_{i,t-8}$	0.29(0.77)	-0.62(0.86)				
$\Delta \ln Y_{i,t-9}$	-0.17(0.48)	-0.39(0.66)				
$\Delta \ln Y_{i,t-10}$	-0.09(0.27)	-1.79(3.34)**				
$\Delta \ln Y_{i,t-11}$	-0.99(3.08)**					
$\Delta \ln REX_{i,t}$	-0.29(0.73)		-0.17(2.13)**		0.32(1.18)	
$\Delta \ln REX_{i,t-1}$	0.91(2.57)**				-0.12(0.45)	
$\Delta \ln REX_{i,t-2}$					0.57(2.13)**	
ΔPOS_t		2.52(1.56)		-0.53(3.02)**		6.31(3.39)**
ΔPOS_{t-1}		-3.21(1.55)				5.39(2.73)**
ΔPOS_{t-2}		-2.03(0.89)				5.71(3.09)**
ΔPOS_{t-3}		-1.20(0.50)				-2.05(1.00)
ΔPOS_{t-4}		-0.59(0.25)				-6.41(3.43)**
ΔPOS_{t-5}		-2.05(0.90)				-1.62(0.87)
ΔPOS_{t-6}		-0.39(0.14)				0.53(0.29)
ΔPOS_{t-7}		-0.98(0.39)				5.18(2.94)**
ΔPOS_{t-8}		-4.12(2.12)**				0.11(0.07)
ΔPOS_{t-9}		2.12(1.12)				-0.98(0.63)
ΔPOS_{t-10}		-1.69(0.89)				-6.65(4.09)**
ΔNEG_t		-4.12(1.69)*		-0.76(1.19)		-0.56(0.69)
ΔNEG_{t-1}		-1.49(0.69)		1.28(1.92)*		-0.27(0.34)
ΔNEG_{t-2}		1.83(0.92)				1.67(1.87)*
ΔNEG_{t-3}		-1.96(0.95)				0.15(0.15)
ΔNEG_{t-4}		-2.45(1.12)				2.43(2.04)**
ΔNEG_{t-5}		-1.34(0.66)				-0.70(0.56)
ΔNEG_{t-6}		1.95(0.98)				0.72(0.64)
ΔNEG_{t-7}		-5.48(2.35)**				-2.33(2.29)**
Panel B: Long–Run Estimates						
$\ln Y_i$	1.14(0.44)	1.81(1.46)	-0.09(0.35)	-0.57(0.86)	0.42(0.85)	2.41(5.15)**
$\ln REX_i$	-3.34(0.61)		-0.54(2.26)**		-0.79(1.54)	
POS		2.99(0.57)		-1.10(2.83)**		-2.53(5.03)**
NEG		0.63(0.12)		-1.22(1.62)		0.09(0.16)
Constant	-2.89(0.03)	-29.23(0.86)	21.87(3.12)**	35.48(2.04)**	8.21(0.54)	-50.17(3.59)**
Panel C: Diagnostic Statistics						
F	0.82	1.42	7.18**	8.34**	2.81	9.93**
ECM_{t-1}	-0.10(0.69)	-0.39(1.44)	-0.31(4.56)**	-0.48(5.08)**	-0.19(2.67)	-0.74(5.65)**
LM	4.19	15.06**	4.39	18.83**	6.09	4.54
RESET	1.72	0.17	1.58	0.75	3.39*	1.29
AdjustedR^2	0.46	0.52	0.02	0.03	0.49	0.52
CS (CS^2)	S(S)	S(S)	S(S)	S(S)	S(S)	S(US)
WALD – S		0.54		0.21		0.41
WALD – L		0.24		0.01		19.35**

Notes:

1.-- Numbers inside the brackets are the absolute values of t-statistics. *, ** indicate significance at the 10% and 5% level respectively.

2.-- The critical value of the F test at the 10% (5%) significant level when there are two exogenous variables (k=2) and 50 observations is 4.31 (5.03) respectively. These come from Narayan (2005, p. 1988).

3.-- The number inside the bracket for the ECM_{t-1} statistic is absolute value of the t-ratio. Critical values for this tests are -3.47 (-3.82) at the 10% (5%) level. Since Pesaran et al.'s (2001, p. 303) critical values are for large samples, we use those from Banerjee et al. (1998, Table 1, p. 276).

4.-- LM is Lagrange Multiplier test of residuals serial correlation. Since data are quarterly, we test for 4^{th} order serial correlation. It is distributed as χ^2 with four degrees of freedom. The critical value at 10% (5%) level is 7.77 (9.48)

5.-- RESET is Ramsey's test for misspecification. This is also distributed as χ^2 with one degree of freedom. Its critical value at 10% and 5% level are 2.71 and 3.84 respectively.

6.-- Both Wald statistics are distributed as χ^2 with one degree of freedom and the 10% and 5% critical values are 2.71 and 3.84 respectively.

7.-- # indicate that the Financial Crisis dummy was significant in these models.

Table 2: Full-Information Estimates of Both Linear ARDL (L-ARDL) and Nonlinear ARDL (NL-ARDL) Import Demand Models.

	i=Australia		**i=China, Mainland**		**i= Hong Kong**		**i=Indonesia**	
	L – ARDL#	**NL - ARDL**	**L - ARDL**	**NL - ARDL**	**L – ARDL#**	**NL - ARDL**	**L - ARDL**	**NL - ARDL**
Panel A: Short–Run Estimates								
$\Delta lnYM_t$	0.08(1.32)	0.24(1.60)	0.52(2.34)**	0.69(2.11)**	0.32(1.91)*	0.52(2.02)**	0.14(1.52)	0.33(1.74)*
$\Delta lnYM_{t-1}$			-01.3(0.61)	0.51(0.85)				
$\Delta lnYM_{t-2}$			0.09(0.58)	0.41(0.68)				
$\Delta lnYM_{,t-3}$			-0.51(3.22)**	0.35(0.79)				
$\Delta lnYM_{t-4}$			-0.08(0.51)	0.68(1.87)*				
$\Delta lnYM_{t-5}$			-0.40(2.45)**	0.19(0.63)				
$\Delta lnYM_{t-6}$			-0.10(0.65)	0.19(0.68)				
$\Delta lnYM_{t-7}$			0.22(0.13)	0.44(1.84)*				
$\Delta lnYM_{t-8}$			0.06(0.38)	0.44(1.64)				
$\Delta lnYM_{t-9}$			-0.26(1.71)**	0.003(0.01)				
$\Delta lnYM_{t-10}$				0.35(1.46)				
$\Delta lnYM_{t-11}$								
$\Delta lnREX_{i,t}$	-0.36(2.55)**		1.53(3.02)**		0.98(3.66)**		-0.26(2.51)**	
$\Delta lnREX_{i,t-1}$			-0.45(0.53)					
$\Delta lnREX_{i,t-2}$			-0.24(0.29)					
$\Delta lnREX_{i,t-3}$			0.21(0.32)					
$\Delta lnREX_{i,t-4}$			-0.76(1.37)					
$\Delta lnREX_{i,t-5}$			-0.33(0.81)					
$\Delta lnREX_{i,t-6}$			1.16(3.36)**					
$\Delta lnREX_{i,t-7}$			-0.96(1.84)*					
ΔPOS_t		-2.01(1.68)*		-0.82(0.13)		5.57(2.22)**		-0.38(0.82)
ΔPOS_{t-1}		2.60(2.18)**		-21.71(2.75)**		5.91(2.39)**		1.27(2.16)**
ΔPOS_{t-2}		0.21(0.18)		-18.34(2.77)**		1.98(0.80)		1.23(2.05)**
ΔPOS_{t-3}		2.57(2.14)**		-10.81(1.70)*		4.38(1.76)*		
ΔPOS_{t-4}		1.77(1.53)		-12.59(1.92)*		-1.05(0.38)		
ΔPOS_{t-5}		-1.62(1.49)		-12.20(2.02)**		-2.11(0.71)		
ΔPOS_{t-6}				-6.45(1.15)		2.62(1.09)		
ΔPOS_{t-7}				-5.03(1.06)		-2.19(0.89)		
ΔPOS_{t-8}				-12.38(1.99)*		-3.72(1.91)*		
ΔPOS_{t-9}				12.56(2.16)**		-1.40(0.78)		
ΔPOS_{t-10}				-9.09(1.89)*		-4.08(2.24)**		
ΔNEG_t		0.75(0.61)		2.99(1.03)		2.41(2.28)**		-1.66(3.40)**
ΔNEG_{t-1}		3.58(2.96)**		-14.87(2.33)**		-1.62(1.46)		
ΔNEG_{t-2}				-15.12(2.59)**		1.58(1.29)		
ΔNEG_{t-3}				13.05(2.42)**		-1.81(1.51)		
ΔNEG_{t-4}				-16.58(3.12)**		2.61(1.65)		
ΔNEG_{t-5}				-13.20(2.78)**		1.79(1.11)		
ΔNEG_{t-6}				-1.15(0.49)		0.49(0.34)		
ΔNEG_{t-7}				-8.04(2.76)**		1.77(1.25)		
ΔNEG_{t-8}				-3.13(0.97)		1.81(1.27)		
ΔNEG_{t-9}				-3.00(0.99)		0.29(0.21)		
ΔNEG_{t-10}				1.02(0.43)		-2.31(1.78)*		
ΔNEG_{t-11}				-5.23(2.27)**				
ΔNEG_{t-12}								
Panel B: Long–Run Estimates								
ln YM	0.43(1.58)	1.94(0.92)	2.05(13.08)**	0.64(0.91)	0.09(0.44)	0.29(0.46)	0.74(3.01)**	0.17(0.42)
ln REX_i	-1.93(2.15)**		3.31(2.86)**		1.78(2.59)**		-1.44(1.98)*	
POS		-17.16(1.14)		28.57(3.30)**		2.89(1.07)		-4.51(2.89)**
NEG		-9.55(1.54)		14.41(5.21)**		3.04(2.68)**		-6.23(3.29)**
Constant	8.52(1.37)	-24.73(0.49)	-47.44(5.15)**	4.22(0.25)	16.28(3.58)**	13.09(0.85)	13.36(1.08)	15.47(1.60)
Panel C: Diagnostic Statistics								
F	5.95**	5.77**	1.45	4.00**	4.66**	3.22	1.40	3.07
ECM_{t-1}	-0.18(3.48)*	-0.12(1.63)	-0.24(2.01)	-0.86(3.01)	-0.25(2.53)	-0.35(2.35)	-0.18(2.56)	-0.27(3.27)
LM	2.48	3.87	4.89	15.27**	6.29	7.62	1.11	6.32
RESET	0.59	0.83	1.39	7.33**	0.01	2.65	0.79	2.95*
Adjusted R^2	0.21	0.25	0.56	0.49	0.29	0.37	0.27	0.24
CS (CS^2)	S(US)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)
WALD – S		2.58		1.56		0.28		2.71*
WALD – L		0.03		2.66		0.35		2.01

Notes: see end of the table.

Table 2 continued.

	i=Japan		i= Philippines		i=Singapore		i=South Korea	
	L – ARDL	**NL - ARDL**	**L – ARDL#**	**NL – ARDL#**	**L - ARDL**	**NL - ARDL**	**L - ARDL**	**NL - ARDL**
Panel A: Short–Run Estimates								
$\Delta lnYM_{t}$	0.29(2.16)**	0.22(1.35)	0.48(1.55)	0.43(1.30)	0.17(3.56)**	0.38(1.74)*		0.58(1.96)*
$\Delta lnYM_{,t-1}$	0.12(0.88)	-0.63(3.03)**	0.87(2.86)**	1.11(2.93)**		-1.05(3.73)**		-0.77(2.25)**
$\Delta lnYM_{t-2}$	0.06(0.42)	-0.39(2.32)**				-0.70(3.02)**		-0.27(0.86)
$\Delta lnYM_{t-3}$	-0.22(1.48)	-0.66(4.17)**				-0.39(2.27)**		-0.37(1.24)
$\Delta lnYM_{,t-4}$	0.08(0.57)	-0.14(0.89)				-0.25(1.55)		0.07(0.25)
$\Delta lnYM_{t-5}$	-0.42(2.89)**	-0.54(3.79)**				-0.24(1.66)		-0.61(2.24)**
$\Delta lnYM_{t-6}$	-0.22(1.54)	-0.67(4.03)**				-0.39(2.61)**		-0.47(1.91)*
$\Delta lnYM_{t-7}$		-0.34(2.45)**						
$\Delta lnYM_{t-8}$		-0.11(0.85)						
$\Delta lnYM_{t-9}$								
$\Delta lnREX_{i,t}$	-0.02(0.09)		0.36(1.20)		0.94(2.33)**		-0.29(0.92)	
$\Delta lnREX_{i,t-1}$	0.35(1.98)*				-0.72(1.49)		-0.46(1.50)	
$\Delta lnREX_{i,t-2}$					-0.56(1.17)		0.70(2.26)**	
$\Delta lnREX_{i,t-3}$					-0.57(1.25)			
$\Delta lnREX_{i,t-4}$					0.03(0.07)			
$\Delta lnREX_{i,t-5}$					-0.38(0.82)			
$\Delta lnREX_{i,t-6}$					-0.61(1.32)			
$\Delta lnREX_{i,t-7}$					-1.46(3.26)**			
$\Delta lnREX_{i,t-8}$					-0.79(1.70)*			
$\Delta lnREX_{i,t-9}$					0.22(0.48)			
$\Delta lnREX_{i,t-10}$					0.83(1.87)*			
$\Delta lnREX_{i,t-11}$					-0.89(2.04)**			
$\Delta lnREX_{i,t-12}$								
ΔPOS_{t}		-1.02(3.83)**		3.08(1.55)		-4.61(2.45)**		-2.90(1.87)*
ΔPOS_{t-1}								-3.22(2.64)**
ΔPOS_{t-2}								-0.09(0.06)
ΔPOS_{t-3}								-2.38(1.94)*
ΔPOS_{t-4}								-0.74(0.59)
ΔPOS_{t-5}								-1.69(1.37)
ΔPOS_{t-6}								2.16(1.75)*
ΔNEG_{t}		0.95(1.54)		-2.98(1.08)		2.82(2.16)**		0.78(0.48)
ΔNEG_{t-1}		1.21(1.74)*				-1.42(0.88)		-3.09(1.58)
ΔNEG_{t-2}		-0.79(1.09)				-2/75(1.73)*		0.71(0.34)
ΔNEG_{t-3}		-0.30(0.39)				-1.74(1.04)		-1.43(0.66)
ΔNEG_{t-4}		-0.50(0.64)				-2.16(1.27)		-0.78(0.39)
ΔNEG_{t-5}		-0.87(1.02)				-2.83(1.61)		-3.18(1.53)
ΔNEG_{t-6}		-1.79(2.24)**				-4.16(2.39)**		-3.62(1.77)*
ΔNEG_{t-7}		-1.02(1.32)				-5.55(3.23)**		1.60(0.92)
ΔNEG_{t-8}		-2.97(3.96)**				-4.92(2.72)**		-0.23(0.13)
ΔNEG_{t-9}		-1.01(1.17)				-2.35(1.17)		1.96(1.13)
ΔNEG_{t-10}		-1.52(2.06)**				-4.97(2.82)**		3.49(2.06)**
ΔNEG_{t-11}		-2.37(2.82)**						1.78(1.06)
ΔNEG_{t-12}								
Panel B: Long–Run Estimates								
ln YM	0.14(1.37)	2.41(4.53)**	-0.02(0.06)	-1.54(0.92)	0.89(5.01)**	2.72(7.32)**	0.62(6.59)**	-12.75(0.64)
ln REX_{i}	-0.38(0.72)		1.98(1.59)		2.91(1.57)		-0.54(1.05)	
POS		-3.16(2.70)**		14.31(1.59)		-10.07(3.34)**		15.26(0.69)
NEG		3.70(3.00)**		4.78(1.77)*		5.78(2.82)**		-34.58(0.67)
Constant	20.02(10.43)**	-35.59(2.79)**	14.26(2.03)**	56.01(1.39)	1.75(0.53)	-44.29(4.93)**	8.77(2.03)**	321.26(0.68)
Panel C: Diagnostic Statistics								
F	4.42**	6.75**	3.56	2.91	3.95*	5.42**	6.12**	3.87**
ECM_{t-1}	-0.23(2.78)	-0.32(3.93)*	-0.18(2.28)	-0.21(2.58)	-0.19(2.93)	-0.46(4.55)**	-0.28(4.23)**	0.08(0.66)
LM	2.85	3.70	2.98	2.79	1.94	1.79	6.29	7.57
RESET	2.79*	4.28**	5.65**	5.83**	5.02**	3.16*	1.11	0.85
AdjustedR^2	0.34	0.42	0.23	0.21	0.26	0.15	0.13	0.18
CS (CS^2)	S(US)	S(S)	S(S)	S(S)	S(US)	S(S)	S(S)	S(S)
WALD – S		3.38*		0.15		10.06**		0.34
WALD – L		14.62**		0.60		46.50**		0.41

Notes: see end of the table.

Table 2 continued.

	i=Thailand		i=U.K.		i=U.S.	
	L – ARDL	**NL – ARDL**	**L – ARDL#**	**NL – ARDL**	**L – ARDL**	**NL – ARDL**
Panel A: Short–Run Estimates						
$\Delta lnYM_{,t}$	0.16(3.00)**	0.38(2.46)**	0.13(1.32)	0.10(1.17)	0.03(0.22)	-0.05(0.38)
$\Delta lnYM_{,t-1}$					0.17(1.36)	-0.14(1.02)
$\Delta lnYM_{t-2}$					0.32(2.44)**	0.21(1.66)
$\Delta lnYM_{,t-3}$					-0.13(0.98)	0.02(0.16)
$\Delta lnYM_{t-4}$					0.29(2.23)**	0.46(3.36)**
$\Delta lnYM_{t-5}$					0.23(1.76)*	-0.15(1.04)
$\Delta lnYM_{t-6}$						0.08(0.54)
$\Delta lnYM_{t-7}$						-0.14(1.16)
$\Delta lnYM_{t-8}$						0.04(0.33)
$\Delta lnYM_{t-9}$						0.03(0.22)
$\Delta lnYM_{t-10}$						-0.22(1.89)*
$\Delta lnYM_{t-11}$						-0.20(1.68)*
$\Delta lnREX_{i,t}$	0.43(1.32)		0.13(1.32)		0.19(1.89)*	
$\Delta lnREX_{i,t-1}$	-0.07(0.21)					
$\Delta lnREX_{i,t-2}$	-0.75(2.17)**					
$\Delta lnREX_{i,t-3}$						
ΔPOS_{t}		-0.35(0.24)		-2.21(1.60)		-0.21(0.14)
ΔPOS_{t-1}		-4.45(3.47)**		-1.85(1.31)		3.58(2.46)**
ΔPOS_{t-2}		-6.07(4.73)**		1.35(1.04)		2.85(1.96)*
ΔPOS_{t-3}		-2.74(1.98)*		-0.29(0.23)		1.24(0.83)
ΔPOS_{t-4}		-2.01(1.58)		-1.68(1.28)		-1.36(0.93)
ΔPOS_{t-5}		-1.68(1.39)		1.50(1.10)		-1.81(1.17)
ΔPOS_{t-6}		-3.12(2.56)**		0.86(0.84)		3.35(1.88)*
ΔPOS_{t-7}		-2.15(2.10)**		0.57(1.66)		-2.21(1.29)
ΔPOS_{t-8}		-2.48(2.10)**		2.65(2.79)**		-2.16(1.31)
ΔPOS_{t-9}		-2.17(1.83)*				-3.34(2.16)**
ΔPOS_{t-10}		-3.44(2.72)**				
ΔPOS_{t-11}						
ΔPOS_{t-12}						
ΔNEG_{t}		1.91(1.41)		0.83(0.98)		1.13(4.26)**
ΔNEG_{t-1}		2.86(2.15)**		2.12(2.33)**		
ΔNEG_{t-2}						
Panel B: Long–Run Estimates						
ln Y_i	0.89(6.46)**	0.50(1.17)	0.17(3.56)**	0.39(1.33)	0.18(4.68)**	0.39(7.25)**
ln REX_i	-1.40(1.34)		0.28(1.39)		0.42(1.98)*	
POS		-0.15(0.05)		-0.19(0.17)		-0.22(0.49)
NEG		-1.11(0.66)		0.89(0.76)		1.3(4.71)**
Constant	1.78(0.33)	8.86(0.79)	16.33(12.87)**	10.52(1.47)	17.73(17.27)**	12.43(9.79)**
Panel C: Diagnostic Statistics						
F	2.13	6.45**	7.62**	1.78	8.19**	9.33**
ECM_{t-1}	-0.18(3.21)	-0.27(4.14)	-0.46(4.82)**	-0.25(2.05)	0.46(5.14)**	-0.79(5.97)**
LM	2.65	4.26	8.56*	4.58	4.70	11.69**
RESET	8.79**	0.01	0.41	0.04	0.44	7.12**
AdjustedR^2	0.12	0.22	0.04	0.29	0.11	0.46
CS (CS^2)	S(S)	S(S)	S(S)	S(S)	S(S)	S(S)
WALD – S		10.18**		3.64*		24.47**
WALD – L		1.19		0.81		8.51**

Notes:

1.-- Numbers inside the brackets are the absolute values of t-statistics. .*, ** indicate significance at the 10% and 5% level respectively

2.- The critical value of the F test at the 10% (5%) significant level when there are two exogenous variables (k=2) and 50 observations is 4.31 (5.03) respectively. These come from Narayan (2005, p. 1988).

3.-- The number inside the bracket for the ECM_{t-1} statistic is absolute value of the t-ratio. Critical values for this tests are -3.47 (-3.82) at the 10% (5%) level. Since Pesaran et al.'s (2001, p. 303) critical values are for large samples, we use those from Banerjee et al. (1998, Table 1, p. 276).

4.-- LM is Lagrange Multiplier test of residuals serial correlation. Since data are quarterly, we test for 4th order serial correlation. It is distributed as χ^2 with four degrees of freedom. The critical value at 10% (5%) level is 7.77 (9.48)

5.-- RESET is Ramsey's test for misspecification. This is also distributed as χ^2 with one degree of freedom. Its critical value at 10% and 5% level are 2.71 and 3.84 respectively.

6.-- Both Wald statistics are distributed as χ^2 with one degree of freedom and the 10% and 5% critical values are 2.71 and 3.84 respectively.

7.-- # indicate that the Financial Crisis dummy was significant in these models.