On the Relation between Domestic Output and Exchange Rate in 68 Countries: An Asymmetry Analysis

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Abstract

In an effort to engage in the most comprehensive analysis of the asymmetric effects of exchange rate changes on domestic production, we concentrate on bivariate linear and nonlinear models where domestic output is regressed on the real effective exchange rate. By using annual data from each of the 68 countries in our sample, the findings favor the nonlinear model and nonlinear adjustment of the exchange rate. Exchange rate changes are shown to have short-run asymmetric effects in almost all models. However, the short-run effects translate into long-run asymmetric effects in 24 countries only, though the findings are country specific.

JEL Classification: F31

Keywords: Domestic Output, Exchange Rate, Asymmetry, Nonlinear ARDL, 68 Countries.

I. Introduction

Although most studies in international finance assess the impact of exchange rate changes on the trade balance, several studies are concerned with the ultimate impact of exchange rate changes on domestic production. After all, countries devalue their currencies or allow them to depreciate with a hope of gaining international competitiveness, exporting more, and eventually boosting domestic production and employment. However, since a devaluation or depreciation also raises cost of imports, especially imported inputs, it could hurt aggregate supply, leaving response of domestic output to exchange rate changes indeterminant. If net exports and aggregate demand expand more than the contraction in aggregate supply, a devaluation could be expansionary. Otherwise, it is said to be contractionary.

The empirical literature that is mixed includes panel models as well as time-series models. The list in chronological order includes Krugman and Taylor (1978), Gylfason and Shmidt (1983), Gylfason and Risager (1984), Edwards (1986, 1989), Agenor (1991), Rogers and Wang (1995), Bahmani-Oskooee (1996), Bahmani-Oskooee and Rhee (1997), Kamin and Rogers (2000), Anker and Bahmani-Oskooee (2001), Bahmani-Oskooee et al. (2002), Chou and Chao (2001), Christopoulos (2004), Frenkel (2005), Bahmani-Oskooee and Miteza (2006), Kim and Ying (2007), Narayan and Narayan (2007), Bahmani-Oskooee and Kutan (2008), Kalyoneu et al. (2008), Bahmani-Oskooee and Kandil (2009), Sencicek and Upadhyaya (2010), Mejia-Reyes et al. (2010), Eltalla (2013), Bahmani-Oskooee and Gelan (2013), Kappler *et al.* (2013), Yang *et al.* (2013), An *et al*. (2014), and Manalo *et al*. (2015)

Studies from the above list prior to 2003 have been reviewed by Bahmani-Oskooee and Miteza (2003) and past-2003 studies have been reviewed by Bahmani-Oskooee and Mohammadian (2016, 2017a) and Bahmani-Oskooee et al. (2017) who not only reviewed each article but also pointed out their common feature, i.e., the assumption that the effects of exchange rate changes on domestic production are symmetric. However, they argued that the response of domestic output to currency depreciation could be different than its response to appreciation, implying that exchange rate changes could have asymmetric effects on domestic output. As they argued, since exports and imported originate in two different countries that are subject to two different trade rules and trade environment, output could respond to exchange rate changes in an asymmetric manner. Furthermore, there is now clear evidence that import and export prices (Bussiere 2013) and net exports (Bahmani-Oskooee and Fariditavana 2015, 2016) respond to exchange rate changes in an asymmetric manner, implying that output should also respond in an asymmetric manner.

To demonstrate asymmetric response of output to exchange rate changes Bahmani-Oskooee and Mohammadian (2016, 2017a) relied upon a reduced form model in which the real effective exchange rate, money supply, government spending, oil prices, and wage rate were identified to be the main determinant of domestic output. By using quarterly data from Australia and Japan and by applying Shin *et al.*'s (2014) nonlinear ARDL approach, they indeed showed that in Australia and Japan, exchange rate changes do have short-run and long-run asymmetric effects on each country's domestic production. The same model specification and method also confirmed asymmetric response in several emerging economies by Bahmani-Oskooee and Mohammadian (2017b) who also used quarterly data.

Quarterly data for the variables mentioned above are not available for many other countries. Therefore, our goal in this paper is to expand the literature on the asymmetric effects of exchange rate changes on domestic output by using annual data which allows us to test the asymmetry assumption for as many as 68 countries, resulting in the most comprehensive study.

Indeed, Shin et al. (2014) demonstrated their method by having a model that included two variables. We will do the same by having output as dependent variable and the real effective exchange rate as the independent variable. To that end, we introduce the models and methods in Section II and present the results in Section III. While a summary is provided in Section IV, data definition and sources are identified in an Appendix.

II. The Models and Methods

As mentioned in the previous section, in order to be as comprehensive as possible so that we can include all countries for which annual data are available, we begin with the following long-run relation between real output (*Y*) and real effective exchange rate (*REX*):

$$LnY_t = a + bLnREX_t + \varepsilon_t \qquad (1)$$

By way of construction, a decline in the real effective exchange rate signifies a depreciation of domestic currency. Therefore, a positive (negative) estimate of b will be an indication of contractionary (expansionary) devaluation. This estimate is the long-run estimate and in order to also assess the short-run effects of exchange rate changes on output, we must rewrite (1) in an error-correction format as follows:

$$\Delta LnY_t = \alpha_0 + \sum_{k=1}^{n1} \alpha_{1k} \Delta LnY_{t-k} + \sum_{k=0}^{n2} \alpha_{1k} \Delta LnREX_{t-k} + \lambda \varepsilon_{t-1} + \omega_t \qquad (2)$$

Specification (2) is an error-correction model that follows Engle and Granger (1987) which requires both variables to be integrated of the same order. If both variables are, say, integrated of order one, I(1), but the residuals in (1) are integrated of order zero, I(0), the two variables are said to be cointegrated and estimate of b will be valid. If the residuals in (1) are also I(1), Banerjee et al. (1998) argue and demonstrate that if estimate of λ in (2) is negative and significant, cointegration still be supported. However, as they demonstrate, the t-ratio that is sued to judge significance of λ has a new distribution for which they tabulate new critical values.[1]

What to do if one of the variables such as real output is I(1) and the other, i.e., the real effective exchange rate is I(0). Indeed, if the Purchasing Power Parity theory holds in any country, its real effective rate will be stationary or I(0). Prior to introduction of the bounds testing approach by Pesaran *et al*. (2001) such cases had to be excluded from analysis. Pesaran *et al*. (2001) introduce a new method in which variables could be combination of I(0) and I(1). Their approach amounts to solving (1) for ε_t, lagging the solution by one period, and then substituting the lagged solution into (2) to arrive at:

$$\Delta LnY_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_{1i} \Delta LnY_{t-i} + \sum_{i=0}^{n2} \alpha_{2i} \Delta LnREX_{t-i} + \beta_0 LnY_{t-1} + \beta_1 LnREX_{t-1} + \omega_t \qquad (3)$$

Pesaran *et al*. (2001) propose applying the F test to establish joint significance of lagged level variables in (3) as a sign of cointegration. They tabulate new asymptotic critical values that account for integrating properties of variables and indeed, variables could be combination of I(1) and I(0). Since these are properties of most of the macro variables, there is no need for pre unit-root testing and this is the main advantage of this method.[2] Once cointegration is established, estimate of β_1 normalized on β_0 will yield the long-run effects of exchange rate changes on output. The short-run effects are reflected by the estimates of α_{2i}.[3]

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[1] See Banerjee et al. (1998, p. 276).
[2] Narayan (2005) provides the same critical values but for small samples such as ours.
[3] Note that Pesaran et al. (2001) also propose an alternative test for cointegration which is the same as Banerjee et al.'s (1998) t-test. Under this alternative test the normalized long-run estimate and equation (1) is used to generate the error term, called ECM. After replacing the lagged level variables in (2) by ECM_{t-1}, the new specification is estimated. If ECM_{t-1} carries a significantly negative coefficient, cointegration will be supported. Like F test, they also tabulate new asymptotic critical values for this t-test. See Pesaran et al. (2001, p. 303). Since asymptotic critical values are the same from both sources, for small samples such as ours we will rely upon Banerjee et al.'s critical values.

Models like (1) or (3) assume that the effects of exchange rate changes on output are symmetric, meaning that if a depreciation raises domestic output by $\hat{b} = -\hat{\beta}_1 / \hat{\beta}_0$, an appreciation will lower it by the same amount. In order to demonstrate that this may not be the case and the effects of exchange rate changes could be asymmetric, Shin *et al.* (2014) modify specification (3). Their modification involves decomposing *LnREX* variable into two time-series variables where one variable represents only currency appreciation and the other variable represents only currency depreciation. The procedure involves forming *ΔLnREX* which includes positive values, signifying currency appreciation and negative changes, reflecting only depreciation. Then the two new time-series variables are generated using the partial sum concept as outlined by (4):

$$POS_t = \sum_{j=1}^{t} \Delta \ln REX_j^+ = \sum_{j=1}^{t} \max\left(\Delta \ln REX_j, 0\right)$$

$$NEG_t = \sum_{j=1}^{t} \Delta \ln REX_j^- = \sum_{j=1}^{t} \min\left(\Delta \ln REX_j, 0\right) \qquad (4)$$

In (4) the POS (NEG) variable is the partial sum of positive (negative) changes and reflect only currency appreciation (depreciation). Shin *et al*. (2014) then suggest replacing the *LnREX* variable in (3) by POS and NEG variables to arrive at:

$$\Delta LnY_t = \alpha_0 + \sum_{i=1}^{n1} \alpha_{1i} \Delta LnY_{t-i} + \sum_{i=0}^{n2} \alpha_{2i}^{+} \Delta POS_{t-i} + \sum_{i=0}^{n3} \alpha_{2i}^{-} \Delta NEG_{t-i} + \beta_0 LnY_{t-1} + \beta_1^{+} POS_{t-1} + \beta_1^{-} NEG_{t-1} + \omega_t \qquad (5)$$

Since the method of constructing the POS and NEG variables introduce nonlinearity into the model, Shin *et al*. (2014) label (5) as a nonlinear ARDL model whereas (3) is referred to as a linear model. However, both models are estimated by the OLS method and the same F test or t-test is equally applicable to both models. Shin *et al* (2014, p. 291) further argue for treating the POS and

NEG variables as one variable so that when we shift from the linear model to the nonlinear model, the critical values of the F test does not change. This is mostly due to dependency between the two partial sum variables. As for asymmetry analysis, short-run adjustment asymmetry will be established if $n_2 \neq n_3$ once a set criterion is used to select optimum lags. Furthermore, short-run asymmetric effects will be established if $\hat{\alpha}_{2i}^{+} \neq \hat{\alpha}_{2i}^{-}$ at each individual lag i. Additionally, short-run cumulative or impact asymmetric effects will be established if $\sum \hat{\alpha}_{2i}^{+} \neq \sum \hat{\alpha}_{2i}^{-}$. Finally, long-run asymmetry will be established if $-\frac{\hat{\beta}_1^{+}}{\hat{\beta}_0} \neq -\frac{\hat{\beta}_1^{-}}{\hat{\beta}_0}$. The Wald test is the recommended test to verify the last two inequalities.

III. The Results

In this section we estimate both the linear model outlined by specification (3) and the nonlinear model outlined by specification (5) for as many countries as data permits. We were able to collect annual real GDP data and the real effective exchange rate data for as many as 68 countries. Study period differed from one country to another as shown in the Appendix. Since data are annual, we imposed a maximum of four lags on each first-differenced variable and used Akaike's Information Criterion (AIC) to select optimum lags. Furthermore, since there are different critical values for different statistics, we have collected them in the notes to the table of results and used them to identify significance by * at the 10% level and ** at the 5% level. Results for each country are reported in Table 1.

Table 1 goes about here

The estimates of linear models come under the heading of L-ARDL and those of nonlinear models, under NL-ARDL. While short-run estimates are reported in Panel A, normalized long-run estimates are reported in Panel B. Finally, diagnostic statistics appear in Panel C. From the results of the linear model we gather that the exchange rate carries at least one significant short-run coefficient in 37 countries. However, when we consider the results from nonlinear models, either ΔPOS or ΔNEG carry at least one significant lagged coefficient in 48 countries. This increase must be attributed to introducing nonlinear adjustment of the real exchange rate and favors the nonlinear ARDL model. Furthermore, in the nonlinear model, the size of estimated coefficients attached to ΔPOS variable are different than those attached to ΔNEG variable at the same lags, supporting short-run asymmetric effects. However, short-run impact asymmetry is supported in Bahrain, Cameroon, Chile, China, Cyprus, Denmark, Dominica, Ecuador, Fiji, Finland, Greece, Indonesia, Japan, Malawi, Malaysia, Mexico, Paraguay, the Philippines, Sweden, Trinidad and Tobago, United Kingdom, and Venezuela. In these 23 cases, the Wald test reported as Wald-Short in Panel C is significant, implying that sum of the coefficients attached to ΔPOS is different than the sum attached to ΔNEG variable.

In how many models the short-run effects of exchange rate changes translate into the long run meaningful significant effects that are supported by at least one of the tests for cointegration? The answer is in nine linear models and 24 nonlinear models. Again, this increase should be attributed to nonlinear adjustment of the exchange rate. The nine linear models belong to: Belize, Finland, France, Japan, Malawi, Malaysia, Norway, Singapore, and Uganda. The 24 nonlinear models belong to Antigus and Barbuda, Austria, Bolivia, Cameroon, Canada, Chile, Dominica, Fiji, Finland, France, Iran, Ireland, Japan, Malawi, Malaysia, Malta, Norway, Pakistan, Paraguay, Singapore, Spain, St. Vincent and the Grenadines, Sweden, Togo, and Uganda. These findings are clearly country-specific. For example, in the first country in Table 1, Antigua and Barbuda exchange rate has no long-run significant effect on output. If we were to rely upon the linear model, the process would have stopped here and we would have concluded that exchange rate plays no long run role. However, once appreciations are separated from depreciations, the nonlinear model reveals that while appreciation has significant effect on output, depreciation does not. This finding is supported by asymmetry cointegration at least by ECM_{t-1} test. Since POS carries a significantly positive coefficient, appreciation is said to be expansionary in this case, implying that expansion in aggregate supply more than offsets the decline in aggregate demand. Furthermore, the long-run asymmetric effects is significant since the Wald test reported as Wald-Long in Panel C is significant. Or consider the case of Canada. Again since there is no evidence of cointegration in the linear model, the estimated exchange rate elasticity is spurious. However, in its nonlinear model, there is evidence of asymmetric cointgeration which validates long-run estimates obtained for POS and NEG variables. It appears that in Canada depreciation is expansionary and so is appreciation, a sign of asymmetric long-run effects which is also supported by the Wald-Long test. Indeed, in almost 24 nonlinear models where there is evidence of long-run asymmetric effects of exchange rate changes, the Wald-Long is significant, supporting long-run asymmetric effects.

IV. Summary and Conclusion

Contractionary devaluations before 1973 and contractionary depreciations after 1983 are two terms used to describe the ultimate impact of a devaluation or a depreciation on domestic output. Using devaluation and depreciation interchangeably, a depreciation stimulates aggregate demand by boosting its net export component and it hurts the aggregate supply by raising cost of imported inputs. If aggregate supply declines by more than the expansion in aggregate demand, a depreciation is contractionary. Otherwise, it is said to be expansionary.

Almost all previous empirical research assumed that if a depreciation is contractionary, an appreciation must be expansionary, implying that exchange rate changes have symmetric effects on domestic output. A few recent studies, however, have argued and demonstrated empirically that exchange rate changes could have asymmetric effects on domestic output. To show asymmetric effects of exchange rate changes on domestic output, these studies have used data from Australia, Japan, and several emerging countries. We contribute to the literature by investigating the issue at hand by including all countries for which enough time-series observations are available on their real GDP and real effective exchange rate. A total of 68 countries are included in our study.

Since investigating asymmetric effects requires using nonlinear models, we employ Shin *et al.*'s (2014) nonlinear ARDL approach as our method. However, for comparison purpose, we also apply Pesaran *et al.*'s (2001) linear ARDL approach. The results could be best summarized by saying that in the linear model, exchange rate changes had significant short-run effects in 37 countries. However, when we shifted to nonlinear model, the comparable figure was 48. Thus, separating appreciations from depreciations and introducing nonlinear adjustment of the real effective exchange rate favors the nonlinear model which resulted in relatively more significant short-run effects. Furthermore, the short-run effects were asymmetric in all models. However, the short-run effects translated into the long run only in nine linear models and 24 nonlinear models. Once again, the long-run effects were also asymmetric in all 24 cases.

All in all, although we found more evidence of short-run and long-run asymmetric effects of exchange rate changes on domestic output, the results are country specific. Two important points emerged from this multi-country and the most comprehensive study. The first is the fact that in the linear model we came across countries in which exchange rate did not have any significant long-run effects. Based on the old approach of estimating a linear model, the process would have stopped. However, separating appreciations from depreciations and introducing nonlinear adjustment of the exchange rate proved fruitful and yielded significant long-run asymmetric effects. Second, the long-run asymmetric effects were country specific. In some countries appreciation had long-run effects on domestic output but depreciation did not. In some other countries the opposite was true.

Appendix

Data Definition and Sources

Data are corrected from International Financial Statistics of the IMF (IFS) as well as from the Bank for International Settlements (BIS). Domestic output is proxied by the Real GDP (RGDP) and the exchange rate by the real effective exchange rate (REX).

Country	Source of data		Period
	RGDP	REX	
Antigua and Barbuda	IFS	IFS	1979 - 2010
Australia	IFS	BIS	1970 - 2015
Austria	IFS	IFS	1970 - 2015
Bahrain, Kingdom of	IFS	IFS	1980 - 2015
Belgium	IFS	IFS	1970 - 2015
Belize	IFS	IFS	1980 - 2015
Bolivia	IFS	IFS	1980 - 2015
Brazil	IFS	IFS	1980 - 2011
Burundi	IFS	IFS	1974 - 2013
Cameroon	IFS	IFS	1980 - 2013
Canada	IFS	IFS	1970 - 2015
Chile	IFS	IFS	1980 - 2015
China, P.R.: Mainland	IFS	IFS	1980 - 2015
Colombia	IFS	IFS	1980 - 2015
Costa Rica	IFS	IFS	1980 - 2014
Cote d'Ivoire	IFS	IFS	1980 - 2014
Cyprus	IFS	IFS	1980 - 2015
Denmark	IFS	IFS	1970 - 2015
Dominica	IFS	IFS	1976 - 2010
Dominican Republic	IFS	IFS	1980 - 2015
Ecuador	IFS	IFS	1980 - 2015
Fiji	IFS	IFS	1980 - 2014
Finland	IFS	IFS	1970 - 2015
France	IFS	BIS	1970 - 2015
Germany	IFS	IFS	1970 - 2015
Greece	IFS	BIS	1970 - 2015
Grenada	IFS	IFS	1976 - 2010
Iceland	IFS	IFS	1970 - 2015
India	IFS	FRED	1970 - 2014
Indonesia	IFS	FRED	1970 - 2014
Iran, Islamic Republic of	IFS	IFS	1970 - 2010
Ireland	IFS	IFS	1980 - 2015
Israel	IFS	IFS	1970 - 2015
Italy	IFS	BIS	1970 - 2015

Country	Source of data		Period
	RGDP	REX	
Japan	IFS	BIS	1970 - 2015
Korea, Republic of	IFS	BIS	1970 - 2015
Lesotho	IFS	IFS	1980 - 2015
Luxembourg	IFS	IFS	1980 - 2015
Malawi	IFS	IFS	1980 - 2013
Malaysia	IFS	IFS	1975 - 2015
Malta	IFS	IFS	1970 - 2015
Mexico	IFS	BIS	1970 - 2015
Netherlands	IFS	IFS	1970 - 2015
New Zealand	IFS	BIS	1970 - 2015
Norway	IFS	IFS	1970 - 2015
Pakistan	IFS	IFS	1980 - 2015
Paraguay	IFS	IFS	1980 - 2014
Philippines	IFS	IFS	1975 - 2015
Portugal	IFS	IFS	1978 - 2015
Saudi Arabia	IFS	IFS	1980 - 2015
Sierra Leone	IFS	IFS	1980 - 2014
Singapore	IFS	BIS	1970 - 2014
South Africa	IFS	IFS	1970 - 2015
Spain	IFS	BIS	1970 - 2015
St. Kitts and Nevis	IFS	IFS	1978 - 2010
St. Lucia	IFS	IFS	1977 - 2010
St. Vincent and the Grenadines	IFS	IFS	1975 - 2010
Sweden	IFS	IFS	1970 - 2015
Switzerland	IFS	IFS	1970 - 2015
Togo	IFS	IFS	1980 - 2014
Trinidad and Tobago	IFS	IFS	1970 - 2014
Tunisia	IFS	IFS	1975 - 2014
Turkey	IFS	FRED	1970 - 2014
Uganda	IFS	IFS	1981 - 2013
United Kingdom	IFS	BIS	1970 - 2015
United States	IFS	BIS	1970 - 2015
Uruguay	IFS	IFS	1980 - 2015
Venezuela	IFS	IFS	1980 - 2015

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Table 1: Full-Information Estimates of Both Linear (L-ARDL) and Nonlinear NL-ARDL Models.								
	Antigua and Barbuda		Australia		Austria		Bahrain	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.20 (1.00)		.03 (.18)	.01 (.06)				
ΔLnY_{t-2}			-.36 (2.31)**	-.34 (2.05)**				
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	-.20 (1.00)		.00 (.12)		.04 (.30)		-.09 (.90)	
ΔLER_{t-1}					-.17 (1.31)			
ΔLER_{t-2}					-.04 (.31)			
ΔLER_{t-3}					.32 (2.40)**			
ΔLER_{t-4}								
ΔPOS_t		.30 (0.51)		.02 (.50)		.27 (1.24)		.81 (2.47)**
ΔPOS_{t-1}		-1.52 (2.28)**				-.33 (1.55)		
ΔPOS_{t-2}		-.31 (0.68)				-.36 (1.76)*		
ΔPOS_{t-3}						.33 (1.50)		
ΔPOS_{t-4}								
ΔNEG_t		.00 (.00)		-.02 (-.39)		.03 (.15)		-.32 (2.06)**
ΔNEG_{t-1}								
ΔNEG_{t-2}								
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	6.73 (0.78)	2.75 (5.72)**	7354.0 (.00)	5.11 (.94)	-4.09 (.20)	3.76 (92.49)**	13.50 (8.40)**	2.88 (25.21)**
LER_t	-.46 (0.25)		-1276.1 (.00)		2.05 (.46)		-1.85 (5.69)**	
POS_t		7.52 (2.37)**		-1.16 (.24)		1.67 (6.31)**		1.12 (2.33)**
NEG_t		2.02 (1.54)		-2.05 (.43)		-.60 (1.76)*		-.98 (5.53)**
Panel C: Diagnostic Statistics								
F	1.37	4.41	2.01	1.29	1.03	2.77	3.34	2.88
ECM_{t-1}	-.06 (1.56)	-.25 (3.77)**	.00 (1.92)	-.02 (1.91)	-.02 (1.45)	-.37 (2.95)*	-.08 (2.50)	-.22 (2.69)
LM	.14	.47	.08	.07	2.67	.84	.08	.14
RESET	.59	1.45	.70	1.34	1.97	.37	.25	.15
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	S	U	U	S	S	U	U
Wald-Long		5.80 **		1.09		557.11**		14.82**
Wald-Short		2.08		.21		.04		3.81**
Adjusted R^2	.07	.30	.08	.06	.16	.32	.11	.18

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.

Table 1 continued.								
	Belgium		**Belize**		**Bolivia**		**Brazil**	
	L-ARDL	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}			-.10 (.61)	-.09 (.73)	.43 (2.54)**		.10 (.58)	
ΔLnY_{t-2}			-.39 (2.97)**	-.27 (2.30)**			.03 (.16)	
ΔLnY_{t-3}			.16 (1.24)	.29 (2.71)**			-.39 (2.31)**	
ΔLnY_{t-4}								
ΔLER_t	.01 (.10)		-.04 (.29)		-.01 (1.13)		.09 (2.69)**	
ΔLER_{t-1}			-.85 (4.49)**		-.03 (2.48)**		-.06 (1.59)	
ΔLER_{t-2}			-.48 (2.50)**					
ΔLER_{t-3}			-.53 (3.20)**					
ΔLER_{t-4}								
ΔPOS_t		.17 (.83)		-.17 (.71)		.11 (3.13)**		.04 (.60)
ΔPOS_{t-1}				-1.24 (2.93)**		-.14 (2.59)**		
ΔPOS_{t-2}				-.76 (1.97)*				
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		0.00 (0.02)		.18 (.88)		-.05 (2.03)*		.12 (2.43)**
ΔNEG_{t-1}				-.58 (3.77)**				
ΔNEG_{t-2}				-.26 (1.68)				
ΔNEG_{t-3}				-.46 (2.94)**				
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	8.83 (.67)	3.85 (45.10)**	63.98 (2.57)**	1.88 (1.87)*	-6.61 (.78)	1.74 (6.12)**	2.83 (.12)	3.91 (24.06)**
LER_t	-.69 (.24)		-13.09 (2.38)**		1.89 (1.21)		-1.50 (.16)	
POS_t		1.32 (4.17)**		22.86 (1.35)		.71 (1.90)*		.24 (1.45)
NEG_t		-.38 (1.60)		9.36 (1.01)		-1.17 (2.70)**		-.28 (1.47)
Panel C: Diagnostic Statistics								
F	2.98	2.72	11.00**	11.34**	3.33	24.90**	.08	1.78
ECM_{t-1}	-.02 (2.47)	-.21 (2.61)	.06 (4.80)**	-.07 (6.17)**	.01 (2.63)	-.03 (8.00)**	.00 (.41)	-.19 (2.31)
LM	.13	.28	3.72*	.39	.13	4.60**	.98	.26
RESET	.35	.04	2.29	4.23**	.14	3.31*	.28	1.26
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	S	S	S	U	S	S	S
Wald-Long		61.32**		2.99*		1.21		86.26**
Wald-Short		.02		1.62		.17		.51
Adjusted R^2	.09	.08	.61	.78	.73	.77	.21	.26

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.

Table 1 continued.								
	Burundi		Cameroon		Canada		Chile	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.34 (2.11)**	.40 (2.56)**	.56 (5.55)**			.32 (2.34)**		.16 (1.37)
ΔLnY_{t-2}								-.08(.97)
ΔLnY_{t-3}								.09 (1.06)
ΔLnY_{t-4}								
ΔLER_t	.00 (.05)		-.09 (1.95)*		-.03 (.65)		.34 (4.10)**	
ΔLER_{t-1}								
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		.01 (.06)		-.01 (.06)		.09 (.76)		.70 (4.68)**
ΔPOS_{t-1}				-.45 (3.83)**				
ΔPOS_{t-2}				.22 (2.22)**				
ΔPOS_{t-3}				-.24 (2.64)**				
ΔPOS_{t-4}								
ΔNEG_t		.05 (.40)		-.12 (3.92)**		-.02 (.17)		.10 (1.05)
ΔNEG_{t-1}				.10 (3.08)**				
ΔNEG_{t-2}				-.08 (2.35)**				
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	3.27 (.26)	4.03 (17.42)**	22.80 (1.49)	3.40 (25.73)**	14.30 (2.73)**	3.69 (51.50)**	9.88 (2.29)**	3.20 (11.29)**
LER_t	.42 (.13)		-3.85 (1.21)		-1.97 (1.78)*		-.94 (1.01)	
POS_t		.78 (1.10)		4.42 (6.16)**		.34 (1.83)*		1.46 (4.90)**
NEG_t		.18 (.51)		2.09 (4.66)**		-.73 (5.18)**		-.53 (1.99)*
Panel C: Diagnostic Statistics								
F	1.46	1.96	7.24**	43.87**	3.90	3.78	14.68**	8.47**
ECM_{t-1}	-.03 (1.47)	-.13 (2.39)	-.02 (3.86)**	.11 (12.09)**	-.03 (2.64)	-.21 (3.43)*	-.03 (2.48)	-.14 (5.00)**
LM	.01	.49	.03	.20	2.21	.16	5.49*	.33
RESET	5.94**	4.95**	.30	6.89**	1.11	3.57*	.91	1.22
CUSUM	S	U	U	S	S	S	U	S
CUSUMSQ	S	S	U	S	S	S	S	S
Wald-Long		6.19**		56.40**		231.10**		122.63**
Wald-Short		.10		2.80*		.28		8.22**
Adjusted R^2	.11	.17	.72	.91	.10	.24	.34	.65

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
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Table 1 continued.

	China		Colombia		Costa Rica		Cote d'Ivoire	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.51 (2.51)**	.47 (3.08)**	.40 (2.38)**	.45 (2.66)**	.19 (1.31)	.23 (1.13)	.39 (2.16)**	.40 (2.34)**
ΔLnY_{t-2}	-.33 (1.68)*				-.36 (2.73)**	-.50 (2.66)**		
ΔLnY_{t-3}						-.38 (1.85)*		
ΔLnY_{t-4}								
ΔLER_t	-.04 (1.07)		.06 (.86)		-.06 (.69)		-.02 (.30)	
ΔLER_{t-1}								
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.53 (4.71)**		.16 (.89)		.31 (1.57)		.04 (.29)
ΔPOS_{t-1}						-.51 (2.51)**		
ΔPOS_{t-2}						-.43 (2.63)**		
ΔPOS_{t-3}						.18 (1.49)		
ΔPOS_{t-4}								
ΔNEG_t		.12 (2.68)**		.02 (.14)		-.03 (.15)		-.04 (.60)
ΔNEG_{t-1}						.28 (1.40)		
ΔNEG_{t-2}						.19 (1.01)		
ΔNEG_{t-3}						-.27 (1.65)		
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	45.87 (.61)	1.01 (1.64)	3.53 (.43)	3.99 (19.52)**	-49.34 (.76)	2.82 (2.65)**	-27.63 (.14)	4.01 (11.27)**
LER_t	-3.31 (.40)		.34 (.18)		10.42 (.83)		6.46 (.16)	
POS_t		3.74 (7.15)**		.52 (1.86)*		1.38 (1.32)		-.30 (.12)
NEG_t		.57 (1.52)		-.14 (.43)		-1.76 (1.27)		-1.05 (.43)
Panel C: Diagnostic Statistics								
F	.13	2.89	.25	1.23	1.27	.82	.81	1.29
ECM_{t-1}	.00 (.35)	.03 (2.19)	-.01 (.50)	-.14 (1.81)	0.01 (1.62)	-.09 (1.67)	.01 (1.22)	-.07 (1.83)
LM	1.24	2.08	.05	.77	1.19	3.09*	1.06	.40
RESET	.53	1.87	8.69**	.31	3.61*	.23	8.44**	5.83**
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	U	S	U	U	S	S	U	U
Wald-Long		73.19**		28.80**		28.74**		3.94**
Wald-Short		26.14**		.31		.79		.43
Adjusted R^2	.08	.42	.11	.17	.14	.36	.13	.16

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

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Table 1 continued.								
	Cyprus		Denmark		Dominica		Dominican Republic	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}						.39 (2.96)**	.19 (1.17)	.24 (1.43)
ΔLnY_{t-2}						.00 (.03)	-.49 (2.78)**	-.41 (2.32)**
ΔLnY_{t-3}						.45 (3.71)**		
ΔLnY_{t-4}								
ΔLER_t	.11 (.69)		-.08 (.69)		-.75 (3.11)**		.16 (2.76)**	
ΔLER_{t-1}					.29 (1.28)		.04 (.78)	
ΔLER_{t-2}							.11 (2.15)**	
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		.58 (1.77)*		-.34 (1.69)*		-1.43 (3.33)**		.15 (1.28)
ΔPOS_{t-1}		.17 (.57)		-.40 (2.09)**		-.63 (2.04)*		
ΔPOS_{t-2}		.35 (1.20)				-.57 (2.24)**		
ΔPOS_{t-3}		.80 (2.37)**				.55 (2.45)**		
ΔPOS_{t-4}								
ΔNEG_t		-.60 (2.00)*		.10 (.52)		.13 (.49)		.12 (1.58)
ΔNEG_{t-1}				.56 (2.62)**		.77 (2.62)**		
ΔNEG_{t-2}				.31 (1.47)				
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	12.31 (1.41)	5.55 (.82)	-704.35 (.03)	4.38 (13.25)**	9.25 (6.66)**	3.93 (22.28)**	31.68 (.22)	4.24 (3.80)**
LER_t	-1.66 (.87)		151.17(.03)		-1.01 (3.42)**		-9.33 (.22)	
POS_t		-15.37 (.30)		-.91(.58)		.18 (.49)		2.68 (1.81)*
NEG_t		-3.39 (.43)		-2.53 (1.42)		-.84 (4.41)**		1.07 (.76)
Panel C: Diagnostic Statistics								
F	12.27**	11.30**	2.20	3.02	2.87	14.71**	.56	1.02
ECM_{t-1}	-.05 (4.86)**	-.02 (6.08)**	.00 (2.12)	-.12 (3.09)	-.09 (2.25)	-.60 (7.00)**	.00 (1.06)	-.06 (1.81)
LM	.39	.00	.58	.06	.00	.49	.54	.64
RESET	.63	.25	.22	1.55	.00	.19	2.59	.02
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	S	S	S	S	S	S	S
Wald-Long		.06		25.14**		21.30**		15.23**
Wald-Short		6.41**		8.43**		7.95**		.03
Adjusted R^2	.39	.52	.05	.19	.22	.73	.25	.19

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
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Table 1 continued.								
	Ecuador		Fiji		Finland		France	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	-.39 (1.89)*	-.54 (3.31)**	-.60 (3.66)**	-.37 (2.79)**	.37 (2.45)**	.35 (2.29)**		.43 (3.57)**
ΔLnY_{t-2}			-.30 (1.92)*			-.24 (1.55)		
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	.09 (1.85)*		.17 (1.70)*		-.04 (.45)		-.20 (3.29)**	
ΔLER_{t-1}								
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.11 (1.29)		-.50 (1.40)		.28 (1.28)		.06 (.57)
ΔPOS_{t-1}		-.10 (1.40)				-.62 (2.85)**		
ΔPOS_{t-2}						-.48 (2.10)**		
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		.26 (4.19)**		.32 (2.98)**		.26 (1.81)*		-.33 (3.25)**
ΔNEG_{t-1}		-.02 (.25)				.23 (1.47)		
ΔNEG_{t-2}		-.19 (2.98)**				.34 (2.16)**		
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	6.32 (.67)	4.49 (7.37)**	11.06 (5.53)**	4.12 (54.36)**	17.72 (3.13)**	3.82 (59.68)**	21.54 (5.09)**	3.77 (71.97)**
LER_t	-1.10 (.46)		-1.30 (3.20)**		-2.81 (2.35)**		-3.63 (3.97)**	
POS_t		1.31 (1.94)*		.73 (1.98)*		1.07 (4.42)**		.50 (1.45)
NEG_t		.38 (.74)		-.54 (2.88)**		-.11 (.63)		-1.07 (4.35)**
Panel C: Diagnostic Statistics								
F	.91	1.93	4.29	5.43*	5.41*	6.54**	11.99**	4.30
ECM_{t-1}	.01 (.48)	-.08 (2.51)	-.12 (2.86)	-.36 (4.10)**	-.05 (3.33)*	-.35 (4.57)**	-.05 (4.90)**	-.25 (3.57)*
LM	.10	.02	1.74	1.04	2.53	1.34	1.84	.04
RESET	4.48**	8.91**	.37	.09	.57	4.56**	.73	.57
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	S	S	S	U	U	S	S
Wald-Long		13.66**		35.62**		238.32**		132.74**
Wald-Short		3.10*		4.05**		9.45**		2.35
Adjusted R^2	.05	.40	.37	.52	.35	.47	.37	.40

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.

Table 1 continued.								
	Germany		**Greece**		**Grenada**		**Iceland**	
	L-ARDL	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.26 (1.68)*	.37 (2.34)**	.49 (3.60)**	.47 (3.19)**			.32 (2.47)**	.22 (1.61)
ΔLnY_{t-2}	-.25 (1.66)*			.09 (.55)				
ΔLnY_{t-3}				.36 (2.40)**				
ΔLnY_{t-4}								
ΔLER_t	-.05 (.51)		-.15 (1.11)		-.11 (.50)		.21 (3.95)**	
ΔLER_{t-1}								
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.02 (.07)		.23 (.69)		.15 (.35)		.12 (.74)
ΔPOS_{t-1}				-.47 (1.66)*				-.03 (.24)
ΔPOS_{t-2}								.45 (3.46)**
ΔPOS_{t-3}								.25 (1.95)*
ΔPOS_{t-4}								
ΔNEG_t		-.05 (.27)		-.25 (1.35)		-.24 (.54)		.13 (1.38)
ΔNEG_{t-1}								.29 (3.10)**
ΔNEG_{t-2}								
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	15.91 (1.44)	3.77 (29.62)**	-74.79 (.20)	3.72 (23.53)**	-19.81 (.23)	2.16 (2.24)**	-106.71 (.13)	1.72 (.33)
LER_t	-2.32 (98)		17.59 (.21)		5.59 (.29)		24.89 (.14)	
POS_t		.86 (1.60)		.48 (1.07)		3.81 (1.59)		5.65 (.41)
NEG_t		-.62 (1.59)		-.73 (1.20)		-.14 (.09)		2.90 (.31)
Panel C: Diagnostic Statistics								
F	1.05	1.97	1.76	2.46	1.24	1.04	1.09	.63
ECM_{t-1}	-.03 (1.45)	-.23 (2.47)	.01 (1.57)	-.17 (2.78)	-.02 (1.39)	-.03 (.90)	.00 (1.50)	.02 (1.42)
LM	.18	.33	.91	.00	.08	.00	.09	.01
RESET	.00	1.05	2.01	3.33*	.04	3.53*	1.95	.20
CUSUM	S	S	U	S	S	S	S	S
CUSUMSQ	S	S	S	S	U	U	S	S
Wald-Long		89.68**		25.69**		3.03*		.35
Wald-Short		.01		5.01**		.03		1.49
Adjusted R^2	.07	.10	.29	.35	.01	-.05	.37	.48

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.

Table 1 continued.								
	India		Indonesia		Iran		Ireland	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}			.58 (3.88)**		.33 (2.23)**	.37 (2.88)**	.89 (3.70)**	.96 (6.41)**
ΔLnY_{t-2}			-.35 (2.60)**		-.18 (1.16)	-.08 (.58)	-.45 (2.00)*	
ΔLnY_{t-3}					-.53 (3.46)**	-.32 (2.53)**		
ΔLnY_{t-4}								
ΔLER_t	.06 (1.09)		.15 (6.45)**		-.08 (2.21)**		-.37 (2.49)**	
ΔLER_{t-1}			-.06 (2.03)**					
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.03 (.23)		-.14 (3.60)**		-.07 (.71)		-.08 (.27)
ΔPOS_{t-1}				-.09 (2.25)**				
ΔPOS_{t-2}				-.08 (2.01)**				
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		.13 (1.45)		.22 (9.33)**		-.03 (.78)		-.52 (2.19)**
ΔNEG_{t-1}		.10 (1.14)						.50 (1.99)*
ΔNEG_{t-2}		-.23 (2.59)**						.62 (2.48)**
ΔNEG_{t-3}		.21 (2.51)**						.62 (2.31)**
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	-1.39 (.18)	.49 (.20)	12.58 (3.27)**	5.22 (3.15)**	.40 (.10)	3.37 (30.18)**	300.05 (.33)	3.38 (26.91)**
LER_t	.23 (.18)		-2.40 (1.99)*		.59 (.81)		-62.78 (.32)	
POS_t		2.73 (1.67)		.73 (1.30)		.25 (1.78)*		-.10 (.17)
NEG_t		.00 (.00)		.02 (.05)		-.19 (1.51)		-3.07 (5.32)**
Panel C: Diagnostic Statistics								
F	5.53*	.91	2.67	5.37*	4.16	5.54*	1.58	7.47**
ECM_{t-1}	.02 (3.27)*	.03 (1.70)	.02 (2.32)	-.04 (4.13)**	.05 (2.94)*	-.16 (4.24)**	.00 (1.77)	-.27 (4.95)**
LM	.69	.00	.02	.00	2.30	2.95*	.40	.88
RESET	.34	9.55**	19.99**	16.80**	1.52	1.76	.27	3.30*
CUSUM	S	S	U	S	S	U	S	S
CUSUMSQ	U	S	U	U	U	U	U	S
Wald-Long		6.83**		7.11**		13.94**		479.83**
Wald-Short		.76		33.14**		.08		2.31
Adjusted R^2	.24	.27	.54	.72	.44	.55	.49	.66

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.

Table 1 continued.								
	Israel		Italy		Japan		Korea	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}		.39 (1.45)				.33 (2.51)**		
ΔLnY_{t-2}		.20 (1.39)						
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	-.06 (.45)		-.10 (1.70)*		.02 (.72)		-.03 (.65)	
ΔLER_{t-1}	-.20 (1.35)				-.08 (2.54)**		.13 (3.33)**	
ΔLER_{t-2}	.15 (1.17)							
ΔLER_{t-3}	-.27 (2.01)**							
ΔLER_{t-4}								
ΔPOS_t		.24 (.92)		-.04 (.28)		-.01 (.21)		-.14 (1.61)
ΔPOS_{t-1}		.06 (.29)				-.20 (3.37)**		-.17 (2.01)**
ΔPOS_{t-2}		-.32 (1.57)				.06 (.97)		.15 (1.95)*
ΔPOS_{t-3}		-.59 (3.07)**				-.09 (1.74)*		
ΔPOS_{t-4}								
ΔNEG_t		-.52 (1.69)*		-.17 (1.81)*		.08 (1.64)		.08 (1.92)*
ΔNEG_{t-1}		-.63 (3.13)**						.17 (3.42)**
ΔNEG_{t-2}		.49 (2.66)**						-.15 (3.10)**
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	38.80 (1.13)	2.46 (10.16)**	7.92 (1.70)*	1.74 (.17)	.43 (.31)	3.77 (26.77)**	15.35 (2.42)**	-16.03 (.22)
LER_t	-7.06 (.99)		-.70 (.70)		.93 (3.02)**		-2.07 (1.49)	
POS_t		1.07 (1.42)		5.29 (.25)		.89 (6.89)**		13.15 (.24)
NEG_t		-1.06 (1.64)		.93 (.15)		.54 (3.54)**		2.75 (.13)
Panel C: Diagnostic Statistics								
F	.45	2.21	8.59**	4.91*	15.68**	3.29	13.88**	10.80**
ECM_{t-1}	-.02 (.96)	-.22 (2.67)	-.05 (4.19)**	.01 (3.93)**	-.08 (5.49)**	-.15 (3.24)*	-.03 (5.33)**	.01 (5.85)**
LM	.13	1.46	.43	.11	1.50	2.52	.13	.04
RESET	7.39	5.76**	.29	.34	1.30	2.58	5.73**	.13
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	U	S	S	S	S	S	U	S
Wald-Long		106.24**		.41		17.58**		.02
Wald-Short		.00		.35		3.37*		1.96
Adjusted R^2	.20	.54	.31	.33	.39	.44	.41	.61

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
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Table 1 continued.								
	Lesotho		Luxembourg		Malawi		Malaysia	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}					.11 (.70)	-.19 (1.42)		.15 (1.23)
ΔLnY_{t-2}					.25 (1.67)*	.46 (2.63)**		.05 (.45)
ΔLnY_{t-3}					-.23 (1.54)			.31 (2.64)**
ΔLnY_{t-4}								
ΔLER_t	-.16 (.53)		-.11 (.70)		.11 (1.70)*		.24 (3.07)**	
ΔLER_{t-1}					.04 (.51)			
ΔLER_{t-2}					.24 (3.23)**			
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.49 (.83)		-.23 (1.31)		.25 (1.69)		-.07 (.30)
ΔPOS_{t-1}						.61 (3.95)**		-.60 (2.62)**
ΔPOS_{t-2}						.39 (3.08)**		-.40 (1.85)*
ΔPOS_{t-3}								-.55 (2.45)**
ΔPOS_{t-4}								
ΔNEG_t		.02 (.04)		.21 (.51)		-.08 (.90)		.48 (5.03)**
ΔNEG_{t-1}						.21 (2.27)**		
ΔNEG_{t-2}						.31 (3.83)**		
ΔNEG_{t-3}						.30 (3.18)**		
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	7.65 (1.98)*	4.30 (10.20)**	28.87 (1.28)	4.55 (3.01)**	9.87 (9.95)**	3.83 (60.56)**	16.05 (6.46)**	3.04 (10.11)**
LER_t	-.63 (.78)		-5.09 (1.05)		-1.13 (6.12)**		-2.27 (4.13)**	
POS_t		-.38 (.26)		-3.56 (.72)		-1.76 (2.77)**		3.38 (4.39)**
NEG_t		-.52 (.65)		-5.11 (1.34)		-1.46 (3.86)**		-.37 (1.07)
Panel C: Diagnostic Statistics								
F	1.78	1.23	2.27	1.01	4.42	9.28**	5.15*	4.71
ECM_{t-1}	-.11 (1.92)	-.12 (1.92)	-.02 (1.73)	-.03 (1.73)	-.22 (3.04)*	-.37 (5.60)**	-.05 (3.24)*	-.17 (3.91)**
LM	.00	.03	.00	.15	1.60	1.79	.94	3.16*
RESET	.14	.01	4.08**	.48	3.41*	6.18**	8.32**	9.33**
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	U	U	S	S	S	S	S	S
Wald-Long		.06		.01		1.38		64.61**
Wald-Short		.59		.58		4.35**		9.46**
Adjusted R^2	.05	.06	.06	.09	.44	.65	.35	.55

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi2$ distribution with one degree of freedom.

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Table 1 continued.

	Malta		Mexico		Netherlands		New Zealand	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.31 (2.12)**	.31 (2.45)**			.27 (1.81)*	.39 (2.81)**		
ΔLnY_{t-2}		.29 (2.45)**						
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	-.33 (2.87)**		.11 (4.21)**		-.11 (1.25)		.02 (.44)	
ΔLER_{t-1}	.04 (.28)		.08 (3.17)**				.07 (1.50)	
ΔLER_{t-2}	-.19 (1.60)						.08 (1.75)*	
ΔLER_{t-3}	-.23 (1.81)*							
ΔLER_{t-4}								
ΔPOS_t		-.17 (90)		0.00 (.07)		-.16 (.84)		.06 (.66)
ΔPOS_{t-1}								
ΔPOS_{t-2}								
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		-.18 (1.05)		.13 (3.51)**		.00 (.00)		.00 (.01)
ΔNEG_{t-1}		.63 (2.74)*		.15 (4.51)**				.11 (1.51)
ΔNEG_{t-2}		.19 (.89)						.13 (1.81)*
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	4.88 (.28)	2.83 (63.98)**	-.40 (.08)	4.75 (4.16)**	32.49 (1.48)	3.81 (17.23)**	-23.01 (1.46)	3.80 (18.90)**
LER_t	.19 (.05)		1.23 (1.14)		-5.93 (1.26)		5.74 (1.71)*	
POS_t		.72 (6.11)**		.23 (.42)		.54 (.58)		-.24 (.31)
NEG_t		-1.81 (22.81)**		.05 (.10)		-1.07 (1.40)		-1.10 (1.20)
Panel C: Diagnostic Statistics								
F	1.34	6.52**	7.46**	5.67*	1.58	1.99	.69	.77
ECM_{t-1}	-.02 (1.66)	-.37 (4.53)**	-.03 (3.91)**	-.06 (4.24)**	-.01 (1.78)	-.13 (2.47)	.01 (1.08)	-.07 (1.44)
LM	.98	3.73*	.02	.03	.33	.26	.05	.10
RESET	.76	.37	2.25	3.36*	.11	.10	.05	.61
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	S	S	S	S	S	U	U
Wald-Long		772.05**		.43		38.36**		46.06**
Wald-Short		2.53		6.18**		.35		.59
Adjusted R^2	.67	.77	.50	.54	.14	.18	.04	.04

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

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Table 1 continued.								
	Norway		**Pakistan**		**Paraguay**		**Philippines**	
	L-ARDL	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.39 (2.50)**	.38 (2.79)**	.34 (2.00)**	.28 (1.78)*		.26 (1.53)	.58 (3.44)**	.71 (4.18)**
ΔLnY_{t-2}	-.09 (.54)	.14 (.93)				.31 (1.68)	-.31 (1.80)*	-.22 (1.29)
ΔLnY_{t-3}	-.28 (1.80)*	-.25 (1.95)*				.68 (3.50)**		
ΔLnY_{t-4}								
ΔLER_t	-.21 (2.66)**		.04 (.63)		.10 (1.24)		.04 (.56)	
ΔLER_{t-1}							.09 (1.58)	
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.28 (1.99)*		.04 (.28)		.24 (1.49)		.33 (2.04)**
ΔPOS_{t-1}		.01 (.06)				-.50 (2.92)**		
ΔPOS_{t-2}		.39 (2.95)**				-.35 (1.80)*		
ΔPOS_{t-3}						-.35 (2.09)**		
ΔPOS_{t-4}								
ΔNEG_t		-.09 (.71)		.05 (.64)		-.06 (.54)		-.09 (.93)
ΔNEG_{t-1}		.09 (.44)				.17 (1.62)		
ΔNEG_{t-2}		.04 (.19)				.26 (2.20)**		
ΔNEG_{t-3}		.40 (2.63)**				.24 (2.22)**		
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	37.42 (3.70)**	3.88 (28.95)**	-7.34 (.12)	3.52 (8.74)**	-25.87 (.17)	3.71 (79.26)**	-7.53 (.45)	3.39 (24.55)**
LER_t	-7.06 (3.22)**		3.90 (.23)		8.14 (.20)		2.14 (.63)	
POS_t		-1.39 (2.08)**		1.96 (3.07)**		.62 (8.42)**		1.63 (2.75)**
NEG_t		-3.74 (6.67)**		-.72 (1.97)*		-.33 (5.47)**		.06 (.14)
Panel C: Diagnostic Statistics								
F	5.81*	4.20	1.36	3.51	.07	6.93**	.92	1.12
ECM_{t-1}	-.03 (3.46)**	-.18 (3.68)**	.00 (1.66)	-.11 (3.19)	.00 (.28)	-.72 (4.85)**	.01 (1.37)	-.05 (1.88)
LM	.19	1.35	.29	.57	.00	12.64**	.21	.73
RESET	.02	.92	2.48	2.71*	7.28**	1.57	6.08**	9.06**
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	S	S	S	S	U	S	S
Wald-Long		207.60**		53.66		523.97**		5.69**
Wald-Short		.31		.16		7.64**		3.17*
Adjusted R^2	.45	.62	.22	.35	-.01	.53	.31	.34

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

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Table 1 continued.								
	Portugal		Saudi Arabia		Sierra Leone		Singapore	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}							-.17 (1.35)	-.12 (1.01)
ΔLnY_{t-2}							-.35 (3.12)**	-.32 (2.94)**
ΔLnY_{t-3}								.17 (1.62)
ΔLnY_{t-4}								
ΔLER_t	.22 (1.07)		-.27 (2.77)**		-.06 (70)		.37 (5.12)**	
ΔLER_{t-1}								
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		.53 (1.71)*		-.25 (1.10)		.27 (1.10)		.41 (2.52)**
ΔPOS_{t-1}								
ΔPOS_{t-2}								
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		-.30 (.66)		-.32 (2.98)**		-.13 (1.27)		.46 (3.77)**
ΔNEG_{t-1}								
ΔNEG_{t-2}								
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	3.35 (.57)	4.05 (7.00)**	242.60 (.11)	1.50 (.50)	2.88 (90)	-16.19 (.15)	15.22 (3.22)**	3.41 (1.95)*
LER_t	.27 (.21)		-47.30 (.11)		.21 (.34)		-1.87 (1.79)*	
POS_t		.14 (.12)		-2.70 (.36)		23.92 (.18)		-.12 (.07)
NEG_t		-.86 (.34)		-4.42 (.72)		5.23 (.18)		-1.93 (2.88)**
Panel C: Diagnostic Statistics								
F	4.03	2.00	15.53**	18.32**	.75	3.87	11.16**	9.35**
ECM_{t-1}	-.10 (2.88)	-.13 (2.52)	-.003 (5.66)**	-.04 (7.59)**	.07 (1.24)	-.01 (3.36)*	-.03 (4.74)**	-.07 (5.46)**
LM	.13	.01	1.31	.28	1.71	.04	.24	.18
RESET	7.30**	4.47**	.38	.10	1.14	3.97**	6.67**	3.41*
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	U	U	U	U	S	U	S	S
Wald-Long		.73		4.26**		.01		2.24
Wald-Short		1.35		.03		.59		.04
Adjusted R^2	.16	.17	.47	.63	-.01	.22	.49	.55

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.

Table 1 continued.								
	South Africa		**Spain**		**St. Kitts and Nevis**		**St. Lucia**	
	L-ARDL	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**	**L-ARDL**	**NL-ARDL**
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.32 (2.20)**	.42 (2.71)**	.50 (3.90)**	.39 (3.23)**	.45 (2.55)**	.39 (2.18)**		
ΔLnY_{t-2}					-.43 (2.18)**			
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	-.01 (.23)		-.01 (.12)		-.39 (2.00)*		-.60 (3.10)**	
ΔLER_{t-1}	.09 (2.26)**							
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		.04 (.56)		.02 (.15)		-.51 (1.29)		-.44 (1.16)
ΔPOS_{t-1}								-.80 (2.11)**
**ΔPOS_{t-2}								-.30 (.90)
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		.02 (.32)		.03 (.27)		-.01 (.03)		-.72 (1.98)*
ΔNEG_{t-1}				.28 (2.34)**				.60 (1.62)
ΔNEG_{t-2}								
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	11.61 (4.30)**	3.77 (43.55)**	-52.75 (.48)	3.96 (15.79)**	20.70 (1.54)	4.23 (2.31)**	15.42 (2.60)**	4.21 (6.35)**
LER_t	-1.46 (2.81)**		12.18 (.52)		-3.40 (1.18)		-2.32 (1.82)*	
POS_t		.60 (2.21)**		-.63 (.77)		-.39 (.09)		.74 (.52)
NEG_t		-.12 (.69)		-2.31 (2.33)**		-1.51 (.83)		-.15 (.10)
Panel C: Diagnostic Statistics								
F	.89	1.05	3.08	6.28**	1.37	.71	3.90	3.46
ECM_{t-1}	-.03 (1.32)	-.13 (1.82)	.01 (2.51)	-.08 (4.33)**	-.03 (1.69)	-.04 (1.33)	-.05 (2.55)	-.09 (3.13)
LM	1.06	.18	.10	.30	2.58	.81	.03	1.27
RESET	.05	3.80*	.00	.06	1.32	.67	.02	1.63
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	U	U	S	S	S	S	S	S
Wald-Long		30.49**		27.92**		10.57**		2.02
Wald-Short		.02		.07		.26		2.30
Adjusted R^2	.13	.10	.44	.55	.27	.18	.26	.36

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

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Table 1 continued.	St. Vincent and the Grenadines		Sweden		Switzerland		Togo	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	-.26 (1.51)	-.18 (1.13)	.32 (2.17)**	.31 (2.41)**	.26 (1.73)*	.29 (2.05)**		
ΔLnY_{t-2}		.30 (1.90)*	-.22 (1.53)		-.21 (1.45)			
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	-.24 (1.23)		.05 (.94)		-.14 (2.28)**		-.13 (1.13)	
ΔLER_{t-1}	-.43 (2.13)**		-.01 (.07)		-.10 (1.53)			
ΔLER_{t-2}			.11 (1.51)					
ΔLER_{t-3}			.12 (1.84)*					
ΔLER_{t-4}								
ΔPOS_t		.28 (.71)		.05 (.41)		.01 (.07)		.23 (1.23)
ΔPOS_{t-1}		-1.13 (3.14)**						
ΔPOS_{t-2}		-.60 (1.41)						
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		-.68 (1.63)		.10 (1.61)		-.31 (2.57)**		.01 (.08)
ΔNEG_{t-1}				.10 (1.13)		-.03 (.19)		
ΔNEG_{t-2}				.18 (2.29)**		.31 (2.43)**		
ΔNEG_{t-3}				.24 (3.40)**				
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	-106.28 (.42)	3.57 (6.26)**	14.17 (15.32)**	3.86 (218.2)**	-72.35 (.11)	3.93 (56.86)**	10.91 (3.29)**	4.22 (61.63)**
LER_t	24.30 (.44)		-2.03 (10.86)**		18.69 (.12)		-1.35 (1.92)*	
POS_t		4.16 (2.04)**		-.01 (.03)		.02 (.10)		.71 (2.36)**
NEG_t		1.00 (.53)		-.86 (7.22)**		-1.12 (3.71)**		-.01 (.04)
Panel C: Diagnostic Statistics								
F	5.02	4.33	4.09	8.09**	.07	2.88	3.64	3.74
ECM_{t-1}	-.01 (3.22)*	-.20 (3.75)**	-.11 (2.90)	-.39 (5.08)**	.00 (.02)	-.18 (2.86)	-.18 (2.71)	-.63 (3.39)*
LM	.19	.23	3.54*	2.41	1.35	1.23	.25	.52
RESET	1.86	9.15**	5.81**	9.91**	.26	.78	.10	.48
CUSUM	S	S	S	S	S	U	S	S
CUSUMSQ	U	S	U	U	S	U	S	S
Wald-Long		58.42**		87.86**		109.00**		27.76**
Wald-Short		.46		5.45**		.01		.34
Adjusted R^2	.26	.36	.39	.56	.25	.38	.14	.29

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

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Table 1 continued.								
	Trinidad and Tobago		Tunisia		Turkey		Uganda	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.42 (2.24)**	.31 (1.49)					.04 (.23)	.05 (.35)
ΔLnY_{t-2}							-.42 (2.69)**	-.46 (2.97)**
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	-.19 (2.08)**		.10 (1.36)		.18 (3.21)**		-.27 (3.02)**	
ΔLER_{t-1}								
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		-.64 (3.11)**		.05 (.08)		.08 (.55)		-.05 (.21)
ΔPOS_{t-1}								
ΔPOS_{t-2}								
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		-.03 (.20)		.05 (.70)		.15 (1.84)*		-.33 (2.71)**
ΔNEG_{t-1}								
ΔNEG_{t-2}								
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	-12.99 (1.55)	2.88 (9.26)**	10.38 (4.37)**	3.97 (9.68)**	13.90 (.86)	3.24 (30.44)**	15.44 (5.52)**	-.87 (.95)
LER_t	3.70 (2.01)**		-1.00 (1.85)*		-1.37 (.44)		-2.09 (4.47)**	
POS_t		1.80 (2.05)**		7.96 (2.31)**		.37 (2.53)**		-.16 (.08)
NEG_t		1.17 (1.24)		-.41 (.98)		-.60 (4.40)**		-1.58 (2.23)**
Panel C: Diagnostic Statistics								
F	1.91	1.05	1.97	2.20	.74	2.80	4.53	4.45
ECM_{t-1}	.03 (1.98)	.08 (1.83)	-.03 (1.93)	-.07 (2.50)	-.01 (1.21)	-.21 (2.97)	-.09 (3.05)*	-.12 (3.67)**
LM	.05	.46	.14	.28	.88	.77	.02	.17
RESET	.02	.00	.91	2.07	1.51	3.25*	.94	1.16
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	U	U	S	S	S	S	U	U
Wald-Long		5.03**		6.15**		339.38**		5.65**
Wald-Short		3.16*		.14		.10		.83
Adjusted R^2	.39	.44	.08	.11	.19	.29	.38	.44

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.

b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).

c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)

d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.

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Table 1 continued.								
	United Kingdom		United States		Uruguay		Venezuela	
	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL	L-ARDL	NL-ARDL
Panel A: Short-Run Estimates								
ΔLnY_t								
ΔLnY_{t-1}	.45 (2.97)**	.45 (3.11)**	.22 (1.46)	.33 (2.21)**	.38 (2.01)**	.46 (3.03)**	.16 (.93)	.23 (1.50)
ΔLnY_{t-2}	-.32 (2.00)**	-.18 (1.18)					-.33 (1.90)*	
ΔLnY_{t-3}								
ΔLnY_{t-4}								
ΔLER_t	.00 (.04)		.01 (.15)		-.03 (.32)		-.01 (.18)	
ΔLER_{t-1}							-.10 (1.99)*	
ΔLER_{t-2}								
ΔLER_{t-3}								
ΔLER_{t-4}								
ΔPOS_t		.01 (.10)		-.01 (.13)		.13 (1.03)		-.01 (.25)
ΔPOS_{t-1}		-.18 (1.91)*		-.18 (1.78)*				-.23 (2.38)**
ΔPOS_{t-2}				.16 (1.55)				
ΔPOS_{t-3}								
ΔPOS_{t-4}								
ΔNEG_t		.01 (.12)		.08 (.84)		-.11 (1.37)		.07 (.86)
ΔNEG_{t-1}		.14 (2.11)**						
ΔNEG_{t-2}								
ΔNEG_{t-3}								
ΔNEG_{t-4}								
Panel B: Long-Run Estimates								
Constant	89.23 (.02)	3.86 (44.09)**	-15.10 (.29)	4.07 (6.05)**	-6.01 (.36)	3.47 (10.82)**	-1.43 (.23)	3.95 (16.66)**
LER_t	-33.51 (.02)		4.93 (.40)		2.18 (.66)		1.27 (.91)	
POS_t		.49 (1.69)*		1.45 (1.13)		.34 (1.12)		.06 (.28)
NEG_t		-.27 (1.08)		.28 (.24)		-.78 (1.11)		-.35 (1.18)
Panel C: Diagnostic Statistics								
F	.16	2.19	1.50	1.10	5.01	8.15**	1.79	1.62
ECM_{t-1}	.00 (.45)	-.15 (2.54)	-.01 (1.75)	-.07 (1.86)	.06 (2.60)	-.20 (5.04)**	.05 (1.92)	-.20 (2.29)
LM	.83	.66	1.39	.49	.15	.26	.03	.27
RESET	1.74	5.10**	.00	1.83	4.09**	3.20*	.08	2.08
CUSUM	S	S	S	S	S	S	S	S
CUSUMSQ	S	U	S	S	S	S	S	S
Wald-Long		82.13**		41.84**		6.34**		14.64**
Wald-Short		3.45*		.19		1.93		4.25**
Adjusted R^2	.13	.26	.09	.17	.34	.56	.27	.35

Notes:

a. Numbers inside parentheses are t-ratios. **, * denote significance at the 5% and 10% levels, respectively.
b. At the 10% (5%) significance level when there is one exogenous variable (k=1), the upper bound critical value of the F test is 5.050 (6.175). These come from Narayan (2005, p. 1988) for our sample sizes (n=35).
c. Number inside the parenthesis next to ECM_{t-1} is the absolute value of the t-ratio. Its upper bound critical value at the 10% (5%) significance level is 2.95 (3.35) when k=1 and these come from Banerjee et al (1989, p. 276). In the nonlinear model where k=2, these critical values change to 3.24 (3.64). (T=24)
d. LM is Lagrange Multiplier test of residual serial correlation. It is distributed as $\chi 2$ with one degree of freedom (first order). Its critical value at 10% (5%) significance level is 2.70 (3.84). These critical values are also used for Wald tests since they also have a $\chi 2$ distribution with one degree of freedom.
e. RESET is Ramsey's test for misspecification. It is distributed as $\chi 2$ with one degree of freedom.