INTEGRATION OR SEGMENTATION OF MALAYSIAN EQUITY MARKET:

AN ANALYSIS OF PRE- AND POST-CAPITAL CONTROLS

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ABSTRACT

The paper implements time series techniques of cointegration and vector autoregression (VAR) to assess the integration or segmentation of Malaysian equity market prior to the Asian crisis and after the imposition of capital controls. We consider both regional and international financial forces represented by respectively the ASEAN markets and the advanced markets of US and Japan. We form three systems of share prices – (i) ASEAN markets; (ii) US, Japan and Malaysia; and (iii) US, Japan and ASEAN. Our findings suggest no long run relation among share prices in all systems before the Asian crisis and after the imposition of capital controls. However, there are substantial short run dynamic interactions among regional markets of ASEAN. We note significant responses of the Malaysian market to ASEAN shocks regardless of the sample periods. By contrast, its responses to innovations in US and Japan, while significant before the Asian crisis, turn insignificant after the imposition of capital controls. Comparatively, the US market is more influential in accounting for fluctuations in the ASEAN markets. From the results, while not attributing solely to capital control measures, we contend that capital controls play some role in insulating the Malaysian market from international disturbances.

Keywords: Integration and Segmentation, Cointegration, Vector Autoregression, Generalized Impulse Responses.

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1. INTRODUCTION

The recent 1997/1998 financial crisis that sent various East Asian and Southeast Asian markets into financial turbulences has captured much attention. Triggered by successful speculative attack on Thai baht, the stock markets of severely-hit crisis countries (namely, Indonesia, Malaysia, the Philippines, South Korea, and Thailand) witnessed shattered market sentiments and tremendous drop in their share prices. As an example, the Kuala Lumpur Composite Index ended the month of June, 1997 with 1077 points. However, it dropped to as low as 262 points on September 1, 1998. Indeed, to date, the index has yet recovered to the level achieved prior to the crisis. The crisis culminated in a sudden halt of impressive growth experienced by these countries for over a decade. In 1997, the growth rates of Indonesia, South Korea, Malaysia, the Philippines and Thailand were respectively 4.7%, 5.0%, 7.3%, 5.2% and -1.7%. Then, in 1998, these growth figures dropped substantially to -13.1%, (Indonesia), -6.7% (South Korea), -7.4% (Malaysia), -0.6% (the Philippines) and -10.2% (Thailand).

As correctly noted by Athukorala (2001), domestic stabilization policies implemented in these countries are not sufficient to restore market confidence. In responses to the crisis, the normal route to instill confidence in the market for a crisis country is to turn to the IMF for assistance, which has been adopted by Indonesia, the Philippines, South Korea and Thailand. Malaysia, however, has taken an unorthodox route by adopting an official peg to the US dollar buttressed by selective capital controls on mainly short-term

capital flows. The main argument provided for this policy adoption is to stabilize the exchange rate and to insulate domestic financial markets from volatile short-term financial flows so that policy makers can pay undivided attention to standard monetary and fiscal stabilization policies. This policy response has received substantial attention and revived interest on various aspects of capital controls. The main aspects include effectiveness of (Athukorala, 2000, 2001, Dornbusch, 2001, Kaplan and Rodrik, 2001) and benefits and costs of capital controls (Nambiar, 2003). While these studies have added to our understanding, the implication of capital controls on financial integration and linkages of the Malaysian market with regional markets and advanced markets seems to receive little attention[1].

Accordingly, the purpose of this paper is to address this issue by examining long-run and short-run dynamic linkages of the Malaysian stock market with regional and global equity markets for the periods before and after capital controls. The analysis can aid policy makers in assessing interdependencies of international equity markets and the extent to which independent policies can be implemented. If the markets are segmented by the adoption of capital controls, then policy makers have room for independent domestic policies. By contrast, significant linkages between national equity markets mean that developments in domestic and international financial markets can not be ignored. Apart from this policy aspect, the analysis also bears important implications on international portfolio diversification. Namely, to the extent that the Malaysian market is segmented, it can be a potential market for international investors to diversify their

[1] Notable studies that have examined stock market linkages of ASEAN countries are Palac-McMiken (1997), Roca et al. (1998), and Daly (2003). While the first two studies utilize data up until 1995, Daly (2003) focuses specifically on the role of Asian crisis. Our analysis complements these studies by looking at the role of capital controls.

portfolios provided accounts are made on risks or benefits involved with capital controls. All else equals, the reduced correlation between, for example, the US and Malaysian markets means an increase in the weight of the Malaysian (US) market in the US (Malaysian) investors' portfolios. Lastly, capital controls also bear important implications for the developments of Malaysian capital markets.

Malaysia provides an interesting case study as arguments can be made for both market segmentation and market integration. The imposition of capital controls with restrictions on short term capital flows tends to deactivate the finance link among equity markets. Accordingly, as it is intended, the domestic equity market may be insulated from international financial disturbances. Indeed, Cornelius (1992) provides evidence for the effectiveness of capital controls as an insulation device for the case of three emerging markets. However, the trade link that connects Malaysia to other regional economies and to advanced economies of the US and Japan remains strong even during the crisis and after the imposition of capital controls. The three largest trading partners of Malaysia are the United States, Singapore and Japan, accounting for more than 50% of Malaysia's exports. Similarly, prior to the Asian crisis, more than 50% of Malaysia's imports were from these three countries. The import ratio from these three countries reduced slightly after the crisis period due to Ringgit depreciation but remains above 45%. The high level of trade between Malaysia and these three countries, thus, can serve as a channel that links their stock prices. As noted by Hatemi-J and Roca (2004), equity markets of countries that have significant economic links tend to be integrated or interdependent. Some examples are the US and Canada (Jorion and Schwartz, 1986) and Malaysia and Singapore (Cheung and Ho, 1991). Accordingly, if the trade channel is

operative, the Malaysian equity market may still be integrated with other markets even after the imposition of capital controls.

In the analysis, we rely on standard time series methods in assessing long run relations and short run dynamic linkages between the Malaysian equity market and other regional and international markets. More specifically, we use cointegration tests to evaluate the long run co-movements among the stock markets. Then, we construct vector autoregressive (VAR) models and simulate impulse response functions to discern short run dynamic interactions among them. As we have emphasized, our focus is on the role capital controls have played in the linkages of Malaysian equity market with international and regional markets. Accordingly, we assess the linkages for the period prior to the Asian crisis and for the period after the imposition of capital controls. The organization of the paper is as follows. In the next section, we provide a brief background of the Malaysian stock market, the Kuala Lumpur Stock Exchange, and highlight some important aspects of capital controls implemented in September 1998. Then, section 3 details data preliminaries. Section 4 implements time series analysis. Lastly, section 5 concludes with the main findings.

2. BACKGROUND

The history of stock trading in Malaysia can be traced as far back as early 1930s. Prior to 1973, Malaysia shared one exchange market for common stocks with Singapore, having trading rooms in both Kuala Lumpur and Singapore. In 1964, following the formation of Federation of Malaysia in September 1963, the Stock Exchange of Malaysia was established. Then, it was renamed as the Stock Exchange of Malaysia and Singapore

after the secession of Singapore from Malaysia in 1965. Formal separation of the Stock Exchange of Malaysia and Singapore into the Kuala Lumpur Stock Exchange (KLSE) for Malaysia and Stock Exchange of Singapore (SES) for Singapore took place in May 1973. The move was in conjunction with the termination of exchange rate interchangeability between Malaysia and Singapore and was motivated by a policy objective to strengthen Malaysia's financial institutions.

Prior to the imposition of capital controls, investors can move fund in and out from the country freely, making the Kuala Lumpur Stock Exchange one of highly integrated equity markets (World Bank, 1997). Until recent difficulties, the KLSE had emerged to become one of the fastest growing financial markets in the world. Facilitated by the country's privatization policy and high growth performance, market capitalization and turnovers had increased markedly, especially since 1987. During 1980-1986, the average market capitalization was RM62 billion. It then increased to RM74 billion in 1987 and to RM807 billion in 1996, the year before the eruption of the Asian crisis. Similarly, the value of total turnover increased almost three-fold from RM3.4 billion in 1986 to RM10.1 billion in 1987 and over 136 times to RM463.3 billion in 1996. The market had also witnessed rapid rise in the KLSE composite index prior to the Asian crisis. Propelled by large portfolio investment inflows of early 1990s, the index jumped from 644 points at the end of 1992 to 1275 points at the end of 1993 and remained above 1000 points on average until mid-1997. Indeed, assessing stock market development for 44 countries, Demirgüç-Kunt and Levine (1996) ranked Malaysia third in terms of growth rates of market capitalization and the ratio of total value traded to GDP.

The Asian crisis, which was triggered by speculative attack on Thai baht and later on other currencies in the region, has put a sudden halt to this rapid growth of the Malaysian equity market. The market index nosedived during the crisis to as low as 262 points on September 1, 1998. The market capitalization was cut more than half from year 1996 to RM375.8 billion in 1997 and to RM374.5 in 1998. Value of turnovers reduced substantially to only RM115.2 billion in 1998. As Athukorala (2001, Chapter 5) notes, the currency and stock market collapses spread to the banking sector and, later, vibrated to the real sector. All the severely crisis-hit countries including Malaysia experienced sharp reduction in their real activities. Subsequently, on September 2, 1998, the Malaysian government implemented selective capital controls and fixed the exchange rate to RM3.80 per US dollar as part of a package to deal with the crisis. The main aim of capital controls is to insulate domestic financial markets from volatile portfolio capital flows and from speculative activities for the much needed breathing room for the implementation of domestic stabilization policies.

The 1998 capital controls contain essentially measures that eliminate offshore speculative activities and curb external portfolio capital outflows. Malaysia is perhaps the only emerging market that had an offshore market for its currency which, during the crisis, contributed to exchange rate turbulences. Knowing that it was a major source of ringgit for speculative purposes, the government eliminated this offshore market by prohibiting repatriation of externally held ringgit deposits to Malaysia after September 1998. This means that any ringgit outside Malaysia after that date is no longer legal tender. Domestic ringgit credit facilities to non-residents were also prohibited. As part of a package to curtail speculative activities on Malaysian shares, the Central Limit Order

Book (CLOB), which had operated in Singapore since the delisting of Malaysian shares from the Stock Exchange of Singapore in 1990, was shut down. The measures also impose restrictions on external portfolio capital outflows by requiring a 12-month waiting period. Then, in September 15, 1999, the government introduced exited levies that differ according to whether capital was already in the country or entering the country after that date and according to length of stay. This levy system, however, was later modified to make Malaysian equity market attractive to international investors[2].

The Malaysian capital controls have attracted substantial interest with discussions concentrating mainly on their effectiveness and costs and benefits. Although some praise the measures as effective crisis management tools (Athukorala, 2000, 2001), others argued that it would be unconvincing to attribute Malaysian recovery to capital control measures (see, for instance, Jomo, 2003). Malaysia recorded a V-shaped recovery, experiencing a positive growth of 6.1% in 1999 after the drastic contraction in output of 7.4% in 1998. While it is tempted to attribute this remarkable turnaround to capital controls, other crisis-hit countries have also registered positive growth in 1999. Indeed, they recovered more rapidly than Malaysia. More importantly in our context, capital controls are generally viewed as discouraging foreign investments and portfolio inflows. It may be argued that, as they are intended, capital controls have insulated domestic stock market from volatile financial flows. In other words, to the extent that financial links among nations play a dominant role in stock market integration, there is a possibility of market segmentation for the Malaysian case. As the issue bears important implications on the effectiveness of capital controls as an insulation device, international portfolio

[2] The brief description of the 1998 capital controls in this section benefits greatly from Jomo (2003). Readers should refer to Jomo (2003) for more details.

diversification, and on capital market developments, the current analysis focus on the role capital controls have played on dynamic linkages between the Malaysian market and other international and regional markets.

3. DATA PRELIMINARIES

We employ the widely-cited market index for the Malaysian market, the Kuala Lumpur composite index (KLCI), to assess its long run relations and short run dynamic linkages with global and regional markets. By global markets, we mean two dominant equity markets of the US and Japan. The Standard & Poor 500 index (SP) is used to represent the US market while the Nikkei 225 index (NK) represents the Japanese market. We use other ASEAN market indexes to represent regional markets. Namely, they are the Jakarta composite index for Indonesia (JSE); the PSE composite for the Philippines (PSE); the Strait Times index for Singapore (STI); and SET index for Thailand (SET). The main source of data is EconStats[3]. The data are monthly for the time period covering January 1988 to December 2003. The behavior of the Malaysian market is assessed for two sample periods – pre-crisis period (January 1988 – December 1996) and post-capital control period (January 1999 – December 2003). These indices are expressed in natural logarithm. Table 1 presents descriptive statistics of these index returns over the whole period, pre-crisis period, and post-capital control period. Figure 1 plots the Malaysian index against the indexes from advanced markets, i.e. the US, Japan and Singapore. Meanwhile, Figure 2 plots the Malaysian index against the remaining

[3] Website address: www.econstats.com.

three indexes. Note that, in the figures, they are normalized such that the first observations take the value of 100.

Several points are notable from the table. First, the Japanese market is distinct from the rest in that it recorded a negative return over the period under consideration, reflecting continuing decline in the market after the stock market bubble burst in late 1980s. The S&P 500 index exhibited an upward trend until the turn of century but then reverted downward owing to looming recession and various global political uncertainties. From 1999 to 2003, the S & P 500 index recorded an average monthly return of -0.17%. Except the PSE index during the second period, the ASEAN stock markets documented positive returns. Although these markets nosedived in magnitudes unanticipated by many during the Asian crisis, they still posed positive returns over the whole sample period. These positive returns were accounted mostly by the markets' impressive growth prior to the Asian crisis. Indeed, before the crisis, most ASEAN stock markets witnessed higher returns than that of the US.

The emerging markets of ASEAN (Indonesia, Malaysia, the Philippines and Thailand) are relatively more volatile as compared to the advanced markets of US, Japan and Singapore, a stylized fact for the emerging markets. As may be noted from the table, the unconditional standard deviations of market returns are higher for the former for all sample periods. Additionally, the index returns tend to be negatively skewed. However, the returns do not seem to exhibit excess kurtosis, except only for few cases. This seems reasonable as the leptokurtic property of market returns tends to characterize only high frequency data but disappears under temporal aggregation. Lastly, as normally documented for time series data, we note that the market indices under consideration

contain a unit root. The augmented Dickey-Fuller (ADF) unit root test fails to reject the unit root null for all indices except for the case of Indonesia (Whole Sample) and Malaysia (Pre-crisis). However, the unit root null is rejected once they are first-differenced. In short, these indices can generally be characterized as integrated of order 1, or an I(1) process.

The plots of these indexes in Figure 1 and Figure 2 clearly reflect the noted descriptions of stock price movements with generally upward trend in the markets prior to the Asian crisis except for the case of Japan and with higher volatility of emerging markets. Generally, the figures seem to suggest some correlations among these price series not only during the period prior to the crisis but also during the post-capital control period. Indeed, in the case of Japan, the co-movements of its share prices with other markets seem to increase during the post-capital control period. More noticeably, the price movements tend to move in tandem during the crisis periods. During the global market crash of October 1997, we may observe concurrent fall in these indexes. Likewise, all markets except the US also witnessed precipitous fall in their share prices during the recent Asian financial crisis. Note that, comparatively, the reduction in the emerging market indexes was more pronounced, illustrating the fact that they are more vulnerable to financial disturbances.

Casual observations of the graphical plots, however, may be illusionary. Accordingly, we compute the price and return correlation coefficients between Malaysian market and other equity markets for the whole sample, pre-crisis sample, and post-capital control sample. These correlation coefficients are reported in Table 2. While not conclusive, they serve as a preliminary assessment of short run correlations between pairs of equity

prices. As may be observed from the table, the price correlations between KLCI and other indexes before the crisis are very high exceeding 0.9 in most cases. Note that, for the case of Japan, its correlation with the Malaysian market is negative. However, these correlations, except for the case of Indonesia, drop substantially during the post-control period. For the case of Japan, the correlation turns positive. Likewise, we may also note lower return correlations in the post-capital control period. The exception is only in the case of Indonesia where the return correlation between the Kuala Lumpur Stock Exchange and Jakarta Stock Exchange increases from 0.28 to roughly 0.51. These statistics, thus, provide a preliminary indication of increased segmentation of the Malaysian market after the imposition of capital controls. To be more conclusive, we implement a formal analysis using time series techniques in the ensuing section.

4. TIME SERIES ANALYSIS

To further evaluate market integration or segmentation of the Malaysian stock market, we proceed to time series framework of cointegration and vector autoregression. We use cointegration tests to assess the long run co-movements among the stock markets and vector autoregressive (VAR) models to evaluate their short run dynamic interactions. While the correlation analysis focuses on bivariate relations between equity prices, our main aim in this section is to look at regional and global integration or segmentation of the Malaysian market. Three systems of markets are analyzed - (i) ASEAN, (ii) Malaysia, US and Japan, and (iii) ASEAN, US and Japan. The analysis is done for pre-crisis period (January 1988 – December 1996) and post capital control period (January 1999 – December 2003).

4.1 Cointegration

To test for long-run co-movements or cointegration among stock markets, we apply multivariate cointegration test of Johansen (1988) and Johansen and Juselius (1990). They develop trace and maximal eigenvalue statistics to determine the presence as well as the number of cointegration vectors in the system. As it is well known, the Johansen-Juselius cointegration test is not only sensitive to the order of VAR but also tends to be biased toward finding evidence for cointegration especially in finite samples. While there are various information criteria that can be employed to determine the lag length, Cheung and Lai (1993) show that lag length selection using information criteria may not be adequate in the presence of moving average error terms. Hall (1989) and Johansen (1992), however, suggest specifying the lag length such that the VAR residuals are serially uncorrelated or Gaussian. Accordingly, in the present analysis, we specify the lag length according to their suggestion. To account for finite sample bias, we adjust the test statistics by a factor of (T – nk)/T as suggested by Reinsel and Ahn (1992), where T is the number of effective observations, n is the number of variables, and k is the order of VAR.

Table 3 reports cointegration test results for the ASEAN markets. Meanwhile, Table 4 reports the results for the markets of Malaysia, US and Japan. As may be noted from the tables, the null hypothesis of no cointegration can not be rejected for both systems and for all sample periods. Accordingly, the Malaysian equity prices are neither tied to regional markets nor to advanced markets of the US and Japan. In other words, they can drift arbitrarily away from other market trends in the long run. These results conform well to those documented by Roca et al. (1998) and Daly (2003). In particular, Roca et al.

(1998) find no evidence indicating long-run co-movements among ASEAN markets using weekly data from 1988 to 1995. Similarly, based on daily data from April 1990 to October 2001, Daly (2003) finds limited evidence of cointegration among ASEAN markets and among ASEAN and three advanced markets of Australia, Germany and the United States. It needs mentioning that evidence of cointegration among ASEAN markets is documented in Palac-McMiken (1997). However, unlike ours, his results are based on the bivariate Engle and Granger's (1987) two-step cointegration test. Note that our results are further substantiated in our 7-market systems consisting of ASEAN markets, US and Japanese markets (Table 5).

Thus, based on the foregoing results, we are unable to infer the role capital controls play in the long run financial integration of the Malaysian market. Prior to the crisis, the ASEAN markets serve as potential markets for international portfolio diversification to investors that have long-term investment horizons. This potential remains even after the Asian crisis. For the case of Malaysia, however, the risks or benefits associated with capital controls need to be incorporated as an additional input before committing to long term investments.

4.2 VAR Analysis

We next estimate VAR models to assess short-run dynamic interactions among the share prices. Given no evidence of cointegration, we estimate the VAR models using the variables in first differences. Then, from the VAR models, we generate impulse-response functions as a basis for inferences. We are interested in the dynamic interactions between the Malaysian market and other ASEAN markets as well as between these markets and the advanced markets of US and Japan. The latter allows us to assess the

Malaysian market short run behavior in comparison with the dynamics of other ASEAN markets that have not adopted capital controls. In implementing the VAR models, we note that the error terms are significantly contemporaneously correlated especially among the ASEAN markets. This means that the use of traditional Cholesky factorization as suggested by Sims (1980) in generating the impulse response functions would not be appropriate since the results will be markedly different depending on the ordering of variables in the VAR models. Accordingly, we adopt the generalized impulse response functions developed by Pesaran and Shin (1998), which are shown to be invariant to the variables' ordering.

Recall that we have three systems of equations – (i) ASEAN markets; (ii) Malaysia, US, and Japan; and (iii) ASEAN, US and Japan. The results we obtained for the first two systems are similar to and fully captured by system (iii). Thus, to avoid repetition in the discussion of results, we only present the results for the third system. We first look at dynamic responses of KLCI to shocks in other ASEAN markets and responses of ASEAN markets to innovations in KLCI, which are summarized in Figure 3. Then, we assess the responses of ASEAN markets to innovations in the two developed markets (Figure 4). Panel (a) of the figures presents the results for pre-crisis period. Meanwhile, panel (b) captures the results for post-capital control period.

From Figure 3, we observe substantial dynamic interactions among the ASEAN markets prior to the crisis. Indeed, the responses of these markets to innovations in other ASEAN markets are immediate and significant but subside toward zero quickly. Note that the Malaysian market reacts positively to shocks and, at the same time, its shocks lead to positive responses from other markets. These two-way effects between

the Malaysian market and other ASEAN markets prevail during the post-capital control period. However, while significant, the responses seem to be less in magnitude in the second sample, post-capital control sample. Regionally, thus, the imposition of capital control measures by Malaysia beginning September 1998 has not led to complete segmentation of its equity market. Regional market developments are still an important force in driving the dynamics of Malaysian market. Likewise, news from the Malaysian market remains relevant. These perhaps reflect close proximity and economic ties between the countries of ASEAN.

The responses of ASEAN markets to the developed markets, plotted in Figure 4, reveal several interesting insights. Generally, the US market seems to be more influential than the Japanese market in accounting for short run dynamics of the ASEAN markets. Prior to the crisis, innovations in the advanced markets of US and Japan solicit positive and significant reactions from the markets of Malaysia, Singapore and Thailand. The Philippine market reacts significantly to only the US innovations. Meanwhile, the Jakarta Stock Exchange tends to be isolated or segmented from the two advanced markets. While positive, its responses to the US and Japanese shocks are not significant. During the second period, we observe the reduced role of Japanese market in accounting for the variations in the ASEAN markets. To be more specific, none of the ASEAN markets except Singapore react significantly to positive Japanese shocks. Meanwhile, the US shocks remain significant in explaining the variations in the equity prices of Singapore and Thailand. Additionally, the reaction of Indonesian market turns significant while that of the Philippine market is not significant. In short, there seem to be some changes

in the influences of international markets on the ASEAN markets. Our results suggest a reduced role of the global financial forces.

Turning to the case of Malaysia, we document evidence that the Malaysian market turns from being vulnerable into being insignificant in reacting to international shocks. While regional forces remain significant, the reaction of Malaysian market to innovations in both the US and Japan are insignificantly different from zero. The questions are: Has the Malaysian market been more insulated from international disturbances after capital controls? Are capital controls an effective insulation device? The answer to the first question is affirmative. While the evidence clearly indicates insignificant responses of the Malaysian market to global shocks in the second sample, the answer to the second question is not unequivocally yes. Our contention is that capital controls do play some role in accounting for the reduced integration or increased segmentation of Malaysian market. However, the insignificant responses in the second sample can not be attributed fully to capital control measures. The markets of Thailand and the Philippine also become less vulnerable to global shocks, although they opt for the IMF-style measures. Perhaps, the Asian crisis has heightened market risks in these markets. Accordingly, equity returns in these markets may not move in tandem with those of the advanced markets. Moreover, the influences of advanced markets may still be felt indirectly by the Malaysian market, propagated through the regional markets of ASEAN.

5. CONCLUSION

Understanding long run relations and dynamic interactions among national equity markets bears important implications on the implementation of independent

macroeconomic policies, international portfolio diversification, and on capital market developments. In this paper, we assess this issue for the case of Malaysia, which has adopted capital controls as a crisis management tool. In specific, we focus on the question of market segmentation or integration as experienced by Malaysia after the imposition of capital controls, examining the influences of regional forces (i.e. ASEAN markets) and international forces (i.e. US and Japanese markets) before the Asian crisis and after the imposition of capital controls. The analysis relies on time series techniques of cointegration and vector autoregression to respectively examine the long run relations and short run dynamic interactions among equity prices. In the latter, we adopt generalized impulse response functions as a basis for making inferences. Three systems of share prices are considered – (i) ASEAN, (ii) US, Japan and Malaysia, and (iii) US, Japan and ASEAN.

From the analysis, we document various interesting results. To summarize, they are stated as follows:

- There is no long run relation among share prices in all systems of share prices before the Asian crisis and after the imposition of capital controls.
- There are substantial short run dynamic interactions among regional markets of ASEAN. The significant responses of Malaysian market to ASEAN shocks documented prior to the crisis period prevail after the imposition of capital controls.
- Comparatively, the US market is more influential in accounting for fluctuations in the ASEAN markets.

- The responses of Malaysian market to innovations in US and Japan, while significant prior to the Asian crisis, turns insignificant after the imposition of capital controls.

Apart from the above results, we also note some asymmetry in the responses of ASEAN markets to international shocks. Some ASEAN markets respond to both the US and Japanese markets while others respond only to the US markets. Among the ASEAN markets, the Indonesian market seems to be most isolated from international disturbances pre-crisis while the Malaysian market is least affected after the crisis. Needless to say, with the exception of Singapore, there seems to be a reduction in the responses of ASEAN markets to international disturbances after the crisis.

Generally, our results suggest reduced integration or increased segmentation of the Malaysian equity market. We contend that, while not completely attributing this finding to capital control measures implemented by Malaysia, capital controls play some role in insulating the Malaysian market from the international disturbances in the short run. Note that, despite this, the regional forces remain a significant driving factor in explaining the dynamics of Malaysian market. This may reflect the close proximity and economic ties among the ASEAN markets. The implication of our finding is that the ASEAN markets remain potential markets for international diversification in the long run. However, the benefits for international portfolio diversification in these markets in the short run may be limited. While the Malaysian and the Philippine markets can be potential for short run diversification, since we observe their insignificant responses to international shocks in the second period, proper accounts of specific risks inherent in these markets need to be made. Lastly, to the extent that capital controls discourage

portfolio flows and accordingly untie the financial links between national markets, the needed liquidity for the progress of the capital market may be restricted.

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Table 1: Descriptive Statistics

Equity Markets	Index Returns				ADF Tests	
	Mean	Std. Dev.	Skewness	Kurtosis	X	ΔX
(a) Whole Sample (Jan 1988 – Dec 2003)						
SP	0.0077	0.0423	-0.5944	3.8364	-1.037	-14.43*
NK	-0.0042	0.0650	-0.2688	3.3182	-2.991	-13.97*
KLCI	0.0054	0.0833	-0.0520	4.7119	-2.555	-4.836*
JSE	0.0111	0.1053	1.0199	12.687	-3.899**	-9.443*
PSE	0.0030	0.0940	-0.0536	4.6531	-1.867	-12.06*
STI	0.0035	0.0726	-0.2187	5.1472	-2.514	-12.99*
SET	0.0046	0.1031	-0.1310	3.6730	-2.034	-12.49*
(b) Pre-Crisis (Jan 1988 – Dec 1996)						
SP	0.0099	0.0331	-0.1842	3.8745	-2.314	-11.61*
NK	-0.0019	0.0697	-0.3032	3.6819	-2.465	-10.68*
KLCI	0.0138	0.0651	-0.1841	4.4736	-3.508**	-6.207*
JSE	0.0190	0.1022	2.6718	19.891	-2.876	-8.197*
PSE	0.0127	0.0932	-0.1659	4.5126	-2.390	-9.585*
STI	0.0083	0.0530	-0.5970	5.0072	-3.117	-9.490*
SET	0.0090	0.0901	-0.3130	4.3061	-2.293	-8.735*
(c) Post-Capital Controls (Jan 1999 – Dec 2003)						
SP	-0.0017	0.0497	-0.1838	2.3476	-1.877	-7.804*
NK	-0.0043	0.0585	-0.2415	1.9326	-2.063	-7.107*
KLCI	0.0051	0.0744	0.8154	5.1770	-3.087	-7.158*
JSE	0.0092	0.0849	0.2998	2.4409	-2.832	-5.987*
PSE	-0.0052	0.0745	0.2233	3.0281	-2.847	-6.750*
STI	0.0039	0.0731	-0.2292	4.3134	-2.715	-7.398*
SET	0.0129	0.0958	-0.1587	3.5420	-0.356	-8.332*

Note: *, ** denote significance at 1% and 5% respectively.

Table 2: Correlations of Malaysian Equity Market with Other Markets

	Price Correlations			Return Correlations		
Equity Markets	Whole Sample	Pre-Crisis	Post-Control	Whole Sample	Pre-Crisis	Post-Control
SP	0.3652	0.9233	0.4083	0.3966	0.3970	0.3023
NK	-0.2499	-0.6176	0.4477	0.2595	0.3145	0.1653
JSE	0.7553	0.7837	0.7011	0.4094	0.2823	0.5057
PSE	0.8254	0.9351	0.2625	0.5697	0.5768	0.3216
STI	0.9327	0.9814	0.6676	0.6757	0.7855	0.4627
SET	0.5280	0.9356	0.3661	0.5883	0.6410	0.4918

Table 3: Cointegration Tests – ASEAN

Null Hypothesis	Full Sample	Pre-Crisis Sample	Post-Control Sample	Critical Values (5%)
(a) Trace Statistics				
$r = 0$	45.81	54.57	62.53	68.52
$r \leq 1$	27.21	32.85	37.45	47.21
$r \leq 2$	16.11	16.85	21.04	29.68
$r \leq 3$	8.88	6.01	10.00	15.41
$r \leq 4$	3.03	0.24	1.27	3.76
(b) Max Eigenvalue Statistics				
$r = 0$	18.60	21.72	25.08	33.46
$r \leq 1$	11.10	16.00	16.41	27.07
$r \leq 2$	7.23	10.84	11.03	20.97
$r \leq 3$	5.85	5.77	8.74	14.07
$r \leq 4$	3.03	0.24	1.27	3.76

Table 4: Cointegration Tests – Malaysia, US and Japan

Null Hypothesis	Full Sample	Pre-Crisis Sample	Post-Control Sample	Critical Values (5%)
(a) Trace Statistics				
$r = 0$	14.20	10.30	12.78	29.68
$r \leq 1$	4.93	2.86	5.72	15.41
$r \leq 2$	2.07	0.22	0.50	3.76
(b) Max Eigenvalue Statistics				
$r = 0$	9.26	7.44	7.06	20.97
$r \leq 1$	2.87	2.63	5.22	14.07
$r \leq 2$	2.07	0.22	0.50	3.76

Table 5: Cointegration Tests – ASEAN, US and Japan

Null Hypothesis	Full Sample	Pre-Crisis Sample	Post-Control Sample	Critical Values (5%)
(a) Trace Statistics				
$r = 0$	99.49	92.06	107.33	124.24
$r \leq 1$	53.69	62.08	72.07	94.15
$r \leq 2$	36.39	39.07	44.35	68.52
$r \leq 3$	21.89	23.44	28.51	47.21
$r \leq 4$	11.90	12.28	13.27	29.68
$r \leq 5$	6.64	4.85	4.26	15.41
$r \leq 6$	2.20	2.32	0.003	3.76
(b) Max Eigenvalue Statistics				
$r = 0$	45.80	29.98	35.26	45.28
$r \leq 1$	17.29	23.01	27.72	39.37
$r \leq 2$	14.51	15.63	15.84	33.46
$r \leq 3$	9.99	11.16	15.24	27.07
$r \leq 4$	5.25	7.42	9.01	20.97
$r \leq 5$	4.44	2.53	4.25	14.07
$r \leq 6$	2.20	2.32	0.003	3.76

Figure 1: Stock Prices of Malaysia, Singapore, Japan and the US

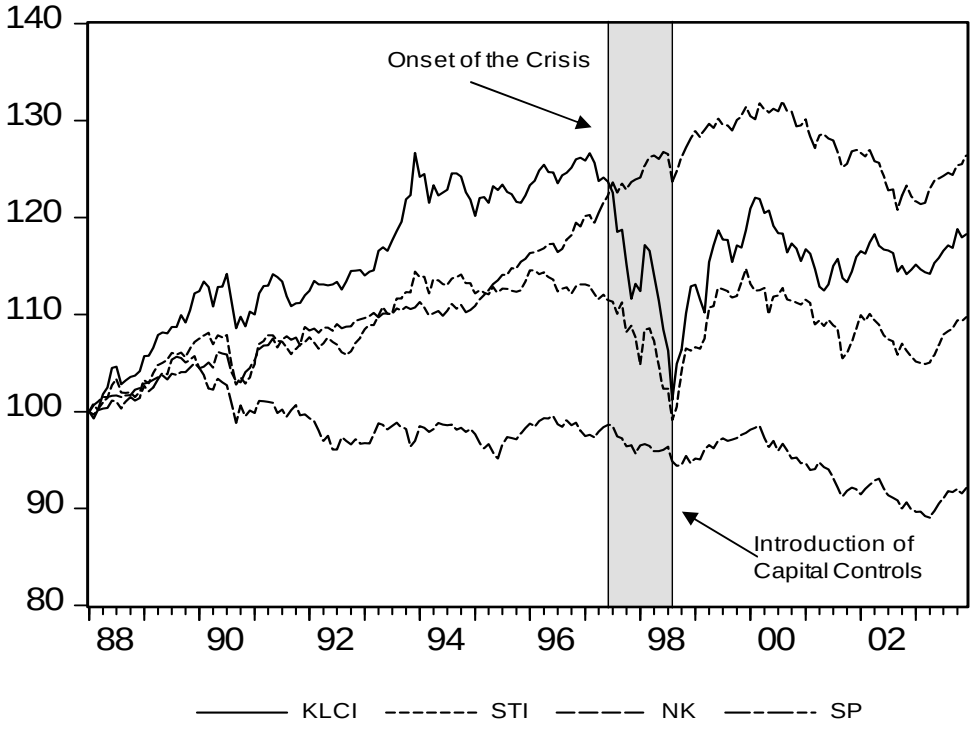


Figure 2: Stock Prices of Malaysia, Indonesia, the Philippines and Thailand

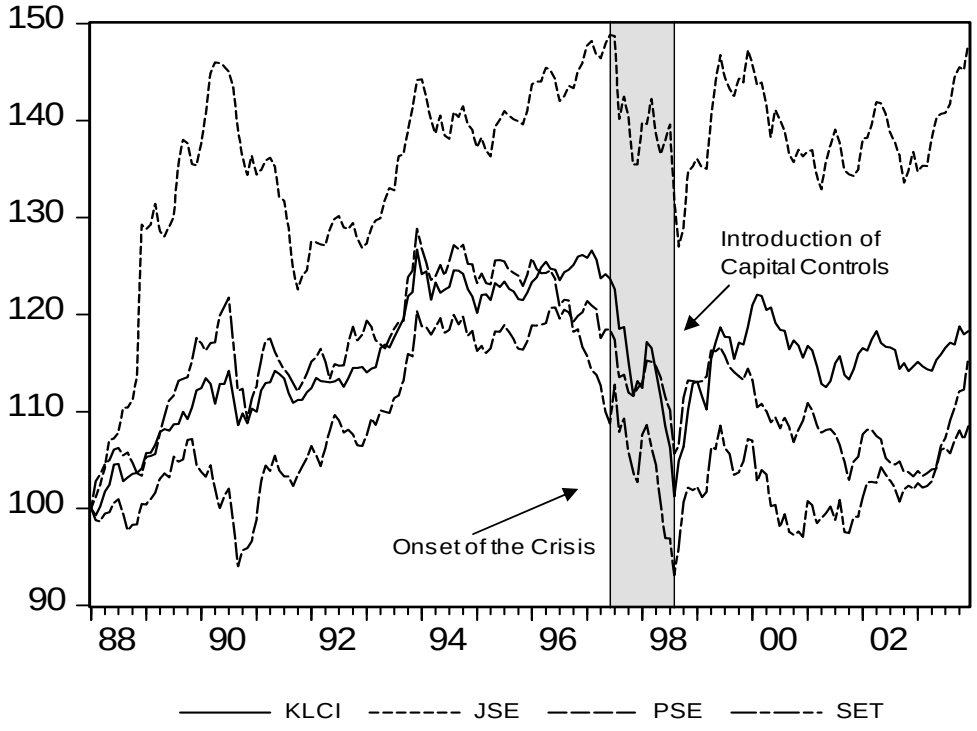
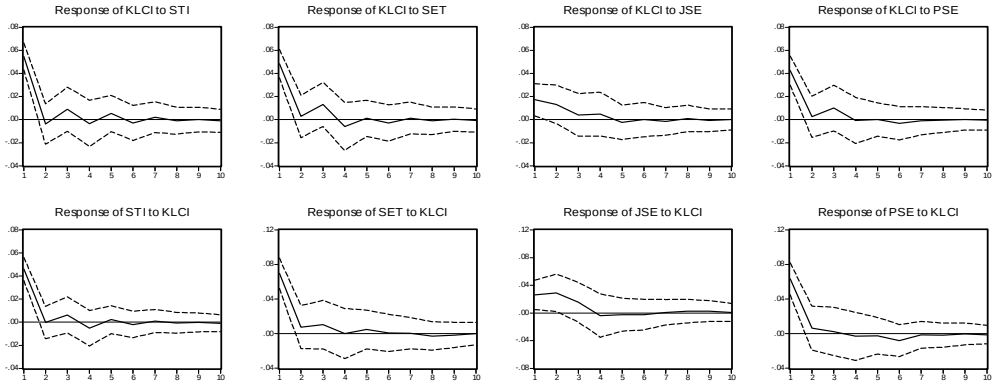


Figure 3: Generalized Impulse Response Functions

(a) Pre-Crisis Period



(b) Post-Capital Control Period

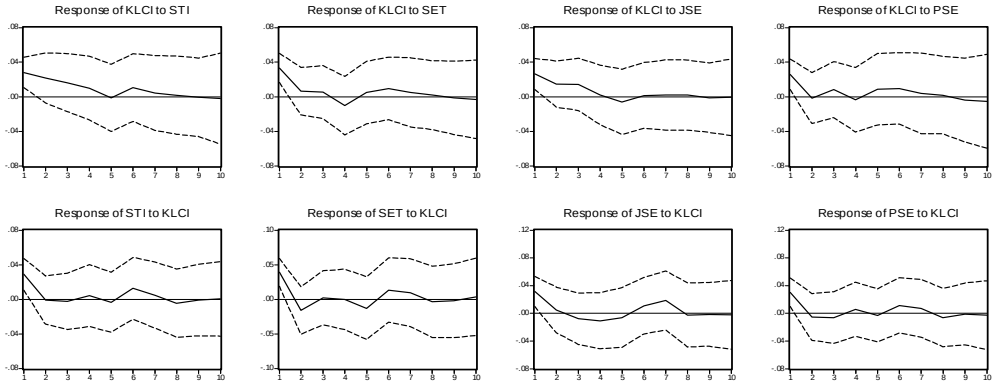
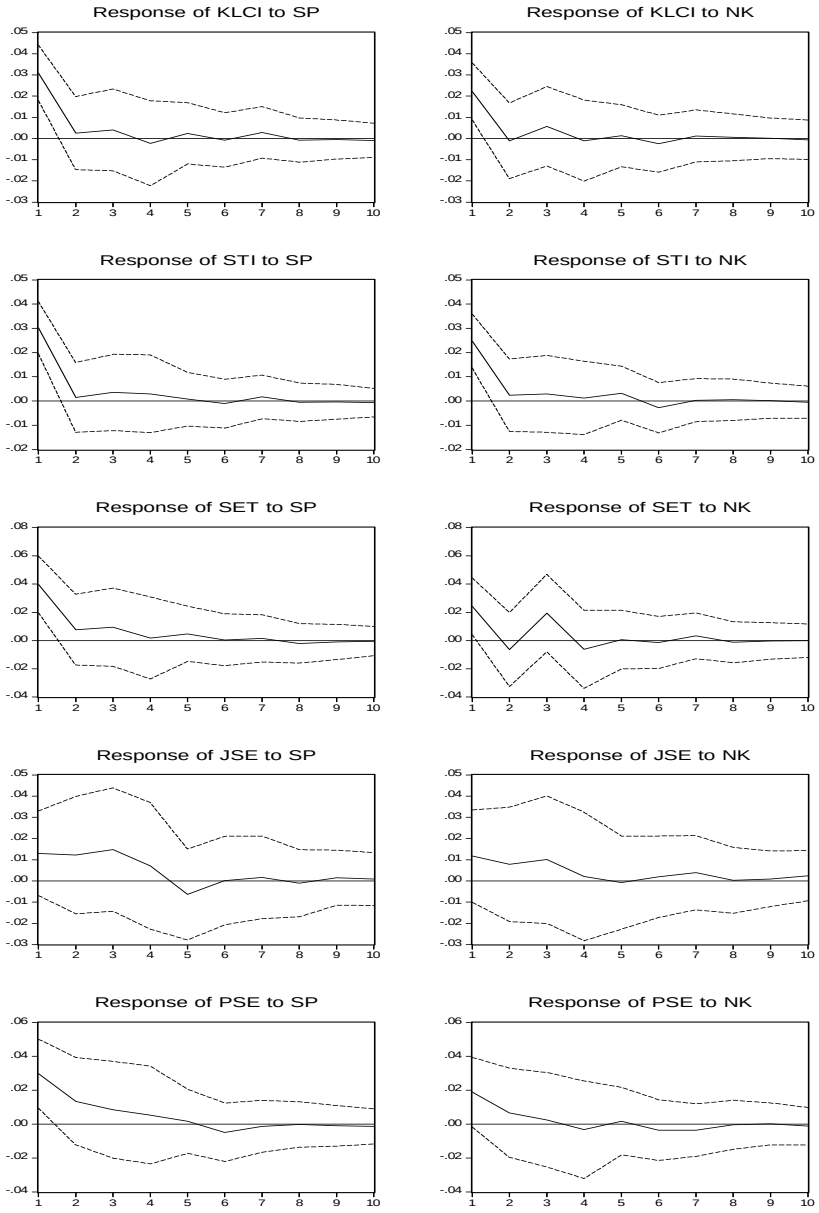


Figure 4: Generalized Impulse Response Functions

(a) Pre-Crisis Period



(b) Post-Capital Control Period