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Response Asymmetries in the Linkage of Asean-5 Equity Prices

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Abstract: The paper extends the analysis of the linkage among ASEAN-5 markets to allow for possible asymmetric responses of an ASEAN market to innovations in other ASEAN markets and the US market. Our results suggest that, while there is lack of cointegration or long run co-movements among the ASEAN and US markets, there seems to be substantial short run interactions among them. Central to our analysis, there is some evidence for both magnitude and pattern asymmetries in the movements of ASEAN markets. We document evidence for stronger reaction to market downturns than to market upturns, which is more apparent in the less developed markets of Indonesia and the Philippines. These results have the following implications: first, it pays to diversify in the ASEAN markets for those who have long term investment horizons. Second, the benefits of international portfolio diversification in these markets in the short run are, however, greatly limited. Indeed, these benefits may not be forthcoming when they are mostly needed, i.e. during market downturns. Lastly, international market downturns tend to be more contagious compared to market upturns.

Keywords: ASEAN-5, response asymmetries, market downturns, international diversifications, stock markets, composite index

1. Introduction

Due to its important implications on benefits of international portfolio diversification and financial integration across nations, the linkage among national stock markets is a subject that has motivated a great deal of empirical research. While early studies document evidence indicating low correlations among national stock returns (Grubel 1968; Levy and Sarnat 1970; Lessard 1973; Solnik 1974), more recent studies tend to suggest increasing interactions among them especially after the October 1987 global market crash (Lee and Kim 1993; Arshanapalli and Doukas 1993; Meric and Meric 1997). Accordingly, the noted benefits of international diversification have been greatly undermined. Moreover, increasing integration among national markets means that international financial disturbances are easily transmitted to domestic financial markets, a phenomenon known as "financial contagion".

Recently, Pagan and Soydemir (2001) contend that national stock markets may not react in the same way to upturns and downturns in other markets. More specifically, this so-called "response asymmetry" by Pagan and Soydemir (2001) suggests stronger reaction of a national market to market downturns than to market upturns in other equity markets. According to them, the presence of asymmetric responses arises from "optimism or pessimism" of investors who, being risk averse, are more concerned about losing their investments during periods of negative returns than gaining during periods of positive returns. Additionally, the differences in market reaction to positive and negative changes in other

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markets may be due to investors' different expectations about the impact of international market changes (see also Erb *et al.* 1994; Bahng and Shin 2003). Looking at Latin American markets, Pagan and Soydemir (2001) found strong evidence for asymmetric responses of the markets for Brazil, Argentina and Chile to the Mexican equity market. Namely, in line with their contention, these markets respond more strongly (magnitude-wise) and more persistently (pattern-wise) to downturns than to upturns in the Mexican market. More recently, Bahng and Shin. (2003) also documented evidence supportive of asymmetric responses among the northeast Asian markets of China, Japan and South Korea.

In this paper, we extend the analysis of response asymmetry to another group of markets, namely, the markets of the five founding members of the Association of Southeast Asian Nations (ASEAN). These ASEAN-5 markets include the equity markets of Indonesia, Malaysia, the Philippines, Singapore and Thailand. Several studies on the ASEAN markets have focused on the causal nexus among the ASEAN markets to assess the degree of their financial integration and benefits of international diversification in these markets (see, for instance Palac-McMiken 1997; Roca *et al.* 1998; Azman-Saini *et al.* 2002; Daly 2003). The common feature in these studies is the assumption of symmetric responses of a market to positive and negative returns of other markets. This assumption, however, can be restrictive. Thus, taking the lead from Pagan and Soydemir (2001), a new perspective is adopted to look at the benefits of international diversification by considering response asymmetries. Namely, if the ASEAN markets respond more strongly to market downturns, then the arguments for potential benefits of international portfolio diversification may be greatly weakened since it is during times of market downturns that these benefits are mostly needed.

The rest of the paper is structured as follows. The next section outlines the empirical approach. Section 3 details the data and presents the preliminary analyses. Section 4 presents results of the estimation. Section 5 concludes and offers some implications.

2. Empirical Approach

Following the footsteps of Pagan and Soydemir (2001), we adopted simple regression and VAR models to capture respectively the magnitude and pattern of asymmetric responses of an ASEAN market to other ASEAN markets. Acknowledging the dominant role of the US in global financial markets, we also added the US equity prices in the analysis. More specifically, to evaluate magnitude asymmetry, we implemented the following regression:

$$DX_t = \alpha_0 + \alpha_1 DYPOS_t + \alpha_2 DYNEG_t + \alpha_3 DSPPOS_t + \alpha_4 DSPNEG_t + e_t \quad (1)$$

where DX_t, DY_t and DSP_t are respectively logarithmic changes of two ASEAN market indexes (X and Y) and US market index or, in short, their index returns. The suffixes, *POS* and *NEG*, refer to upturns and downturns of the market calculated as

$$DPPOS = \max(0, 1\mathrm{n}(P_t/P_{t-1}))$$
$$DPNEG = \min(0, 1\mathrm{n}(P_t/P_{t-1}))$$

where $P = (Y \text{ or } SP)$. Based on equation (1), we tested whether the individual ASEAN market responded differently to market upturns and downturns of another ASEAN market and of the US market. The "magnitude" asymmetry was examined by testing the hypotheses H_0: $\alpha_1 = \alpha_2$ and H_0: $\alpha_3 = \alpha_4$ using Wald F-test.

Then, we applied a vector autoregressive (VAR) model to examine "pattern" asymmetry in the responses of ASEAN markets. Essentially, the VAR model is a system of reduced-form equations treating all variables in the system as potentially endogenous. Its main advantage is that it captures empirical regularities in the data with minimal theoretical restrictions imposed on the system. The model is appropriate when theories are unclear about causal patterns among variables of interest and yet these causal patterns need to be empirically uncovered. Basically, the VAR model is formulated as follows:

$$Z_t = A_0 + \sum_{k=1}^{p} A_k Z_{t-k} + e_t \qquad (2)$$

where Z_t is a 6 x 1 vector of the variables consisting of positive and negative returns of two ASEAN markets under consideration and positive and negative returns of the US markets. That is, $Z = (DXPOS, DXNEG, DYPOS, DYNEG, DSPPOS, DSPNEG)$. A_0 is a 6 x 1 vector of constant terms, A_k is a 6 x 6 matrix of coefficients, e_t is a 6 x 1 vector of error terms with zero mean, and p is the order of autoregression.

While model estimation is based on (2), its coefficient estimates are not very useful for inferences. Normally, interpretation of the VAR is based on its moving average representation. By inverting or successive substitution, VAR model (2) has a moving average representation as follows:

$$Z_t = B + \sum_{k=0}^{\infty} B_k e_{t-k} . \qquad (3)$$

Thus, Z_t is expressed as a linear combination of current and past innovations. From the model, impulse-response functions can then be generated. Essentially, the impulse response functions (IRF) trace the directional responses of a variable to a one-standard deviation shock in other variables. Thus, from the IRF, we can note both the magnitude and persistence of ASEAN equity market responses to upturns and downturns in other markets.

At this juncture, three empirical issues need to be highlighted. First, in modeling time series data, it is now imperative to assess *a priori* the data stochastic properties. Namely, we need to establish the order of integration for all equity indexes to classify whether they are stationary or non-stationary. Then, if they are non-stationary with the same order of integration, we need to establish whether they share a long run equilibrium path. Briefly stated, a variable is said to be integrated of order d, written I(d), if it needs differencing d times to achieve stationarity. The variable is non-stationary if it is integrated of order 1 or higher. A set of non-stationary variables, which is normally I(1), is said to share a long run equilibrium path or is cointegrated if its linear combination is stationary. Thus, in the paper, we first subjected each time series to augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests to determine the variables' stationarity property. Then, we applied the multivariate cointegration test suggested by Johansen (1988) and Johansen and Juselius

(1990) to see whether they were cointegrated.[1] It needs mentioning that the appropriateness of specification Eqn. (2) requires non-stationarity and non-cointegration which, as will be reported later, we find to be the case among share prices under consideration.

Second, in implementing Eqn. (2), we need to specify the lag order of VAR. As a rule, the lag length should not be set arbitrarily since it may lead to bias or inefficiency in the estimation. More specifically, setting the lag length shorter than the optimal lag order leads to omitted variable bias. Meanwhile, the lag length that is too long results in inefficient estimates. In the literature, various information criteria have been suggested for selecting the lag order of VAR. However, Hall (1989) and Johansen (1992) argue that it should be set such that the error terms are serially uncorrelated. Accordingly, instead of using any information criteria, we followed the suggestion made by Hall (1989) and Johansen (1992).

Lastly, the innovations in Eqn. (3) may be contemporaneously correlated. This means that shocks in one variable may work through the contemporaneous correlation with innovations in other variables. Since isolated shocks to individual variables can not be identified due to contemporaneous correlation, the responses of variable to innovations in another variable of interest can not be adequately represented (Lutkepohl 1991). The common approach to solving this identification problem is to employ Sims' (1980) empirical strategy by orthogonalising the innovations using the so-called Cholesky factorisation. The approach, however, requires a pre-specified causal ordering of the variables, which turns out to be its major disadvantage. Namely, the results from impulse response analysis may be sensitive to the ordering of variables particularly when contemporaneous correlations of error terms in the VAR are high. In our case, we noted that the error terms were significantly contemporaneously correlated especially between the ASEAN markets. This means that the use of traditional Cholesky factorisation as suggested by Sims (1980) in generating the impulse response functions would not be appropriate.

In this paper, we adopted the generalised impulse response functions developed by Pesaran and Shin (1998). As noted by Pesaran and Shin (1998), the generalisd impulse response functions fully accounted for the historical patterns of correlations among the different shocks. Accordingly, they are unique and invariant to alternative orderings of the variables in the system. The other advantage of the generalised impulse responses is that, since the error structure is not orthogonalised, the initial impact response of a variable to various shocks can be examined. As stressed by Ewing *et al.* (2003), this feature of the generalised impulse responses is particularly useful for studies of equity markets, which are generally characterised by quick price transmissions and adjustments.

3. Data

The data utilised in the analysis were monthly covering the period from January 1988 to December 2003. While it may be argued that using higher frequency data such as daily or weekly data can better capture dynamic interactions among equity markets, high frequency data contain too much noise and are subject to the problems of non-synchronous and infrequent trading. These problems might lead to erroneous conclusions in the lead-lag relationships among the variables. Moreover, the problem of day-of-the-week effects is

[1] These tests are now standard and readers may refer to their original papers for details.

Table 1. Unit root and co-integration tests

(a) Unit Root Tests

	ADF Test		PP Test	
Variables	*Z*	*DZ*	*Z*	*DZ*
JSE	−3.899**	—	−3.704**	—
KLCI	−2.555	−4.836*	−2.424	−12.50*
PSE	−1.867	−12.06*	−1.700	−11.99*
STI	−2.514	−12.99*	−2.570	−13.00*
SET	−2.034	−12.49*	−2.187	−12.48*
SP	−1.037	−14.43*	−0.974	−14.43*

(b) Co-integration Test (Trace Statistics)

		Null Hypothesis	
System	$r = 0$	$r \leq 1$	$r \leq 2$
KLCI, PSE, SP	20.97	10.20	2.34
KLCI, STI, SP	29.63	11.39	2.11
KLCI, SET, SP	18.89	9.36	1.76
PSE, STI, SP	23.79	9.85	2.18
PSE, SET, SP	18.92	8.58	2.77
STI, SET, SP	19.42	9.75	1.01
1% Critical Values	35.65	20.04	6.65
5% Critical Values	29.68	15.41	3.76

generally inherent in the daily data. For weekly data, we needed to select a day of the week to represent weekly prices. Though there seems to be a general guide in the literature for the purpose, the presence of different holidays across countries complicates the matter. Lastly, by using monthly data, we examined the relations of trend decline or increase over a one-month horizon between the markets. Thus, it complements existing studies that look at day-to-day ups and downs in the markets. Having said these, the transmission of shocks may take place within a few days and, thus, cannot be fully captured by employing monthly data. This point needs to be taken into account when interpreting the results.

As noted, the ASEAN markets considered in this paper were those of the five founding members of ASEAN, namely, Indonesia, Malaysia, the Philippines, Singapore and Thailand. The following indexes were used to represent these markets: the Jakarta Composite Index for Indonesia (JSE), the Kuala Lumpur Composite Index (KLCI) for Malaysia, the PSE Composite Index for the Philippines (PSE), the Straight Times Index for Singapore (STI), and the SET Index for Thailand (SET). We used the Standard & Poor's Composite Index (S & P 500) to represent the US market.[2] These indexes were expressed in natural logarithm.

[2] Data on these indexes were obtained from *www.econstats.com*.

Table 2. Correlations of market upturns and downturns

	DJSE	DKLCI	DPSE	DSTI	DSET	DSP
DJSE	—	0.216	0.289	0.253	0.225	0.066
DKLCI	**0.588**	—	0.473	0.656	0.474	0.281
DPSE	**0.536**	**0.610**	—	0.612	0.541	0.235
DSTI	**0.480**	**0.666**	0.588	—	0.517	0.408
DSET	**0.579**	**0.627**	**0.623**	**0.659**	—	0.336
DSP	**0.444**	**0.447**	**0.477**	**0.568**	**0.408**	—

We formed ten trivariate systems of equity prices consisting of two ASEAN markets and the US market. Table 1 report results from Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests and Johansen-Juselius multivariate co-integration test. As may be observed from the table, except for JSE, all market indexes are non-stationary in level but stationary in first difference. That is, they are integrated of order 1. JSE, however, is found to be stationary in level. Accordingly, we proceeded to the co-integration test only for the sets of non-stationary variables. The results suggest that they are not co-integrated. This finding of non-co-integration conforms well to those documented by Roca *et al.* (1998) using weekly data and Daly (2003) using daily data. More importantly, it justifies specifying VAR model using variables in first difference such as in Eqn. (2).

To preliminarily assess possible asymmetry in the linkage of ASEAN and US markets, we computed simple correlation co-efficients between pairs of the markets for both positive and negative returns. These co-efficients are presented in Table 2. The upper diagonal of the table contains correlation coefficients for market upturns. Meanwhile, the lower diagonal provides correlation co-efficients for market downturns. The co-efficients seem to provide a clear indication of possible asymmetry in the interactions between the markets. Namely, we note that, except for one, the correlation between pairs of the markets is higher during market downturns. This result motivated us to proceed to more standard methods to assess magnitude and pattern asymmetries in the interactions between ASEAN markets and between an ASEAN and US markets.

4. Results

4.1 Magnitude Asymmetry

We estimated the regression model (1) to formally examine the presence of magnitude asymmetry in the relations between an ASEAN market and another ASEAN market and the US market. Table 3 presents the results from estimating (1). As may be observed from the table, the explanatory power of the model, i.e. R^2, ranges from 0.18 for Indonesia to as high as 0.56 for Singapore. This is satisfactory given that the variables are in first difference. Moreover, the *F*-statistics (not reported here) suggest the adequacy of the model in explaining the variations in the ASEAN market returns. The null hypothesis that the slope coefficients jointly equal zero is rejected at better than 1 per cent level of significance.

From Table 3(a), we find strong evidence for the presence of magnitude asymmetry for the market of Indonesia. Notably, the coefficient estimates suggest significant influences of downturns in other markets on the Indonesian share prices. While PSE and STI positive returns are also significant at 5 per cent significance level, market upturns in Malaysia and Thailand do not seem to be significantly associated with variations in the Indonesian market returns. More interestingly, the US market upturns are not significant in all regression equations for Indonesia. The Wald *F*-statistics confirm that the Indonesian market is more strongly related to market downturns than to market upturns especially in the markets of US, Malaysia and Thailand. For the Malaysian market, presented in Table 3(b), the co-efficients of positive and negative returns in other ASEAN markets are significant at conventional levels as suggested by the *t*-ratios. However, from the Wald *F*-test, there is no indication of magnitude asymmetry in the KLCI returns. Note that, while the Malaysia share price is significantly related to the US market downturns, there is again no indication of magnitude asymmetry in the relation between Malaysia and the US.

Turning to Table 3(c), we note generally similar results in that the market of the Philippines is related significantly and symmetrically to positive and negative returns in other ASEAN markets. In line with the Indonesian case, we also documented some evidence for magnitude asymmetry in the PSE returns. More specifically, in two regressions, the Wald *F*-tests rejected the null hypothesis of symmetric relation between the Philippine market and the US market. Like other ASEAN markets, the markets of Singapore and Thailand are also related significantly to upturns and downturns in other ASEAN markets (Figure 3(d) and 3(e)). Likewise, the co-efficients of both US positive and negative returns are significantly different from zero in the regressions for Singapore and Thailand. Testing the equality between the co-efficients of positive and negative returns, however, we found very limited evidence for magnitude asymmetry.

4.2 *Pattern Asymmetry*

To further evaluate the presence of asymmetric responses, we estimate 10 trivariate VAR systems consisting of all possible pairs of the ASEAN market plus the US market. The results of VAR are summarised in Figures 1 to 6. Figures 1 to 5 capture the responses of each ASEAN market to positive and negative return innovations in other ASEAN markets. Meanwhile, Figure 6 plots the responses of each ASEAN market to shocks in the US market.[3] These figures are discussed in turn.

The impulse response functions for Indonesia, reported in Figure 1, further reaffirm asymmetric responses of the Indonesian market to innovations in other ASEAN markets. Note that both positive and negative return innovations in other ASEAN markets led to significant reaction from the Indonesian market. However, the negative impulses seemed to result in more persistent responses. Notably, while the responses to positive return innovations in other ASEAN markets were significant at a 1-month horizon and subsided to zero beyond 1 month, the significant responses to negative return innovations lasted over 2-3 months. The results for Malaysia, however, do not seem to portray uniform pattern of

[3] Note that the US returns enter in all VAR systems. Accordingly, we have four sets of responses of an ASEAN market to the US market. We note that the pattern of responses is similar in all sets. Accordingly, to conserve space, we report only the responses to US shocks from one VAR model for each ASEAN market.

Table 3. Estimation results of magnitude asymmetry

(a) Indonesia

	Co-efficient Estimates						Null Hypothesis	
Y	Constant	DYPOS	DYNEG	DSPPOS	DSPNEG	R^2	$a_1 = a_2$	$a_3 = a_4$
KLCI	0.040	0.130	0.746	–0.118	0.766	0.233	6.026	2.607
	(0.001)	(0.379)	(0.000)	(0.708)	(0.023)		(0.015)	(0.108)
PSE	0.034	0.289	0.611	–0.183	0.719	0.251	2.235	2.781
	(0.006)	(0.028)	(0.000)	(0.554)	(0.033)		(0.155)	(0.097)
STI	0.033	0.371	0.512	–0.394	0.904	0.180	0.232	5.142
	(0.008)	(0.044)	(0.008)	(0.242)	(0.014)		(0.630)	(0.024)
SET	0.044	0.145	0.612	–0.261	0.843	0.249	5.213	4.332
	(0.001)	(0.243)	(0.000)	(0.408)	(0.009)		(0.023)	(0.039)

Note: All figures are estimated co-efficients of equation (1) except for the last two columns, which present Wald *F*-test statistics for the stated null. Numbers in parentheses are *p*-values.

(b) Malaysia

	Co-efficient Estimates						Null Hypothesis	
Y	Constant	DYPOS	DYNEG	DSPPOS	DSPNEG	R^2	$a_1 = a_2$	$a_3 = a_4$
JSE	0.012	0.137	0.428	0.446	0.641	0.272	3.880	0.219
	(0.212)	(0.076)	(0.000)	(0.061)	(0.013)		(0.050)	(0.640)
PSE	0.006	0.414	0.440	0.267	0.534	0.361	0.025	0.455
	(0.475)	(0.000)	(0.000)	(0.236)	(0.030)		(0.873)	(0.501)
STI	0.007	0.824	0.668	–0.181	0.324	0.463	0.695	1.902
	(0.389)	(0.000)	(0.000)	(0.400)	(0.165)		(0.405)	(0.169)
SET	0.014	0.328	0.490	0.135	0.568	0.383	1.213	1.300
	(1.612)	(0.000)	(0.000)	(0.550)	(0.014)		(0.272)	(0.256)

Note: All figures are estimated co-efficients of equation (1) except for the last two columns, which present Wald *F*-test statistics for the stated null. Numbers in parentheses are *p*-values.

(c) Philippines

	Co-efficient Estimates						Null Hypothesis	
Y	Constant	DYPOS	DYNEG	DSPPOS	DSPNEG	R^2	$a_1 = a_2$	$a_3 = a_4$
JSE	0.009	0.256	0.436	0.368	0.859	0.302	1.210	1.130
	(0.380)	(0.003)	(0.000)	(0.161)	(0.003)		(0.273)	(0.289)
KLCI	0.013	0.430	0.658	0.165	0.724	0.373	1.274	1.593
	(0.188)	(0.000)	(0.000)	(0.517)	(0.008)		(0.261)	(0.208)
STI	0.008	0.915	0.627	–0.312	0.622	0.430	1.748	4.802
	(0.411)	(0.000)	(0.000)	(0.214)	(0.023)		(0.188)	(0.030)
SET	0.016	0.409	0.526	–0.001	0.781	0.396	0.513	3.398
	(0.118)	(0.000)	(0.000)	(0.995)	(0.003)		(0.474)	(0.067)

Note: All figures are estimated co-efficients of equation (1) except for the last two columns, which present Wald *F*-test statistics for the stated null. Numbers in parentheses are *p*-values.

(d) Singapore

	Co-efficient Estimates						Null Hypothesis	
Y	Constant	DYPOS	DYNEG	DSPPOS	DSPNEG	R^2	$a_1 = a_2$	$a_3 = a_4$
JSE	0.001	0.135	0.202	0.745	0.924	0.370	0.311	0.280
	(0.927)	(0.031)	(0.020)	(0.000)	(0.000)		(0.578)	(0.597)
KLCI	–0.001	0.465	0.467	0.537	0.656	0.558	0.0002	0.173
	(0.812)	(0.000)	(0.000)	(0.001)	(0.000)		(0.989)	(0.678)
PSE	–0.004	0.433	0.327	0.577	0.692	0.525	0.730	0.152
	(0.532)	(0.000)	(0.000)	(0.001)	(0.000)		(0.394)	(0.697)
SET	0.011	0.160	0.476	0.574	0.678	0.506	7.663	0.124
	(0.109)	(0.022)	(0.000)	(0.001)	(0.000)		(0.006)	(0.725)

Note: All figures are estimated co-efficients of equation (1) except for the last two columns, which present Wald *F*-test statistics for the stated null. Numbers in parentheses are *p*-values.

(e) Thailand

	Co-efficient Estimates						Null Hypothesis	
Y	Constant	DYPOS	DYNEG	DSPPOS	DSPNEG	R^2	$a_1 = a_2$	$a_3 = a_4$
JSE	0.006	0.177	0.590	0.827	0.609	0.308	5.344	0.188
	(0.590)	(0.057)	(0.000)	(0.004)	(0.051)		(0.022)	(0.665)
KLCI	0.004	0.492	0.751	0.585	0.504	0.395	1.418	
	(0.733)	(0.000)	(0.000)	(0.034)	(0.084)		(0.235)	(0.865)
PSE	–0.003	0.563	0.551	0.580	0.520	0.399	0.004	0.016
	(0.803)	(0.000)	(0.000)	(0.033)	(0.078)		(0.949)	(0.898)
STI	0.002	0.802	0.724	0.190	0.430	0.384	0.098	0.244
	(0.872)	(0.000)	(0.000)	(0.505)	(0.165)		(0.755)	(0.622)

Note: All figures are estimated co- efficients of equation (1) except for the last two columns, which present Wald *F*-test statistics for the stated null. Numbers in parentheses are *p*-values.

responses to other ASEAN market fluctuations (Figure 2). As may be observed from Figure 2, the responses of Malaysian market to innovations in positive returns of the Indonesian and the Philippine markets were significant over 2- and 3-month horizons respectively. In contrast, the negative returns in these two ASEAN markets exerted immediate impact on the Malaysian market at a 1-month horizon but had no significant influence thereafter. We also note from Figure 2 that the responses of the Malaysian market to shocks coming from Singapore and Thailand, either their upturns or downturns, are more persistent lasting over a 3-month horizon. There seems to be some evidence that the reaction of the Malaysian market to Singapore market downturns is more persistent than its reaction to Singapore market upturns.

Turning to the case of the Philippines (Figure 3), we noted some evidence for the pattern asymmetry in the responses of the Philippine market to other ASEAN markets. More specifically, the responses to market downturns of Malaysia and Thailand were more

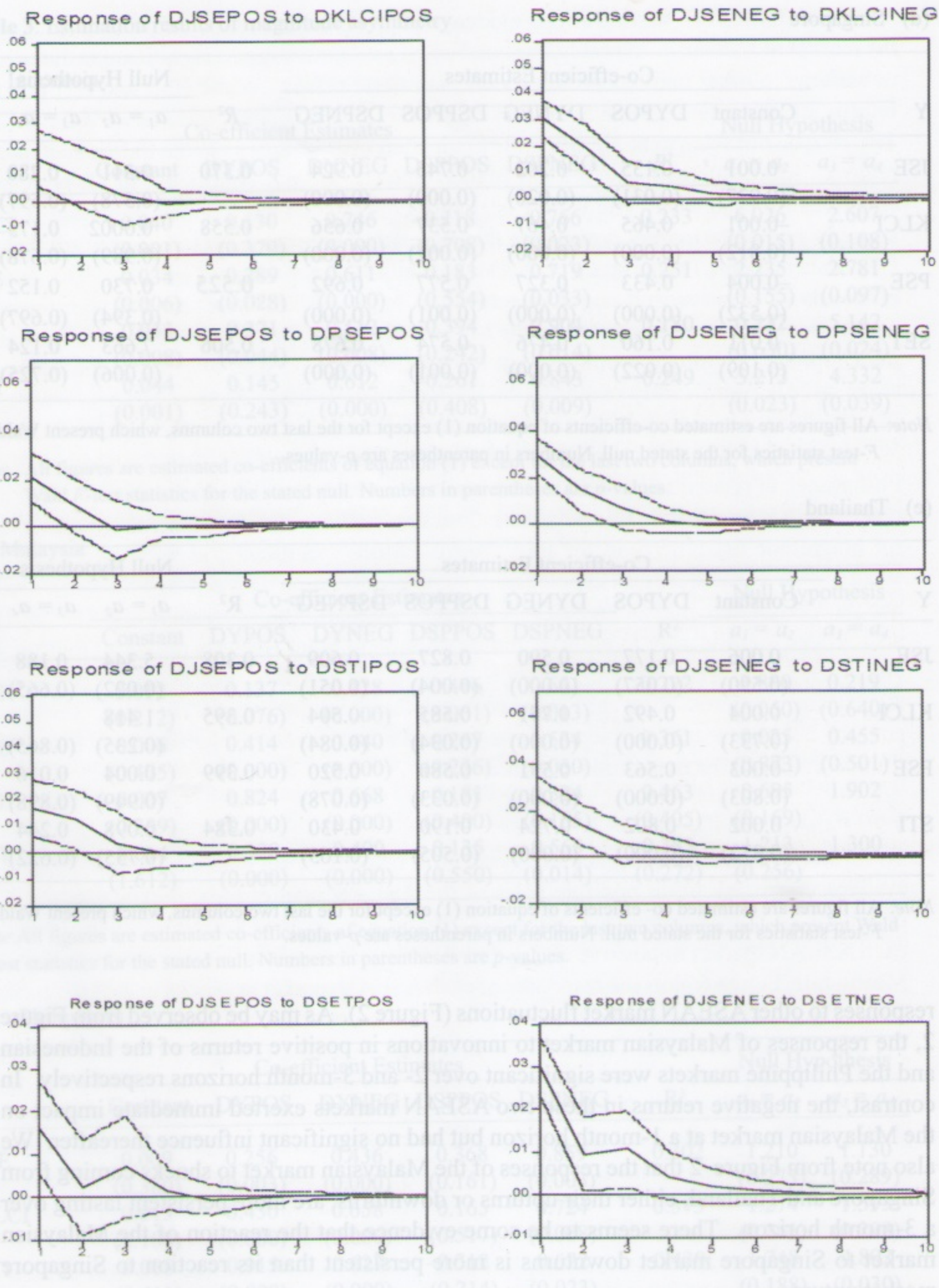

Figure 1. Impulse response functions of JSE to ASEAN shocks

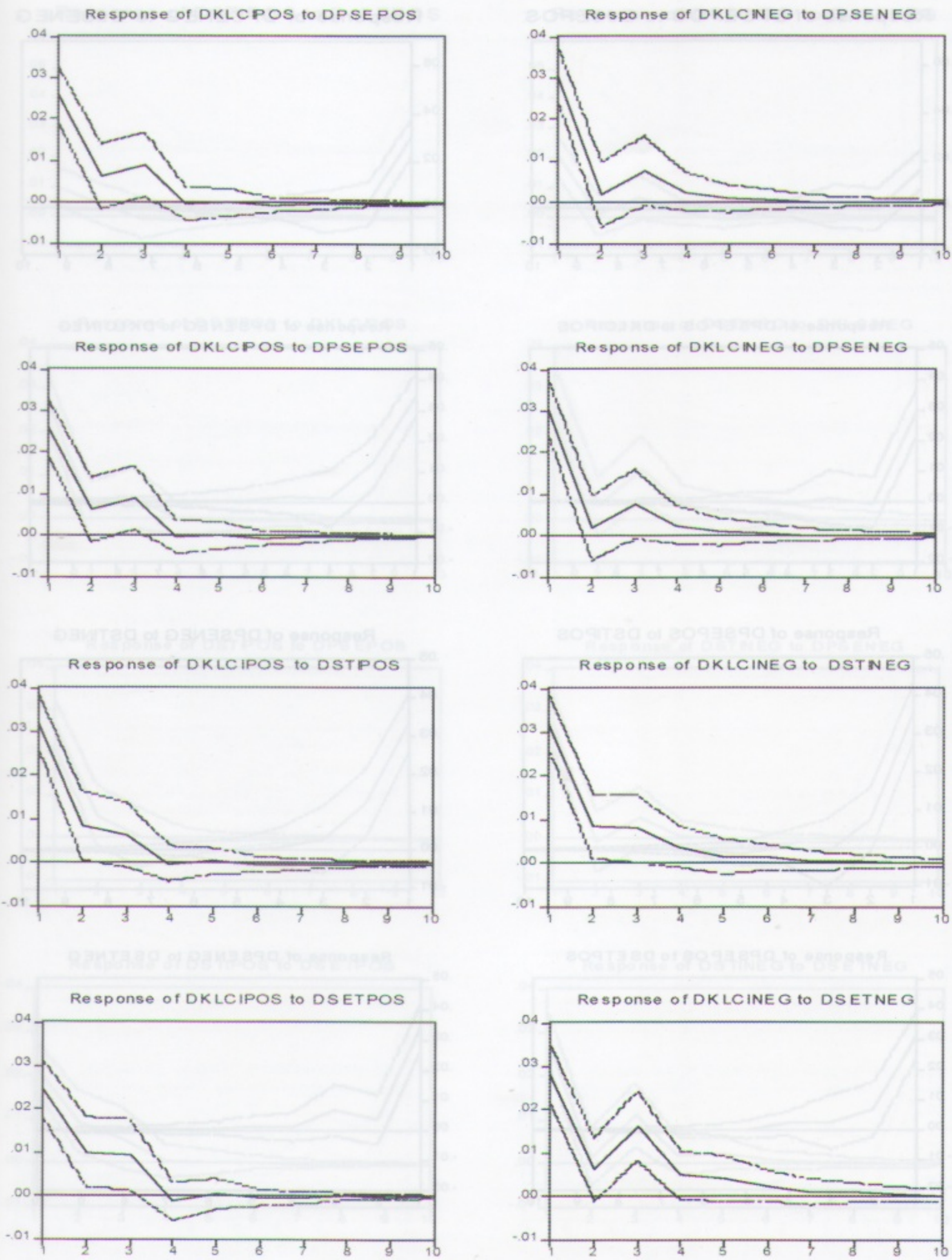

Figure 2. Impulse response functions of KLCI to ASEAN shocks

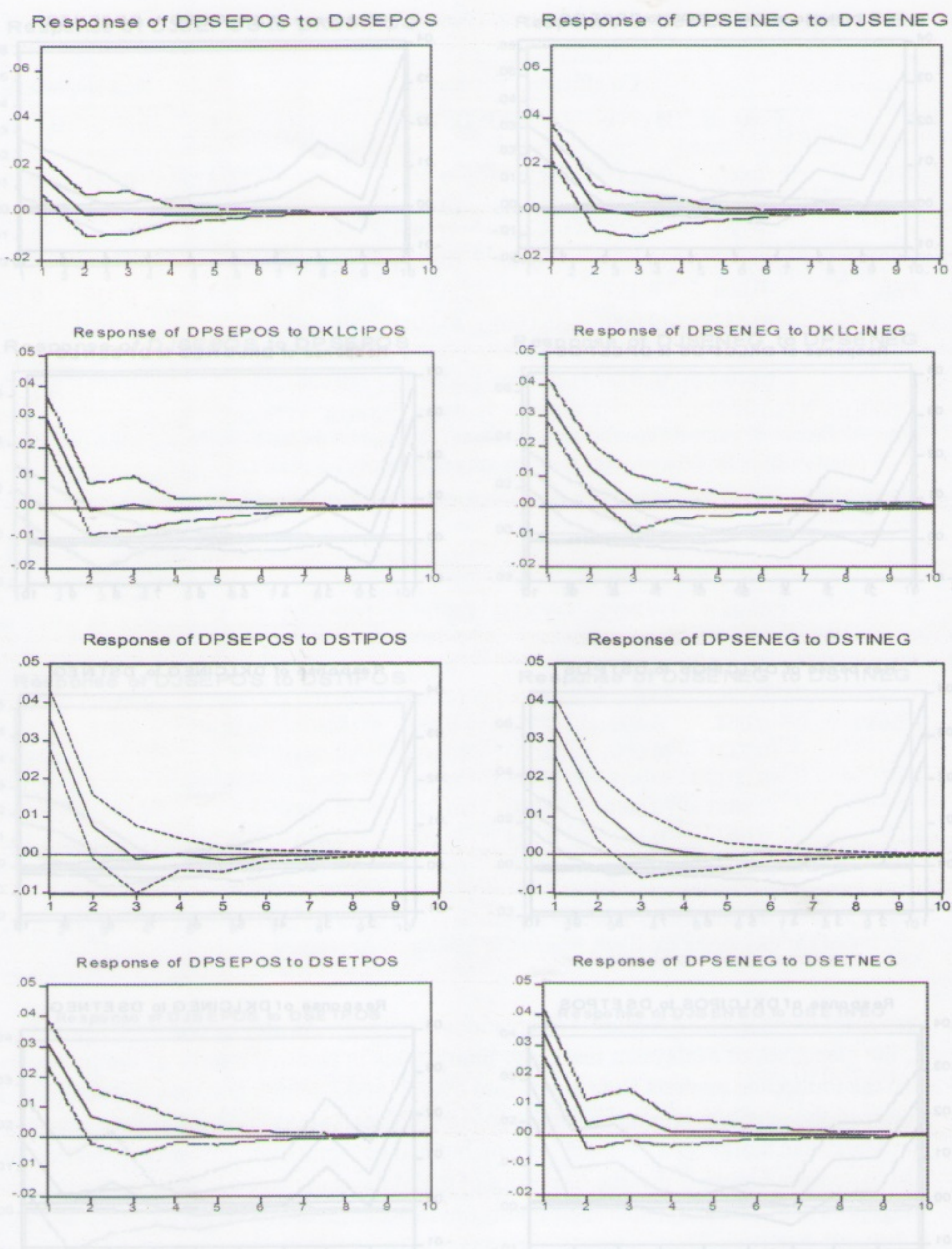

Figure 3. Impulse response functions of PSE to ASEAN shocks

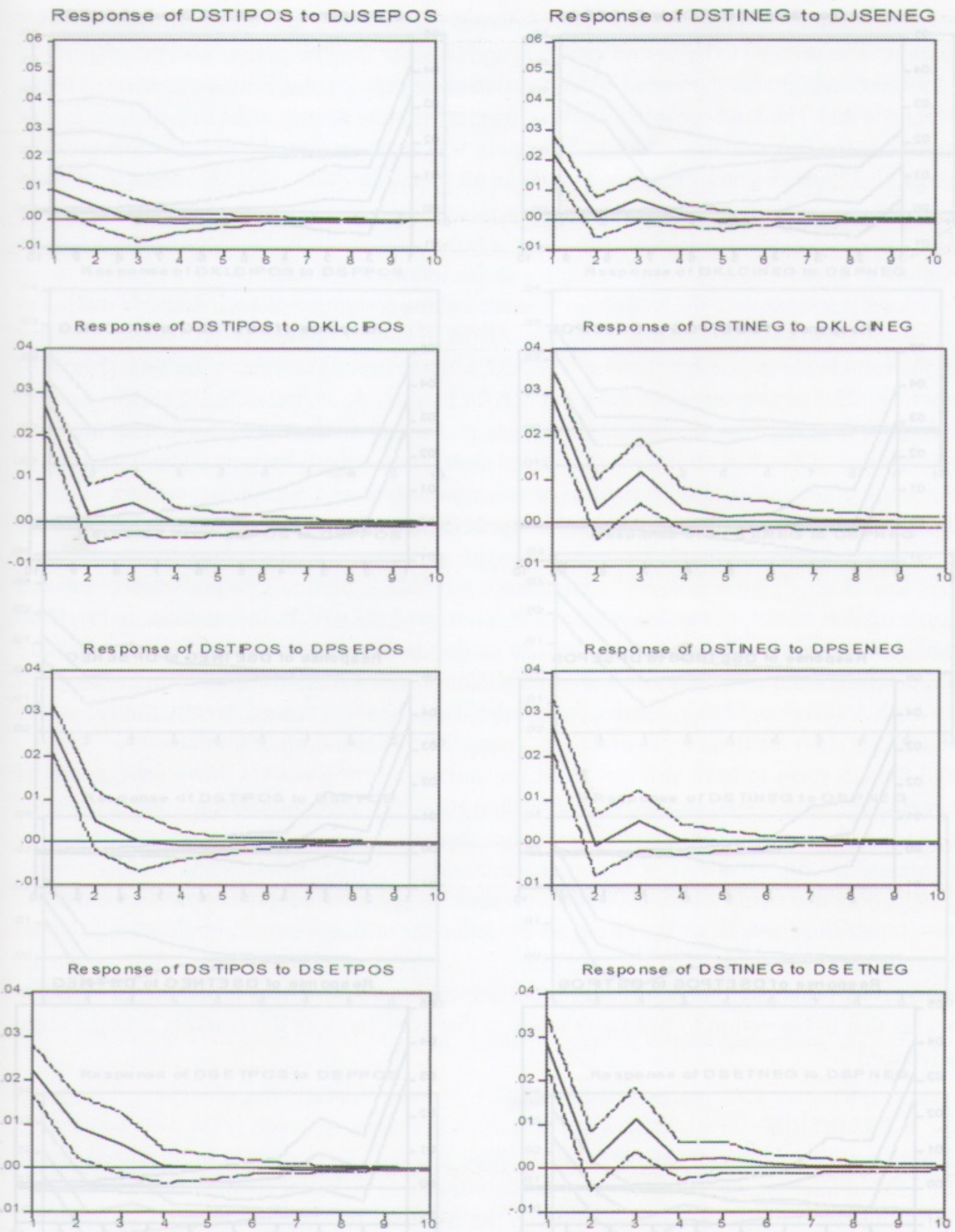

Figure 4. Impulse response functions of STI to ASEAN shocks

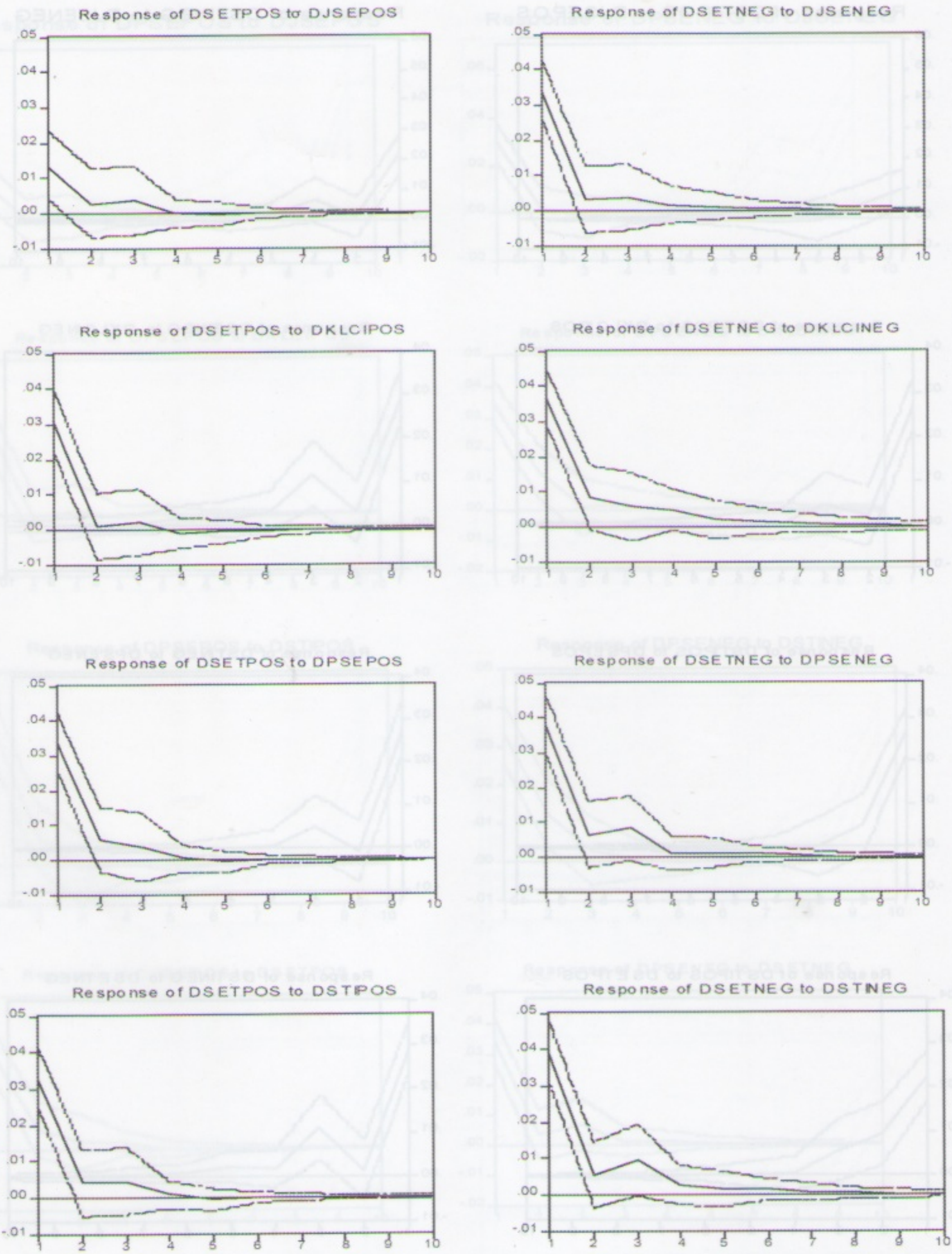

Figure 5. Impulse response functions of SET to ASEAN shocks

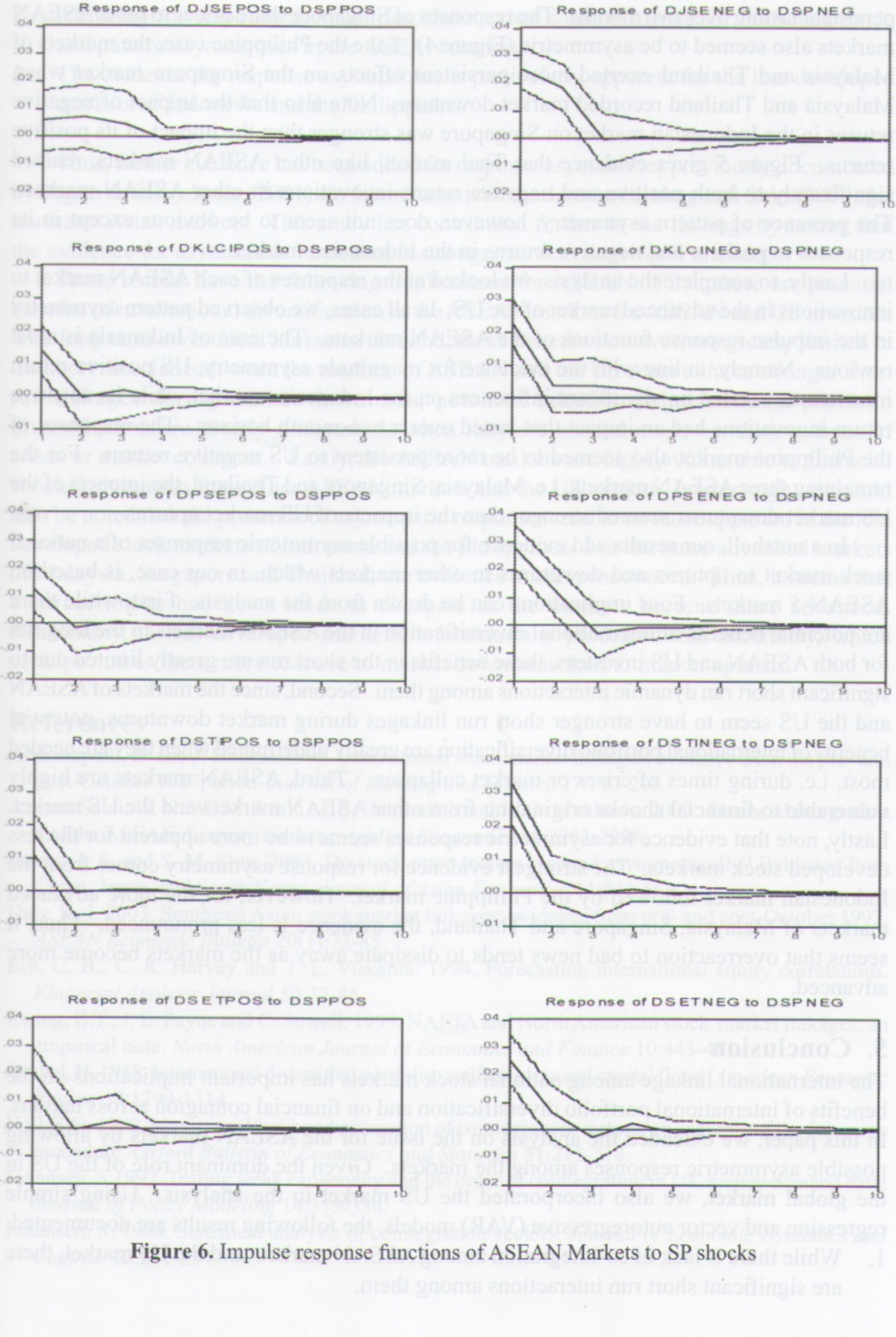

Figure 6. Impulse response functions of ASEAN Markets to SP shocks

persistent lasting over two months. The responses of Singapore share prices to other ASEAN markets also seemed to be asymmetric (Figure 4). Like the Philippine case, the markets of Malaysia and Thailand exerted more persistent effects on the Singapore market when Malaysia and Thailand recorded market downturns. Note also that the impact of negative returns in the Indonesian market on Singapore was stronger than the impact of its positive returns. Figure 5 gives evidence that Thai market, like other ASEAN markets, reacted significantly to both positive and negative return innovations in other ASEAN markets. The presence of pattern asymmetry, however, does not seem to be obvious except in its responses to positive and negative returns in the Indonesian market.

Lastly, to complete the analysis, we looked at the responses of each ASEAN market to innovations in the advanced market of the US. In all cases, we observed pattern asymmetry in the impulse response functions of the ASEAN markets. The case of Indonesia is most obvious. Namely, in line with the evidence for magnitude asymmetry, US positive return innovations exerted no significant influences on the Indonesian market while its negative return innovations had an impact that lasted over a two-month horizon. The responses of the Philippine market also seemed to be more persistent to US negative returns. For the remaining three ASEAN markets, i.e. Malaysia, Singapore and Thailand, the impacts of the US market downturns seemed stronger than the impacts of US market upturns.

In a nutshell, our results add evidence for possible asymmetric responses of a national stock market to upturns and downturns in other markets which, in our case, is based on ASEAN-5 markets. Four implications can be drawn from the analysis. First, while there are potential benefits of international diversification in the ASEAN markets in the long run for both ASEAN and US investors, these benefits in the short run are greatly limited due to significant short run dynamic interactions among them. Second, since the markets of ASEAN and the US seem to have stronger short run linkages during market downturns, potential benefits of international portfolio diversification are greatly undermined when they are needed most, i.e. during times of crises or market collapses. Third, ASEAN markets are highly vulnerable to financial shocks originating from other ASEAN markets and the US market. Lastly, note that evidence for asymmetric responses seems to be more apparent for the less developed stock markets. The strongest evidence for response asymmetry comes from the Indonesian market followed by the Philippine market. However, for the more advanced markets of Malaysia, Singapore and Thailand, the evidence is less pronounced. Thus, it seems that overreaction to bad news tends to dissipate away as the markets become more advanced.

5. Conclusion

The international linkage among national stock markets has important implications on the benefits of international portfolio diversification and on financial contagion across nations. In this paper, we extended the analysis on the issue for the ASEAN markets by allowing possible asymmetric responses among the markets. Given the dominant role of the US in the global market, we also incorporated the US market in the analysis. Using simple regression and vector autoregressive (VAR) models, the following results are documented:

1. While there is lack of co-integration among ASEAN markets and the US market, there are significant short run interactions among them.

2. Allowing for response asymmetries, there exists some evidence for both magnitude and pattern asymmetries in the ASEAN markets.
3. The evidence for response asymmetries is particularly apparent for the less developed markets of Indonesia and the Philippines.

Thus, further evidence has been added for response asymmetries previously documented by Pagan and Soydemir (2001) for Latin American markets and Bahng and Shin (2003) for northeast Asian markets. This study has contributed further to the findings by noting that the evidence for asymmetric responses is stronger for less developed markets.

These results have the following implications for ASEAN. First, there are potential benefits of international diversification in the ASEAN markets for ASEAN and US investors with long term investment horizons. Second, these benefits however, are greatly limited in the short run. Indeed, since the markets of ASEAN and the US seem to have stronger short run linkages during market downturns, potential benefits of international portfolio diversification are greatly undermined when they are needed most, i.e. during times of crises or market collapses. Lastly, the ASEAN markets are highly vulnerable to financial shocks originating from other ASEAN markets and the US market. Interestingly, it should also be noted that the presence of asymmetric responses tend to be more apparent in the less developed stock markets of Indonesia and the Philippines. For the more advanced markets of Malaysia, Singapore and Thailand, the evidence is less pronounced. Thus, it seems that overreaction to bad news tends to dissipate as the markets become more advanced. Reasonably, in less developed markets, information is processed less accurately, which perhaps makes them more reactive to market downturns than to market upturns.

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