Paper 83

An Analysis of the Dynamic Relationships Between South Asian and Developed Equity Markets*

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Abstract

In this paper, I conduct a detailed, large sample analysis of the dynamic relationships between the South Asian markets of India, Pakistan and Sri Lanka and the major developed markets during July 1997 - February 2003. Using a multivariate cointegration framework and vector error-correction modeling I find that the Indian market is influenced by the large developed equity markets including the US, UK and Japan and that this influence has strengthened during the more recent time period of January 2000 - February 2003. In addition, I do not find that the Indian market exerts any significant influence on the Pakistani and Sri Lankan markets. For Pakistan and Sri Lanka I find that these markets are relatively isolated from the major developed markets during the entire sample period of July 1997 - February 2003.

Keywords: South Asian markets; Emerging markets; Cointegration; Vector error-correction model.
JEL Classification: F30, F36, G15.

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1. Introduction

The interest in studying the dynamic relationships among the world's equity markets gathered considerable momentum following the October 1987 global stock market crash, and even more so, following the Asian financial crisis in 1997. Several researchers have examined the short- and long-run relationships among the major developed equity markets and markets in the Asian region. Some researchers, including Eun and Shim (1989), Cheung and Mak (1992), Park and Fatemi (1993), Chung and Liu (1994), Arshanapalli et al. (1995), and Janakiramanan and Lamba (1998), use vector autoregression (VAR) modeling and impulse response analysis to examine these relationships. The main focus of these studies is to examine the short-run causal linkages among equity markets to better understand how shocks in one market are transmitted to other markets. These studies typically find that the US influences most markets in the Asian regions, while markets in this region have little influence on the US market. The UK appears to exert some influence on markets in Japan, Australia, and Hong Kong while Japan, the second largest equity market, has little influence on other equity markets. In addition, the linkages among Asian equity markets can often be attributed to the direct and indirect influences of the US market.

Other studies, including Chan et al. (1992, 1997), Kasa (1992), Hung and Cheung (1995), and Masih and Masih (2001), use the cointegration framework to examine the long-run relationships and the level of market integration among markets in the Asian region and between these markets and developed markets. Some researchers, such as Masih and Masih (1997, 1999) and Sheng and Tu (2000), have specifically focused their attention on the effect of market crashes on the dynamic relationships among these markets. These studies generally tend to find a long-run relationship between Asian equity markets and major developed markets such as the US, UK, and Japan.

While previous researchers have examined the linkages among various equity markets in the Asian region, South Asian markets have received relatively little research interest. In this context, Ghosh et al. (1999) examine the long-run relationship between the US and Japan and the Indian market during the Asian financial crisis period of 1997. They find a long-run cointegrating relationship between the US and the Indian market but not between Japan and India. However, their conclusions are limited in scope because the authors only examine a very short time period of 201 trading days.

Countries in the South Asian region have experienced considerable political and social turmoil over the past few years. At the same time, these countries have deregulated, or are beginning to deregulate, their capital markets and removed barriers to international investment. In addition, the Asian financial crisis in 1997 and the substantial market falls following the terrorist attacks on the US on

September 11, 2001 may have exerted influence on markets in this region potentially making them more integrated with major developed markets. Thus, examining the dynamic relationships among South Asian markets and major developed markets has become increasingly important.

Previous studies have also documented an increase in correlation among the world's equity markets.[1] These findings imply that the benefits of international diversification are declining because of the increased comovement among equity markets. Since the South Asian markets are likely to have relatively low correlations with major developed markets it suggests that foreign investors can achieve substantial risk diversification benefits with an exposure to these markets.

Taking these factors into account, a detailed examination of the evolution and changes in the dynamic relationships between South Asian markets and major developed markets has become topical and of immediate relevance.

The focus of my analysis is on how the Indian equity market is influenced by the major developed equity markets, and what, if any, influence does it exert on other markets in the South Asian region. To examine these dynamic relationships, a multivariate cointegration framework is used with vector error-correction (VEC) models estimated to analyze the causal influence of the major developed markets on South Asian markets, and the Indian market on other South Asian markets. This method allows for a separation of any long-run equilibrium relationships between the markets from the short-run causal effects.

The remainder of this paper is organized as follows. Section 2 outlines the specific research questions addressed and the contribution of this study. Section 3 provides details on the data and method used, while Section 4 presents and discusses the empirical results. Section 5 concluded the paper.

2. Research Questions and Contribution

Based on the above discussion, the main research questions addressed in this study are as follows:

- What are the short- and long-run relationships between each of the equity markets in the South Asian region and the major developed equity markets?
- Does the Indian equity market exert significant short- and long-run influence on other markets in the South Asian region?
- Have the above relationships been significantly influenced by events such as the Asian financial crisis in 1997 and the terrorist attacks on the US in September 2001?

[1] See, for example, Oldier and Solnik (1993) and Solnik, Boucrelle and Le Fur (1996).

The study's main contribution is to examine the dynamic relationships between equity markets in the South Asian region, which have been neglected by previous researchers. The results from this study have implications on how interdependent these markets are on each other and on the major developed markets, and on whether the level of this interdependence has changed over time and as a result of events that can significantly alter market volatility. The results from this study also have implications for international portfolio diversification and portfolio management in the South Asian region.

3. Data and Method

3.1. Data

The analysis focuses on the dynamic relationships between major developed markets and South Asian markets during July 1997 - February 2003. For India, daily data on the CNX Nifty 50 are obtained from the National Stock Exchange's web site. For Pakistan and Sri Lanka daily data on the Karachi 100 and All Share indices, respectively, are obtained from Bloomberg.[2] The choice of which developed equity markets to include in the analysis is determined mainly by the relative size of these markets as well as the expected economic and financial linkages between these markets and South Asian markets. The specific developed equity markets included in the analysis are France (FR), Germany (GE), Japan (JP), the UK, and the US. Data on these daily market indices were obtained from Bloomberg.[3] Table 1 provides information on the markets examined.[4]

Table 2 provides some descriptive statistics for the continuously compounded daily returns in each market along with the correlation coefficients among daily returns. As the table shows, the South Asian markets' returns have relatively low correlations with the returns of the major developed markets. As mentioned earlier, previous studies have documented an increase in correlation among the world's equity markets. The results of these studies imply that the benefits of international diversification are reducing because of the increased correlation. Hence, the low correlations between South Asian markets and major developed markets suggest that foreign investors can achieve substantial risk diversification benefits with an exposure to these South Asian markets.

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[2] Data on only these South Asian markets are available from Bloomberg and these data are available only from July 1997 onwards.

[3] The market index series were measured in local currency terms and all data were screened for errors using filter tests. No major discrepancies were found in the data.

[4] The relatively small sizes of markets in Pakistan and Sri Lanka may be of some concern because of the potential for infrequent trading. An examination of the daily data shows that the indices of these markets tend to change on most days indicating that there is some market activity taking place on a daily basis.

3.2. Method

Two time series are cointegrated when a linear combination of the time series is stationary, even though each series may individually be non-stationary. Since non-stationary time series do not return to their long-run average values following a disturbance, it is important to convert them to stationary processes, otherwise regressing one non-stationary process on another non-stationary process can generate spurious results. If a time series contains a stochastic trend, it is said to be integrated of order *d*, i.e. *I*(*d*), and differencing the series *d* times yields a stationary series. Since market index series are likely to be *I*(*1*) processes they will tend to be non-stationary in levels but stationary in first differences. The dynamic relationships between the South Asian markets and major developed markets is analyzed using a vector error-correction model. The model allows for an examination of the long-run equilibrium relationships between the South Asian markets and major developed markets as well as their short-run adjustments over time.[5]

The behavior of the market index series is examined to first determine whether they are stationary. If, as expected, they are found to be non-stationary, the index series are then examined to determine whether they are cointegrated. Following previous researchers, the augmented Dickey-Fuller (ADF) test is used on the market index levels and their first differences to test for unit roots in the data [Dickey and Fuller (1979, 1981)]. To perform the ADF test, for each market index series, the following regression is estimated:

$$Y_t = \alpha_0 + \alpha_1 t + \rho Y_{t-1} + \sum_{j=2}^{p} \gamma_j Y_{t-j} + \varepsilon_t \,, \tag{1}$$

where Y_t is a time series of closing daily market index values, t is a time trend, and ε_t is a white noise process. The time series is non-stationary if $\rho = 1$. After examining the stationarity of each market's index series the stationarity of the first differences, i.e., ΔY_t, is examined using the above specification. Table 3 reports the results which show that the hypothesis of non-stationarity in the market indices cannot be rejected. However, the hypothesis of non-stationarity in first differences is rejected for all markets implying that the variables are integrated of order one, i.e., they are *I*(*1*).

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[5] As Granger (1988) argues, if two series are cointegrated, the causality tests are misspecified unless a lagged error-correction term is included. Thus, controlling for cointegration among the return series rules out the possibility of any short-run relationships being spurious.

Since the market index series are integrated of the same order, cointegration analysis is used to determine whether the index series become stationary in a linear combination. This test is performed using the Johansen (1991) method which involves estimating the following unrestricted vector autoregressive (VAR) model:[6]

$$Y_t = A_0 + \sum_{j=1}^{p} A_j Y_{t-j} + \varepsilon_t \ , \tag{2}$$

where Y_t is an $n \times 1$ vector of non-stationary $I(1)$ variables, A_0 is an $n \times 1$ vector of constants, p is the number of lags, A_j is an $n \times n$ matrix of estimable parameters, and ε_t is an $n \times 1$ vector of independent and identically distributed innovations. This VAR model can be rewritten as:

$$\Delta Y_t = A_0 + \sum_{j=1}^{p-1} \Gamma_j \Delta Y_{t-j} + \Pi Y_{t-1} + \varepsilon_t \ , \tag{3}$$

where

$$\Gamma_j = -\sum_{i=j+1}^{p} A_i \quad \text{and} \qquad \Pi = \sum_{j=1}^{p} A_j - I \ , \tag{4}$$

Δ is the difference operator, and I is an $n \times n$ identity matrix.

The rank of the matrix Π determines the number of cointegrating vectors since the rank of Π is equal to the number of independent cointegrating vectors. Thus, if the rank of Π equals 0, the matrix is null and equation (3) becomes the usual VAR model in first differences. If the rank of Π is r where $r < n$, then there exist r cointegrating relationships in the above model. In this case, the matrix Π can be rewritten as $\Pi = \alpha\beta'$ where α and β are $n \times r$ matrices of rank r. Here, β is the matrix of cointegrating parameters and α is the matrix of weights with which each cointegrating vector enters the above VAR model.

Johansen provides two different test statistics that can be used to test the hypothesis of the existence of r cointegrating vectors, namely, the trace test and the maximum eigenvalue test. The trace

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[6] An alternative method would be to use Engle and Granger's (1987) two-step cointegration test. Although relatively easy to implement, this test is not used because it assumes only one cointegrating vector and does not allow for potential feedback effects (Enders, 1995).

test statistic tests the null hypothesis that the number of distinct cointegrating relationships is less than or equal to *r* against the alternative hypothesis of more than *r* cointegrating relationships, and is defined as:

$$\lambda_{trace}(r) = -T\sum_{j=r+1}^{p} ln(1-\hat{\lambda}_j)\ , \tag{5}$$

where T is the number of observations and the λs are the eigenvalues of Π in equation (3). The maximum eigenvalue test statistic tests the null hypothesis that the number of cointegrating relationships is less than or equal to *r* against the alternative of *r+1* cointegrating relationships, and is defined as:

$$\lambda_{max}(r, r+1) = -T(ln(1-\hat{\lambda}_{r+1})\ . \tag{6}$$

The results from the Johansen cointegration tests are presented in Table 4.[7] Panel A reports the results for India and the major developed markets, whiles panels B and C report the corresponding results for Pakistan and Sri Lanka, respectively. The test statistics generally lead to a rejection the null hypothesis of no cointegrating relationships, but not the null hypothesis of at least one cointegrating vector.

Since the market index series are found to have a single cointegrating relationship, they will have a tendency to move together in the long-run even though they may experience short-run deviations from the common equilibrium path. For example, the causal relationship between the Indian equity market and the major developed markets is examined using the following error-correction model:

$$\begin{aligned}\Delta IN_t = \alpha_0 + \gamma Z_{t-1} + \sum_{j=1}^{p}\alpha_{1j}\Delta IN_{t-j} + \sum_{j=1}^{p}\alpha_{2j}\Delta FR_{t-j} + \sum_{j=1}^{p}\alpha_{3j}\Delta GE_{t-j} + \sum_{j=1}^{p}\alpha_{4j}\Delta JP_{t-j} + \\ \sum_{j=1}^{p}\alpha_{5j}\Delta UK_{t-j} + \sum_{j=1}^{p}\alpha_{6j}\Delta US_{t-j} + \varepsilon_t,\end{aligned} \tag{7}$$

where

[7] The selection of the order of lags in the Johansen test and, subsequently, the error-correction model is important, as the choice of the lag can have an important impact on the outcome of these tests (Enders, 1995). I use the following criteria suggested by Engle and White (1999) to select the optimum lag structure: (i) residual diagnostic tests to ensure the residuals from the regressions are white noise hence no autocorrection between lags of dependent variables, (ii) the Akaike Information Criterion to optimize the goodness of fit, and (iii) the statistical significance of coefficients of lagged variables.

$$Z_{t-1} = IN_{t-1} - \beta_1 FR_{t-1} - \beta_2 GE_{t-1} - \beta_3 JP_{t-1} - \beta_4 UK_{t-1} - \beta_5 UK_{t-1}. \quad (8)$$

a_0 is the constant representing a linear trend, and ε_t is the error term representing unanticipated movements in the Indian market index, ΔIN_t. Z_{t-1} contains the error-correction term which is derived from the long-run cointegrating relationship between the market indices using the Johansen procedure.

Within the framework of the error-correction model, Engle and Granger (1987) show that deviations from the long-run relationship should prompt adjustments in the market index. The model thus expresses changes in the Indian market index in terms of the lagged changes of the market indices examined and an error-correction term. The economic intuition behind the specification in equation (7) is that if the Indian market and the other markets are cointegrated, part of the current changes in the Indian market index reflects the "alignment" that the Indian market attempts to achieve with trends in other markets.

Similarly, the short- and long-run relationships between equity markets in Pakistan and Sri Lanka and the major developed markets is examined using the above error-correction model after substituting changes in these market indices (ΔPK_t and ΔSL_t, respectively) for the Indian market index (ΔIN_t) in equations (7) and (8).

In addition to the above analysis, which considers each of the South Asian markets individually, all three markets are included in a single error-correction model.[8] Specifically, for the Indian market the error-correction model estimated is as follows:

$$\Delta IN_t = \alpha_0 + \gamma Z_{t-1} + \sum_{j=1}^{p}\alpha_{1j}\Delta IN_{t-j} + \sum_{j=1}^{p}\alpha_{2j}\Delta FR_{t-j} + \sum_{j=1}^{p}\alpha_{3j}\Delta GE_{t-j} + + \sum_{j=1}^{p}\alpha_{4j}\Delta JP_{t-j} + \sum_{j=1}^{p}\alpha_{5j}\Delta US_{t-j} + \sum_{j=1}^{p}\alpha_{6j}\Delta UK_{t-j} + \sum_{j=1}^{p}\alpha_{7j}\Delta PK_{t-j} + \sum_{j=1}^{p}\alpha_{8j}\Delta SL_{t-j} + \eta_t, \quad (9)$$

where

$$Z_{t-1} = IN_{t-1} - \beta_1 FR_{t-1} - \beta_2 GE_{t-1} - \beta_3 JP_{t-1} - \beta_4 UK_{t-1} - \beta_5 US_{t-1} - \beta_6 PK_{t-1} - \beta_7 SL_{t-1}. \quad (10)$$

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[8] The results from the Johansen cointegration tests where all three South Asian markets are included in the system similar to those reported in Table 3 and indicate the presence of at least cointegrating vector. For brevity, these results are reported here but are available from the author upon request.

Similar models are estimated for markets in Pakistan and Sri Lanka. The purpose of this analysis is to verify whether any short- and long-run relationships exist among the three South Asian markets or whether they are relatively isolated from each other.

4. Results and Discussion

4.1. Influences on Individual South Asian Markets

The results for the Indian, Pakistani and Sri Lankan markets appear in tables 5 through 7, respectively. Panel A of each table shows the influence of developed markets on the specified market while Panel B shows whether there is a bi-directional causality between the specified market and developed markets. For India, based on standard diagnostic checking, I use a twelve-lag specification for the VEC model (see Table 5). I find that the error-correction term is not statistically significant, indicating the lack of a long-run relationship between India and the major developed markets. An examination of the individual *t*-statistics of the lagged index changes in the major developed markets shows that contemporaneous changes in the Indian market are Granger-caused by changes in Japan, the UK and the US during the previous day.

These results suggest that some uni-directional causality exists between the Indian market and the developed markets, with these markets leading the Indian market. However, it is possible that a bi-directional relationship also exists among these markets. To ascertain whether a bi-directional relationship exists, I reestimate VEC models with each of the markets included as the dependent variable. The summary results, which are presented in Panel B of Table 5, show that that the Indian market is Granger-caused by markets in France, the UK and the US but not Germany and Japan. Among these markets, the US and UK exert the most influence on India, while the influence of France is relatively modest. Although Japan is the world’s second largest equity market and has substantial trade and economic links with India it does appear to exert much influence on the Indian equity market. This finding is consistent with the evidence documented by previous studies which find that Japan has not tended to influence markets in the Pacific-Basin region in the past.

For Pakistan, the appropriate VEC model specification is a four-lag model, while for Sri Lanka a ten-lag model specification is appropriate. As tables 6 and 7 show, for both markets the error-correction term is not statistically significant, indicating the lack of a long-run relationship between these markets and the major developed markets. An examination of the individual *t*-statistics of the lagged index changes in the major developed markets shows that contemporaneous changes in the Pakistani (Sri

Lankan) market is Granger-caused only by changes in the US (France) during the previous day. Interestingly, for Sri Lanka the previous two days' market changes in its own index are found to be highly statistically significant (see Panel A of Table 7). The results for the bi-directional relationships appear in Panel B of the two tables and show that none of the developed markets appear to exert any influence on either Pakistan or Sri Lanka.

It is possible that the above findings may differ across sub-periods as the relationships among these markets may have evolved over time. I examine this conjecture by dividing the full sample period into two approximately equal sub-periods spanning July 1997 - December 1999 and January 2000 - February 2003. The results, which are not presented here, show that the main empirical findings are similar to those reported above.[9] The main difference observed is that for both India and Pakistan the error-correction term now becomes statistically significant implying the presence of a long-run relationship between these two markets and the major developed markets. Also, for the Indian market I find that it is now Granger-caused by not only France, the UK and the US, but Japan as well. This result implies that large developed equity markets are now increasingly influencing movements in the Indian market.

4.2. Influences on all Three South Asian Markets

To examine the influence among the three South Asian markets the error-correction model in equations (9) and (10) is separately estimated for each market. The results for the Indian, Pakistani and Sri Lankan markets appear in tables 8 through 10, respectively. As before, Panel A of each table shows the influence of developed markets on the specified market while Panel B shows whether there is a bi-directional causality between the specified market and developed markets. Overall, the results are similar to those reported earlier. In addition, I find that none of these markets exert any significant influence on each other. Thus, even though the three countries are located in close geographical proximity and continue to be influenced by political and economic events in that region their equity markets remain relatively isolated from each other. Moreover, this relative isolation has persisted over the more recent time period of January 2000 - February 2003 (results not shown).

4.3. Sensitivity Analysis

[9] All unreported results are available from the author upon request.

To verify the effects of the Asian financial crisis and events around September 11, 2001 the error-correction models in equations (7) and (8) and in equations (9) and (10) are re-estimated after excluding data for the months of July - December 1997 and September 2001.[10] This analysis allows for a verification of whether or not these events have substantially altered the dynamic relationships among the South Asian and developed equity markets. The results, which are not presented here, show that excluding these periods does not alter the main empirical findings reported above. The findings imply that the relationships observed earlier are not driven by the increased volatility observed in equity markets around these events.

It has also been argued that during the "Dot Com" boom of 1999-00 the Indian equity market was more closely related to the US NASDAQ market index rather than to the S&P 500 index. To test this contention I examined the NASDAQ Composite index instead of the S&P 500 index for the US market. The results (not shown) indicate no long-term relationship between the NASDAQ Composite and NSE indices.

5. Summary and Conclusions

In this paper, I conduct a detailed, large sample analysis of the dynamic relationships between the South Asian markets of India, Pakistan and Sri Lanka and the major developed markets during July 1997 - February 2003. Using a multivariate cointegration framework and vector error-correction modeling I find that the Indian market is influenced by the large developed equity markets including the US, UK and Japan and that this influence has strengthened during the more recent time period of January 2000 - February 2003. In addition, I do not find that the Indian market exerts any significant influence on the Pakistani and Sri Lankan markets. For Pakistan and Sri Lanka I find that these markets are relatively isolated from the major developed markets during the entire sample period of July 1997 - February 2003.

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[10] The results are insensitive to excluding a longer time period for the Asian financial crisis period (July 1997 - July 1998) and a shorter time period for September 11, 2001 (September 10 - 21, 2001).

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Table 1. Summary Information on Markets Analyzed

Panel A: Total Market Capitalization, Total Value Traded and Number of Domestic Listed Companies at the end of 2002[a]

Country	Total Market Capitalization (USD millions)	Percent	Total Value Traded (USD millions)	Percent	Number of Domestic Listed Companies	Percent
France	966,962	4.1	934,767	2.4	772	1.6
Germany	685,9702	29.3	1,233,056	3.2	715	1.5
Japan[b]	2,126,075	9.1	1,573,279	4.1	3,058	6.3
UK	1,864,134	8.0	2,721,342	7.0	1,701	3.5
USA	11,052,403	47.2	25,371,270	65.7	5,685	11.8
India[c]	131,011	0.6	197,118	0.5	5,650	11.7
Pakistan	10,200	< 0.1	26,030	< 0.1	712	1.5
Sri Lanka	1,681	< 0.1	318	< 0.1	238	0.5
World	**23,391,914**	**100.0**	**38,645,472**	**100.0**	**48,375**	**100.0**

Panel B: Information on Market Indices Examined

Country	Market Index
France	CAC 40 Index
Germany	DAX Index
Japan	Nikkei 225 Index
UK	FTSE 100 Index
USA	Standard & Poor’s 500 Index
India	CNX Nifty 50 Index
Pakistan	Karachi 100 Index
Sri Lanka	All Share Index

[a] *Source:* Global Stock Markets Factbook, 2003. The *Percent* columns provide information on a particular market’s share relative to the world total at the end of 2002.
[b] Starting in 2002, Japan includes data from JASDAQ listed companies as well.
[c] Starting in 1994, total value traded for India includes data from BSE and NSE.

Table 2. Descriptive Statistics for Daily Market Returns in Local Currency Terms During July 1997 - February 2003

A. Summary Statistics for Daily Market Returns

	Mean	Median	Maximum	Minimum	Std Dev	Skewness	Kurtosis
France	-0.005%	0.000%	6.80%	-7.68%	1.65%	-0.08	4.52
Germany	-0.028	0.000	7.55	-9.58	1.85	-0.12	4.63
Japan	-0.060	0.000	7.66	-7.23	1.58	0.12	4.87
UK	-0.018	0.000	4.93	-5.59	1.33	-0.11	4.21
US	-0.004	0.000	5.57	-7.11	1.35	-0.04	5.13
India	-0.008	0.000	7.63	-8.20	1.64	-0.04	5.90
Pakistan	0.027	0.000	12.76	-13.21	1.95	-0.33	9.07
Sri Lanka	-0.004	0.000	18.29	-5.36	1.06	3.53	64.92

B. Correlation Coefficients Between Daily Market Returns

	France	Germany	Japan	UK	US	India	Pakistan	Sri Lanka
France	1.000							
Germany	0.800^{**}	1.000						
Japan	0.243^{**}	0.226^{**}	1.000					
UK	0.804^{**}	0.715^{**}	0.258^{**}	1.000				
US	0.456^{**}	0.540^{**}	0.125^{**}	0.427^{**}	1.000			
India	0.132^{**}	0.110^{**}	0.183^{**}	0.125^{**}	0.031	1.000		
Pakistan	0.030	0.025	0.016	0.028	-0.021	0.119^{**}	1.000	
Sri Lanka	0.003	-0.004	0.060	-0.004	0.013	0.041	0.075^{**}	1.000
France (-1)	0.022	0.023	0.278^{**}	0.037	0.021	0.118^{**}	0.013	0.036
Germany (-1)	0.101^{**}	0.014	0.260^{**}	0.081^{**}	0.028	0.125^{**}	0.023	0.054^{**}
Japan (-1)	-0.072^{**}	-0.078^{**}	-0.053	-0.082^{**}	-0.052^{*}	-0.023	0.045	0.032
UK (-1)	0.032	0.030	0.254^{**}	0.018	0.028	0.147^{**}	0.010	0.052^{**}
US (-1)	0.318^{**}	0.216^{**}	0.331^{**}	0.322^{**}	-0.018	0.172^{**}	0.059^{**}	0.053^{**}

* Significant at the 5% level.
** Significant at the 1% level.

Table 3. Stationarity tests for market index levels and first differences based on the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) test statistics[a]

A. Augmented Dickey-Fuller Test Statistics

Market	Market Index Levels	First Differences
France	-0.545	-24.105*
Germany	-0.968	-37.624*
Japan	-1.639	-17.211*
UK	-1.586	-17.929*
US	-1.354	-24.029*
India	-2.060	-11.194*
Pakistan	-1.564	-19.665*
Sri Lanka	-1.555	-14.802*

B. Phillips-Perron Test Statistics

Market	Market Index Levels	First Differences
France	-0.500	-37.917*
Germany	-0.876	-37.689*
Japan	-1.808	-40.353*
UK	-1.674	-37.581*
US	-1.374	-39.278*
India	-1.925	-36.751*
Pakistan	-1.527	-36.710*
Sri Lanka	-1.384	-28.266*

[a] The critical values for the test statistics are -3.413 and -3.964 at the 5% and 1% levels, respectively.
* Significant at the 1% level.

Table 4. Johansen's test for multiple cointegrating vectors for the long-run relationship between market returns[a]

A. Trace and Maximum Eigenvalue Statistics for India and Developed Equity Markets

Null Hypothesis	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value	Maximum Eigenvalue Statistic	5 Percent Critical Value	1 Percent Critical Value
No Cointegrating Vector, $r = 0$	111.22**	94.15	103.18	42.83*	39.37	45.10
At Most 1 Cointegrating Vector, $r \leq 1$	68.39	68.52	76.07	32.90	33.46	38.77
At Most 2 Cointegrating Vectors, $r \leq 2$	35.49	47.21	54.46	16.80	27.07	32.24
At Most 3 Cointegrating Vectors, $r \leq 3$	18.69	29.68	35.65	13.81	20.97	25.52
At Most 4 Cointegrating Vectors, $r \leq 4$	4.88	15.41	20.04	3.64	14.07	18.63
At Most 5 Cointegrating Vectors, $r \leq 5$	1.24	3.76	6.65	1.24	3.76	6.65

B. Trace and Maximum Eigenvalue Statistics for Pakistan and Developed Equity Markets

Null Hypothesis	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value	Maximum Eigenvalue Statistic	5 Percent Critical Value	1 Percent Critical Value
No Cointegrating Vector, $r = 0$	97.07*	94.15	103.18	40.12*	39.37	45.10
At Most 1 Cointegrating Vector, $r \leq 1$	56.95	68.52	76.07	26.95	33.46	38.77
At Most 2 Cointegrating Vectors, $r \leq 2$	30.00	47.21	54.46	15.39	27.07	32.24
At Most 3 Cointegrating Vectors, $r \leq 3$	14.61	29.68	35.65	9.89	20.97	25.52
At Most 4 Cointegrating Vectors, $r \leq 4$	4.72	15.41	20.04	4.68	14.07	18.63
At Most 5 Cointegrating Vectors, $r \leq 5$	0.04	3.76	6.65	0.04	3.76	6.65

Table 4 (Continued)

C. Trace and Maximum Eigenvalue Statistics for Sri Lanka and Developed Equity Markets

Null Hypothesis	Trace Statistic	5 Percent Critical Value	1 Percent Critical Value	Maximum Eigenvalue Statistic	5 Percent Critical Value	1 Percent Critical Value
No Cointegrating Vector, $r = 0$	99.63*	94.15	103.18	38.12	39.37	45.10
At Most 1 Cointegrating Vector, $r \leq 1$	61.52	68.52	76.07	24.52	33.46	38.77
At Most 2 Cointegrating Vectors, $r \leq 2$	37.00	47.21	54.46	20.69	27.07	32.24
At Most 3 Cointegrating Vectors, $r \leq 3$	16.31	29.68	35.65	10.69	20.97	25.52
At Most 4 Cointegrating Vectors, $r \leq 4$	5.62	15.41	20.04	5.14	14.07	18.63
At Most 5 Cointegrating Vectors, $r \leq 5$	0.48	3.76	6.65	0.48	3.76	6.65

[a] r denotes the number of cointegrating relationships. The optimal lag structure of the vector autoregression (VAR) model is selected by minimizing the Akaike Information Criterion (AIC). The critical values for the test statistics are obtained from Osterwald-Lenun (1992).
[*] Significant at the 5% level.
[**] Significant at the 1% level.

Table 5. Results testing the long- and short-run relationships between India and selected developed markets during July 1997 - February 2003[a]

A. Vector error-correction model estimated with India as the dependent market [b]

Lag Order (Days)	ΔIN	Independent Markets ΔFR	ΔGE	ΔJP	ΔUK	ΔUS
1	0.051	-0.001	0.001	-0.006	0.032	0.173
	(1.882)*	(-0.057)	(0.141)	(-2.493)**	(2.664)***	(4.332)***
2	-0.044	0.017	-0.004	0.001	-0.009	0.007
	(-1.607)	(1.227)	(-0.402)	(0.346)	(-0.716)	(0.159)
3	-0.012	0.032	-0.010	0.005	-0.007	0.089
	(-0.430)	(2.276)**	(-0.974)	(2.120)**	(-0.541)	(1.968)**
4	0.051	0.000	0.003	-0.002	-0.003	-0.011
	(1.871)*	(0.005)	(0.307)	(-0.604)	(-0.229)	(-0.238)
5	0.016	-0.014	0.000	0.003	0.005	0.060
	(0.575)	(-0.986)	(0.039)	(1.089)	(0.440)	(1.328)
6	-0.068	0.010	0.014	0.002	-0.023	-0.039
	(-2.487)**	(0.696)	(1.305)	(0.967)	(-1.867)*	(-0.849)
7	0.025	-0.002	-0.006	-0.001	0.016	0.027
	(0.923)	(-0.124)	(-0.615)	(-0.380)	(1.314)	(0.596)
8	-0.058	0.029	0.003	0.000	-0.038	0.014
	(-2.142)**	(2.090)**	(0.336)	(0.124)	(-3.118)***	(0.309)
9	0.042	0.033	-0.019	-0.002	0.004	0.041
	(1.563)	(2.337)**	(-1.851)*	(-0.829)	(0.294)	(0.899)
10	0.084	0.001	0.005	0.003	0.006	-0.034
	(3.097)***	(0.053)	(0.436)	(1.118)	(0.512)	(-0.750)
11	-0.041	-0.013	0.004	-0.001	0.004	-0.073
	(-1.500)	(-0.898)	(0.372)	(-0.555)	(0.354)	(-1.626)
12	0.019	-0.005	0.008	-0.003	0.005	0.109
	(0.696)	(-0.330)	(0.794)	(-1.193)	(0.386)	(2.497)**
ECT	-0.0067					
	(-1.389)					
Intercept	-0.052					
	(-0.105)					

Table 5 (Continued)

B. Pairwise Granger-causality tests based on the estimated error-correction models

Independent Markets (Lags 1 - 12)	Dependent Markets					
	ΔIN	**ΔFR**	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**
	χ^2 *Statistics*					
ΔIN	-	11.46	9.22	11.66	12.20	22.18**
ΔFR	19.16*	-	17.46	20.46*	18.77*	16.44
ΔGE	9.43	16.31	-	12.65	19.55*	21.94**
ΔJP	18.12	14.22	24.17**	-	18.43	19.34*
ΔUK	25.39**	14.64	14.20	18.79*	-	18.42
ΔUS	41.50***	174.20***	117.62***	99.19***	200.82***	-

[a] The country codes used are: IN - India, FR - France, GE - Germany and JP - Japan. The numbers in parentheses are *t*-statistics.
[b] The adjusted R^2 and *F*-statistic for the error-correction model are 0.075 and 2.62, respectively.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 6. Results testing the long- and short-run relationships between Pakistan and selected developed markets during July 1997 - February 2003[a]

A. Vector error-correction model estimated with Pakistan as the dependent market [b]

Lag Order (Days)	ΔPK	ΔFR	ΔGE	ΔJP	ΔUK	ΔUS
		Independent Markets				
1	0.041	0.000	0.002	0.003	-0.011	0.130
	(1.550)	(-0.023)	(0.158)	(0.787)	(-0.645)	(2.201)**
2	0.059	-0.008	0.021	-0.002	-0.019	0.069
	(2.234)**	(-0.369)	(1.399)	(-0.435)	(-1.104)	(1.064)
3	0.056	-0.012	0.009	0.000	0.015	0.033
	(2.129)**	(-0.574)	(0.606)	(-0.028)	(0.865)	(0.507)
4	-0.023	-0.013	0.017	0.002	0.017	-0.043
	(-0.881)	(-0.657)	(1.177)	(0.477)	(0.952)	(-0.670)
ECT	-0.0010					
	(-0.840)					
Intercept	0.490					
	(0.664)					

B. Pairwise Granger-causality tests based on the estimated error-correction models

Independent Markets (Lags 1 - 4)	ΔPK	ΔFR	ΔGE	ΔJP	ΔUK	ΔUS
			Dependent Markets			
			χ^2 Statistics			
ΔPK	-	7.53	0.52	4.92	6.63	1.03
ΔFR	0.75	-	2.87	8.34*	6.98	2.31
ΔGE	3.26	5.53	-	2.02	8.99*	1.67
ΔJP	1.11	9.84**	12.35**	-	16.15***	2.84
ΔUK	3.55	6.75	7.75	8.51*	-	3.27
ΔUS	6.24	166.42***	121.18***	82.37***	212.69***	-

[a] The country codes used are: PK - Pakistan, FR - France, GE - Germany and JP - Japan. The numbers in parentheses are *t*-statistics.
[b] The adjusted R^2 and *F*-statistic for the error-correction model are 0.007 and 1.39, respectively.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 7. Results testing the long- and short-run relationships between Sri Lanka and selected developed markets during July 1997 - February 2003[a]

A. Vector error-correction model estimated with Sri Lanka as the dependent market [b]

Lag Order (Days)	ΔSL	Independent Markets				
		ΔFR	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**
1	0.317	-0.009	0.004	-0.001	0.005	0.017
	(11.901)***	(-2.035)**	(1.289)	(-0.827)	(1.198)	(1.307)
2	-0.082	-0.011	0.006	0.000	0.006	0.027
	(-2.941)***	(-2.431)**	(1.795)*	(-0.327)	(1.651)*	(1.845)*
3	0.011	0.000	0.006	0.001	-0.002	0.006
	(0.394)	(0.037)	(1.768)*	(0.655)	(-0.563)	(0.441)
4	-0.005	-0.001	-0.003	-0.001	0.002	-0.004
	(-0.181)	(-0.264)	(-0.891)	(-0.786)	(0.489)	(-0.264)
5	0.103	0.001	0.001	0.000	-0.001	0.007
	(3.673)***	(0.260)	(0.307)	(-0.557)	(-0.172)	(0.502)
6	-0.031	-0.003	0.001	0.000	-0.006	0.008
	(-1.095)	(-0.614)	(0.407)	(0.610)	(-1.435)	(0.530)
7	0.048	-0.004	0.000	0.001	0.001	0.024
	(1.726)*	(-0.892)	(0.093)	(1.427)	(0.211)	(1.612)
8	-0.019	-0.004	-0.002	0.000	0.000	0.014
	(-0.696)	(-0.944)	(-0.645)	(0.012)	(0.041)	(0.989)
9	0.020	0.004	-0.001	0.001	-0.003	0.011
	(0.705)	(0.843)	(-0.168)	(0.799)	(-0.860)	(0.771)
10	0.005	-0.008	0.005	0.001	-0.001	0.032
	(0.191)	(-1.786)*	(1.603)	(1.857)*	(-0.312)	(2.307)**
ECT	-0.0020					
	(-1.602)					
Intercept	0.006					
	(0.040)					

B. Pairwise Granger-causality tests based on the estimated error-correction models

Independent Markets (Lags 1 - 10)	Dependent Markets					
	ΔSL	**ΔFR**	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**
	χ^2 *Statistics*					
ΔSL	-	7.14	5.08	12.85	8.92	5.26
ΔFR	14.84	-	13.81	14.64	12.81	13.77
ΔGE	11.01	14.76	-	8.79	17.70*	16.61*
ΔJP	8.45	10.29	14.13	-	19.36**	15.12
ΔUK	7.84	13.10	13.90	15.36	-	14.14
ΔUS	11.20	162.76***	108.83***	90.16***	196.84***	-

[a] The country codes used are: SL - Sri Lanka, FR - France, GE - Germany and JP - Japan. The numbers in parentheses are *t*-statistics.
[b] The adjusted R^2 and *F*-statistic for the error-correction model are 0.107 and 3.86, respectively.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 8. Results testing the long- and short-run relationships between India, selected developed markets and Pakistan and Sri Lanka during July 1997 - February 2003[a]

A. Vector error-correction model estimated with India as the dependent market[b]

Lag Order (Days)	ΔIN	Independent Markets ΔFR	ΔGE	ΔJP	ΔUK	ΔUS	ΔPK	ΔSL
1	0.050	0.001	0.003	-0.006	0.031	0.173	-0.005	0.124
	(1.801)*	(0.061)	(0.268)	(-2.522)**	(2.545)**	(4.294)***	(-0.294)	(1.486)
2	-0.043	0.015	-0.003	0.001	-0.009	0.008	0.008	-0.036
	(-1.573)	(1.071)	(-0.293)	(0.412)	(-0.712)	(0.188)	(0.434)	(-0.412)
3	-0.012	0.031	-0.011	0.005	-0.005	0.085	-0.018	-0.017
	(-0.447)	(2.163)**	(-1.027)	(2.082)**	(-0.378)	(1.874)*	(-0.958)	(-0.195)
4	0.052	0.000	0.003	-0.001	-0.001	-0.010	-0.013	0.087
	(1.869)*	(-0.020)	(0.255)	(-0.510)	(-0.120)	(-0.218)	(-0.737)	(0.997)
5	0.012	-0.014	0.002	0.003	0.005	0.056	-0.004	0.052
	(0.438)	(-0.972)	(0.176)	(1.150)	(0.440)	(1.229)	(-0.230)	(0.598)
6	-0.067	0.012	0.013	0.002	-0.023	-0.046	-0.002	0.051
	(-2.427)**	(0.860)	(1.273)	(0.952)	(-1.905)*	(-1.000)	(-0.123)	(0.578)
7	0.017	0.000	-0.007	-0.001	0.016	0.024	0.047	-0.038
	(0.636)	(-0.005)	(-0.674)	(-0.378)	(1.296)	(0.518)	(2.553)**	(-0.429)
8	-0.063	0.030	0.003	0.000	-0.036	0.006	0.012	0.041
	(-2.276)**	(2.133)**	(0.255)	(0.094)	(-2.944)***	(0.124)	(0.633)	(0.465)
9	0.046	0.033	-0.020	-0.002	0.004	0.033	-0.023	-0.043
	(1.685)*	(2.365)**	(-1.881)*	(-0.704)	(0.346)	(0.718)	(-1.256)	(-0.491)
10	0.080	0.002	0.004	0.003	0.006	-0.034	0.006	-0.069
	(2.925)***	(0.143)	(0.363)	(1.253)	(0.476)	(-0.740)	(0.340)	(-0.786)
11	-0.043	-0.012	0.003	-0.002	0.004	-0.078	0.015	0.099
	(-1.580)	(-0.821)	(0.279)	(-0.783)	(0.360)	(-1.719)*	(0.816)	(1.137)
12	0.014	-0.003	0.009	-0.003	0.005	0.107	0.013	-0.042
	(0.507)	(-0.240)	(0.874)	(-1.354)	(0.439)	(2.442)**	(0.712)	(-0.513)
ECT	-0.0062							
	(-1.344)							
Intercept	-0.065							
	(-0.129)							

Table 8 (Continued)

B. Pairwise Granger-causality tests based on the estimated error-correction models

Independent Markets (Lags 1 - 12)	Dependent Markets							
	ΔIN	**ΔFR**	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**	**ΔPK**	**ΔSL**
	χ^2 *Statistics*							
ΔIN	-	9.91	8.12	10.19	10.56	22.59**	14.72	10.89
ΔFR	18.33	-	15.71	19.97*	17.84	14.57	2.06	15.07
ΔGE	9.47	13.93	-	11.74	19.15*	20.92*	9.29	9.87
ΔJP	18.80*	13.86	23.41**	-	18.00	18.66*	9.01	8.18
ΔUK	23.65**	14.77	13.35	18.29	-	17.24	6.47	9.06
ΔUS	40.53***	169.56***	113.03***	101.96***	197.53***	-	11.36	10.41
ΔPK	11.14	16.50	7.00	8.81	8.69	4.94	-	11.74
ΔSL	7.27	6.73	5.19	16.70	10.71	7.57	4.26	-

[a] The country codes used are: IN - India, FR - France, GE - Germany, JP - Japan, PK - Pakistan and SL - Sri Lanka. The numbers in parentheses are *t*-statistics.
[b] The adjusted R^2 and *F*-statistic for the error-correction model are 0.071 and 2.15, respectively.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 9. Results testing the long- and short-run relationships between Pakistan, selected developed markets and India and Sri Lanka during July 1997 - February 2003[a]

A. Vector error-correction model estimated with Pakistan as the dependent market [b]

Lag Order (Days)	ΔPK	Independent Markets						
		ΔFR	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**	**ΔIN**	**ΔSL**
1	0.034	0.002	0.000	0.002	-0.009	0.115	0.032	0.172
	(1.261)	(0.123)	(-0.008)	(0.638)	(-0.489)	(1.961)**	(0.817)	(1.414)
2	0.053	-0.005	0.018	-0.002	-0.016	0.051	-0.002	0.099
	(1.994)**	(-0.221)	(1.192)	(-0.441)	(-0.914)	(0.789)	(-0.054)	(0.784)
3	0.046	-0.007	0.006	-0.001	0.015	0.020	0.057	0.100
	(1.733)*	(-0.361)	(0.397)	(-0.162)	(0.864)	(0.305)	(1.455)	(0.791)
4	-0.028	-0.011	0.014	0.002	0.015	-0.060	0.003	-0.063
	(-1.054)	(-0.550)	(0.975)	(0.465)	(0.886)	(-0.947)	(0.066)	(-0.525)
ECT	0.00004							
	(0.484)							
Intercept	0.514							
	(0.697)							

Table 9 (Continued)

B. Pairwise Granger-causality tests based on the estimated error-correction models

Independent Markets (Lags 1 - 4)	**Dependent Markets**							
	ΔPK	**ΔFR**	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**	**ΔIN**	**ΔSL**
	χ^2 *Statistics*							
ΔPK	-	6.61	0.51	5.26	6.43	1.27	1.42	8.29
ΔFR	0.44	-	3.04	9.63**	6.56	2.32	6.08	6.82
ΔGE	2.34	5.61	-	2.11	9.01*	1.98	1.19	4.35
ΔJP	0.90	9.62**	12.07**	-	14.78***	2.96	9.67**	1.74
ΔUK	2.79	6.67	7.30	8.60*	-	3.96	7.85*	5.97
ΔUS	5.52	168.40***	116.86***	83.93***	213.11***	-	27.10***	3.05
ΔIN	2.67	2.85	4.15	1.61	2.84	3.97	-	3.32
ΔSL	4.85	1.76	2.23	2.00	4.05	2.58	2.58	-

[a] The country codes used are: PK - Pakistan, FR - France, GE - Germany, JP - Japan, IN - India and SL - Sri Lanka. The numbers in parentheses are *t*-statistics.
[b] The adjusted R^2 and *F*-statistic for the error-correction model are 0.006 and 1.28, respectively.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.

Table 10. Results testing the long- and short-run relationships between Sri Lanka, selected developed markets and India and Pakistan during July 1997 - February 2003[a]

A. Vector error-correction model estimated with Sri Lanka as the dependent market [b]

Lag Order (Days)	ΔSL	Independent Markets ΔFR	ΔGE	ΔJP	ΔUK	ΔUS	ΔIN	ΔPK
1	0.308	-0.009	0.004	-0.001	0.007	0.011	0.006	0.007
	(11.432)***	(-2.095)**	(1.136)	(-0.847)	(1.684)*	(0.853)	(0.692)	(1.124)
2	-0.087	-0.011	0.006	0.000	0.008	0.020	0.015	0.007
	(-3.088)***	(-2.426)**	(1.672)*	(-0.344)	(1.941)*	(1.346)	(1.649)*	(1.126)
3	0.003	0.000	0.006	0.001	-0.002	-0.001	0.004	0.008
	(0.118)	(0.019)	(1.653)*	(0.758)	(-0.401)	(-0.054)	(0.401)	(1.330)
4	-0.011	-0.001	-0.003	-0.001	0.002	-0.010	0.001	0.005
	(-0.377)	(-0.286)	(-0.816)	(-0.797)	(0.614)	(-0.682)	(0.129)	(0.809)
5	0.098	0.001	0.001	0.000	0.000	0.002	-0.011	0.005
	(3.454)***	(0.219)	(0.200)	(-0.576)	(0.114)	(0.134)	(-1.205)	(0.866)
6	-0.036	-0.003	0.000	0.000	-0.004	0.006	0.000	0.003
	(-1.282)	(-0.574)	(0.139)	(0.481)	(-1.020)	(0.378)	(-0.043)	(0.552)
7	0.043	-0.003	-0.001	0.001	0.001	0.019	0.009	-0.004
	(1.540)	(-0.638)	(-0.152)	(1.222)	(0.312)	(1.294)	(1.030)	(-0.659)
8	-0.025	-0.003	-0.003	0.000	0.000	0.011	-0.001	-0.001
	(-0.878)	(-0.616)	(-0.904)	(0.076)	(0.092)	(0.756)	(-0.112)	(-0.155)
9	0.017	0.004	-0.001	0.001	-0.003	0.010	0.007	0.006
	(0.591)	(0.898)	(-0.365)	(0.632)	(-0.714)	(0.675)	(0.773)	(1.082)
10	0.000	-0.009	0.005	0.001	0.000	0.030	0.009	0.007
	(0.018)	(-1.971)**	(1.480)	(1.576)	(-0.107)	(2.139)**	(1.051)	(1.154)
ECT	-0.0006							
	(-0.976)							
Intercept	-0.016							
	(-0.100)							

Table 10 (Continued)

B. Pairwise Granger-causality tests based on the estimated error-correction models

Independent Markets (Lags 1 - 10)	Dependent Markets							
	ΔSL	**ΔFR**	**ΔGE**	**ΔJP**	**ΔUK**	**ΔUS**	**ΔIN**	**ΔPK**
	χ^2 Statistics							
ΔSL	-	6.16	4.60	11.82	7.45	5.00	4.65	5.69
ΔFR	14.94	-	14.22	15.97	12.99	13.27	16.99*	1.37
ΔGE	9.94	13.31	-	11.25	16.59*	17.65*	9.17	6.24
ΔJP	6.95	9.02	13.99	-	18.03*	15.21	14.76	3.17
ΔUK	8.64	13.91	14.94	17.06*	-	17.10*	25.61***	4.64
ΔUS	8.70	171.46***	105.71***	101.79***	199.35***	-	30.33***	9.56
ΔIN	7.45	9.64	7.18	7.23	8.01	16.30*	-	10.69
ΔPK	10.27	15.47	6.79	7.90	8.80	4.29	9.09	-

[a] The country codes used are: SL - Sri Lanka, FR - France, GE - Germany, JP - Japan, IN - India and PK - Pakistan. The numbers in parentheses are *t*-statistics.
[b] The adjusted R^2 and *F*-statistic for the error-correction model are 0.105 and 3.11, respectively.
* Significant at the 10% level.
** Significant at the 5% level.
*** Significant at the 1% level.