INTERDEPENDENCE BETWEEN JAKARTA STOCK EXCHANGE AND OTHER PACIFIC-BASIN STOCK MARKETS [1)]

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ABSTRACT

International capital markets linkages have been studied since early 90-es. Most of these studies have mainly focused on the US and other developed markets. There were only a few researches on this topic in the emerging markets. This paper examines the dynamic linkages among Indonesian and other Pacific-Basin stock markets using correlation analysis, Granger-causality and vector autoregressive (VAR) approach.

All the methods give generally similar results. Our empirical results indicate a high degree of international co-movement among the stock price indices. The degree of integration among these markets after Asian Crisis increased substantially in compare to those before Asian Crisis. The results also show that there are close relationships among the geographically and economically closed markets such as ASEAN markets, New Zealand-Australian and also Hong Kong - South Korea. The pattern of impulse-response functions illustrates a rapid transmission of stock market events. Shocks in the developed markets are immediately transmitted to other markets. Shocks in the emerging markets are also transmitted to other markets, but without such a big effect comparing to those in the developed markets

The Jakarta stock exchange is strongly correlated with other Pacific-Basin markets, especially with ASEAN markets, Hong Kong and Australia. The strongest foreign effects for the JSX come from Singapore, Hong Kong and Thailand. They can explain about 5 – 8% of error variance of the Jakarta Index. In contrast, the JSX index can explain 3 - 5 % of their error variances.

Keywords : capital markets, vector autoregressive, Pacific-Basin
JEL Classification : G15, F33, E44

INTRODUCTION

Stock market linkages between national capital markets have been studied since early 90-es, i.e. after the stock market crash of October 1987 on Wall Street. The reason why shocks in one markets should affect other markets are explained for example by Janakiramanan and Lamba (1998) as follows:

a) Dominant economic power: during the early part of the 20th century when Britain was the world economic power, actions taken by the Bank of England reverberated immediately around the world. In the post-World War period, US become the most influential economy, since most of the interna-tional trading is dominated in US dollars. Economic factors affecting the US capital markets and the US dollars will also have a worldwide effect.

b) Common investor groups: The geographically close countries have normally a similar group of

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investors in their markets. Therefore, these markets are influenced each other. The larger market has a stronger influence on the relatively small market.

c) Multiple stock listing: When a stock is dually listed in two markets, shocks in one market can be transmitted to the other market. More dually listed stocks will have a greater impact on the stock market shocks transmission. For example Gjerde and Saettem (1995) found that Switzerland was influenced by most of other European markets, because a large portions of stocks traded on the Swiss market are multilisted in other European markets.

d) Indirect influences: investors in one market may react both directly and indirectly to the initial shock in other markets. Eun and Shim (1989), for example, found that the Australian market, which closes before the UK and US markets, reacts to an initial shock in the US market on day 1. On the following day, the Australian market also reacts to the UK market.

Other possible reasons as explained by Arshanapalli and Doukas (1993) are "*the relaxation of controls on capital movements and foreign exchange transactions,* and *improvements in computer and communication technology that have lowered the cost of cross-border information flows and financial transactions*".

The previous studies concerning this issue have mainly focused on the US and other developed markets in the western countries. The main results were[1]:

a) The international markets are becoming increasingly integrated over time, especially after global shock October 1987.

b) The US is the dominant one, and it influences all other stock markets while the other markets have little, if any, influence on the US market.

c) The European markets are also integrated each other and the US market influences all of these markets, but none of these markets affect the US stock market.

Linkages among emerging stock markets have been relatively less explored, and therefore there is a need for more research in this area. Elyasiani *et al.* (1998) studied the interdependence and dynamic linkage between stock market of Sri Lanka and its major trading partners. The result showed that there was no significant interdependence between stock market of Sri Lanka and the US and other Asian markets. The study of Janakiramanan and Lamba (1998) using the data of 1988-1996, showed that Pacific-Basin stock markets are integrated each other, except Indonesia, and the US market influences all of these markets. On the other hand, none of the Pacific-Basin markets have significance influence on the US markets.

Following the devaluation of Bath in July 2, 1997, there are global shocks in the Asian Economies. This economic and financial crisis started in Thailand, then moved to the Philippines, Malaysia and Indonesia. The crisis then spread like an epidemic to South Korea and Taiwan in North Asia until it reached the largest financial base of the West in Asia, which is Hong Kong. This crisis also influences almost all of the Asian stock markets, and is reflected by the declining of the stock market indices.

Motivated with this phenomenon, the question about causality among Pacific-Basin stock markets will be empirically re-examined. We are especially concerned with establishing relationships among Pacific-Basin stock markets (US, New Zealand, Australian, Japan, Hong Kong, South Korea, Taiwan, China, Thailand, Singapore, Malaysia, Indonesia, and Philippines).

We apply a multivariate vector autoregressive (VAR) model to examine the dynamic interactions among these stock markets, with special attention goes to the Jakarta Stock Exchange (JSX). Empirical structural regularities among stock markets are analyzed by the variance decomposition approach, i.e. investigating the extent to which a national stock market responds to shocks in other markets in the global system. We also utilize the impulse response function, addressing the question of how events in a single market are transmitted to other markets.

The structure of this paper is as follows. In Section 2,

[1] For more information see for example Roll (1988), Arshanapalli and Doukas (1993), Gjerde and Saettem (1995) as well as Eun and Shim (1989).

we explain framework of the analysis. In Section 3, we define the variables and the data as well as the descriptive statistics. In section 4, our results are presented. First, an appropriate VAR model is estimated, and then the decomposition of forecasting error variances result and impulse response analysis are presented and interpreted. A brief summary of important results and some conclusions are offered in Section 5.

FRAMEWORK OF ANALYSIS

A multivariate vector autoregressive (VAR) method is a useful alternative to the conventional structural modeling procedure. The VAR analysis works with unrestricted reduced forms, treating all variables as a potentially endogenous. It has been widely used by several authors. For more information, see Gjerde and Saettem (1995), Arshanapalli and Doukas (1993), Eun and Shim (1989) and Janakiramanan and Lamba (1995).

A VAR(p) model can be described as follows :

$$y_t = a + \Phi_1 y_{t-1} + \Phi_2 y_{t-2} + ... + \Phi_p y_{t-p} + \varepsilon_t \quad (1)$$

where y_t is an mx1 vector of jointly dependent variables, a is an mx1 vector of constant terms, Φ_i is an mx1 vector of coefficients and ε_t is an mx1 vector of white noise errors independently and normally distributed with zero mean. The method requires the time series analyzed to be stationer. We employ the unit root test based on the augmented Dickey-Fuller test procedure (ADF) to do this. The order or VAR, p, can be selected using Akaike Information Criterion (AIC) or Schwarz Bayesian Criterion (SBC).

One of the key questions that can be addressed with VAR is how useful some variables are for forecasting others. In this paper we apply not only bivariate granger causality, but also block granger causality test.

Bivariate Granger-causality test proposed by Granger (1969) and popularized by Sims (1972). The question investigated in this test is whether y can help forecast x. If it can not, than we say that y does not Granger-cause x. Here we assume a particular autoregressive lag length p and estimate

$$x_t = c_t + \alpha_1 x_{t-1} + \alpha_2 x_{t-2} + ... + \alpha_p x_{t-p}$$

$$+ \beta_1 y_{t-1} + \beta_2 y_{t-2} + ... + \beta_p y_{t-p} + u_t \quad (2)$$

by ordinary least square (OLS) method. We than conduct an F-test of the null hypothesis

$$H_o : \quad \beta_1 = \beta_2 = ... = \beta_p = 0 \quad (3)$$

To implement this test, we calculate the sum of square residuals from (2),

$$RSS_1 = \sum_{\forall t} \hat{u}_t^2$$

and compare this with the sum of squared residuals of univariate autoregression for x_t,

$$RSS_0 = \sum_{\forall t} \hat{e}_t^2$$

where

$$x_t = c_0 + \gamma_1 x_{t-1} + \gamma_2 x_{t-2} + ...$$

$$+ \gamma_p x_{t-p} + e_t \quad (4)$$

is also estimated by OLS.

If

$$S = \frac{(RSS_0 - RSS_1)/p}{RSS1/(T - 2p - 1)} \quad (5)$$

is greater than the 5% critical value for an F(p, T-$2p$-1) distribution, than we reject the null hypothesis that y does not Granger-cause x, that is, is S is sufficiently large, we conclude that y does Granger-cause x. For more details see for example Hamilton (1994).

Block Granger causality test provides a statistical measure of the extent to which lagged values of a set of variables (say y_{2t}) are important in predicting another set of variables (say y_{1t}) once lagged values of the latter set are included in the model.

More formally, let $y_t = (y'_{1t}, y'_{2t})'$, where y_{1t} and y_{2t} are ($m1$ x 1) and ($m2$ x 1) subsets of and $m = m1 + m2$. Consider now the following block decomposition:

$$y_{1t} = a_{10} + \sum_{i=1}^{p} \Phi_{i,11} y_{1,t-i} + \sum_{i=1}^{p} \Phi_{i,12} y_{2,t-i} + u_{1t} \quad (6)$$

$$y_{2t} = a_{20} + \sum_{i=1}^{p} \Phi_{i,21} y_{1,t-i} + \sum_{i=1}^{p} \Phi_{i,22} y_{2,t-i} + u_{2t} \quad (7)$$

The hypothesis that the subset y_{2t} does not Granger-cause y_{1t} is defined by $H_G : \Phi_{12} = 0$, where $\Phi_{12} = (\Phi_{1,12}, \Phi_{2,12}, ..., \Phi_{p,12})$. The log-likelihood ratio statistic of this test is:

$$LR_G = 2(\log|\tilde{\Sigma}_R| - \log|\tilde{\Sigma}|) \quad (8)$$

where $\tilde{\Sigma}$ is maximum likelihood estimator of Σ for the full system, and $\tilde{\Sigma}_R$ is maximum likelihood estimator of Σ when restriction $\Phi_{12} = 0$ are imposed. The statistic LR_G asymptotically follows the chi-squared distribution with $m1m2p$ degrees of freedom. For more information, see for example Pesaran and Pesaran (1997).

Using the VAR method makes it possible to analyze the dynamic responses to shocks in the system. Using Impulse Response Analysis, it is possible to analyze the effect of a unit shock in a market to the change in other markets in the successive future period. To analyze the dynamic of the system, the VAR model in equation (1) can be transformed into its moving-average (MA) representation as follows:

$$y_t = \sum_{k=0}^{\infty} M_k \varepsilon_{t-k} \quad (9)$$

The ij-th component of the matrix Mk represents the response of the i-th market to a shock in the j-th market. If the elements of the error vector ε_t are correlated, the error term can be transformed by triangular matrix Q to solve the problem. The orthogonalized innovations v can be obtained from $\varepsilon = Qv$ and can be incorporated in the above MA representation as:

$$y_t = \sum_{k=0}^{\infty} P_k v_{t-k} \quad (10)$$

where $P_k = M_k Q$ (for details see Eun and Shim, 1989). The ij-th component of the matrix Pk is the impulse response of the i-th market in the period k to a shock in the j-th market. Usually, this latter shock is given in terms of a standard error.

The VAR also provides the possibility of the decomposition of forecast error variance of one individual variable corresponding to each of all variables:

$$\Theta_{ij,K} = \frac{\sum_{k=0}^{K} [M_k Q]_{ij}}{\sum_{k=0}^{K} [M_k \Sigma M_k']_{ij}} \quad (11)$$

where the square brackets refer to the indicated component of the corresponding matrix. $\Theta_{ij,K}$ gives the proportion of the contribution of the variable j to the whole K-step forecast error variance of a variable i. This way the shares of each variable at the variance of another variable can be interpreted as the relative importance of each variable in generating the variation in that individual variable.

DESCRIPTION OF VARIABLES AND THE DATA

We analyze the developed markets of Australian (AU), New Zealand (NZ), Japan (JP), Hong Kong (HK), Singapore (SG), and the US and the emerging markets of Taiwan (TW), South Korea (KR), Thailand (TH), Malaysia (MY), Indonesia (ID), Philippines (PH) and China (CH). Compared to the previous studies, we use the new data and include all international stock markets in the region.

Stock markets included in this study operate in different time zone, and have different opening and closing times. A change of interest in one market may not be fully reflected in another market on the same calendar day. All Asia-Pacific exchanges are closed when the US market open, with exception of New Zealand. There is some trading overlap between US and NZ markets (see Table 1).

For each markets, we obtain the daily markets indices for the period of October 1, 1992 until November 1, 2002. The data compiled from the Capital Market Advisory Board of Indonesia BAPEPAM, the Jakarta Stock Exchange (JSX), Yahoo Finance and Bloomberg. The indices are measured in local currency term.

These indices were converted into the daily rate of return using the formula:

$$Rj,t=Ln(I_{j,t} / I_{j,t-1})$$

where $I_{j,t}$ is value of index on day t for stock markets j and $I_{j,t-1}$ is value of index on day (t-1) for stock market j.

Table 2 presents the descriptive statistics of daily market returns in local currency terms from October 1992 till November 2002. During the period of pre-Asian Crisis, many markets have positive mean of market returns. Among others HK market has the highest mean of daily market returns, followed by the markets of Taiwan, US and Indonesian. Thailand's market, in contrast, is the worst market with lowest mean of daily market returns.

Table 1. Market indices, market opening and closing time of the Pacific Basin stock markets

Country	Index	Local time	Greenwich mean time
Australia	All Ordinaries Index	10.00 - 16.00	00.00 - 06.00
Hong Kong	Han Seng Index	10.00 - 12.30	02.00 - 04.30
		14.30 - 15.30	06.30 - 07.30
Indonesia	Jakarta Composite Index	10.00 - 12.00	03.00 - 05.00
		13.30 - 15.00	06.30 - 08.00
Japan	Nikkei-Dow Index	09.00 - 11.00	00.00 - 02.00
		12.30 - 15.00	03.30 - 06.00
Malaysia	KLSE Composite Index	10.00 - 12.30	02.00 - 04.30
		14.30 - 16.00	06.30 - 08.00
New Zealand	NZSE Top 40 Index	10.00 - 16.00	22.00 a - 04.00
Philippines	PSE Index	09.30 - 12.00	01.30 - 04.00
Singapore	Straits Times Index	09.00 - 12.30	01.00 - 05.30
		14.00 - 16.00	06.00 - 08.00
South Korea	KSE Index	09.00 - 15.00	00.00 - 06.00
		15.10 - 15.40	06.10 - 06.30
Taiwan	TSE Index	09.00 - 12.00	01.00 - 04.00
Thailand	SET 50 Index	10.00 - 12.30	03.00 - 05.30
		14.30 - 16.00	07.30 - 09.00
USA	S&P 500 Index	09.30 - 16.00	14.30 - 21.00 a

a Time corresponds to the previous day

Tabel 2. Descriptive statistics of daily market returns in local currency terms: October 1, 1992 – November 1, 2002

Variable(s)	US	NZ	AU	JP	TW	KO	HK	PH	SG	MY	ID	TH	CH
Panel A: All data													
Maximum	0,0242	0,0412	0,0264	0,0333	0,0370	0,0435	0,0749	0,0703	0,0559	0,0904	0,0883	0,0493	0,1172
Minimum	-0,0309	-0,0578	-0,0412	-0,0314	-0,0440	-0,0619	-0,0640	-0,0423	-0,0697	-0,1049	-0,0899	-0,0436	-0,0778
Mean	0,0001	0,0001	0,0001	-0,0001	0,0000	0,0000	0,0001	-0,0001	0,0000	0,0000	0,0000	-0,0001	0,0001
Std. Deviation	0,0047	0,0041	0,0035	0,0062	0,0075	0,0091	0,0079	0,0703	0,0559	0,0904	0,0883	0,0493	0,1172
Panel B: Pre Asian Crisis													
Maximum	0,0117	0,0205	0,0110	0,0328	0,0322	0,0273	0,0248	0,0311	0,0209	0,0422	0,0246	0,0329	0,1172
Minimum	-0,0136	-0,0284	-0,0156	-0,0250	-0,0303	-0,0249	-0,0363	-0,0254	-0,0246	-0,0289	-0,0184	-0,0330	-0,0778
Mean	0,0003	0,0002	0,0002	0,0001	0,0003	0,0001	0,0004	0,0002	0,0001	0,0002	0,0003	-0,0001	0,0002
Std. Deviation	0,0028	0,0035	0,0032	0,0053	0,0066	0,0054	0,0062	0,0053	0,0038	0,0050	0,0037	0,0063	0,0086
Panel C: Post Asian Crisis													
Maximum	0,0242	0,0411	0,0263	0,0332	0,0370	0,0435	0,0749	0,0703	0,0559	0,0904	0,0883	0,0493	0,0408
Minimum	-0,0308	-0,0578	-0,0411	-0,0314	-0,0439	-0,0619	-0,0639	-0,0423	-0,0697	-0,1049	-0,0899	-0,0436	-0,0379
Mean	0,0000	-0,0001	0,0003	-0,0003	-0,0002	-0,0001	-0,0002	-0,0003	-0,0001	-0,0002	-0,0002	-0,0001	0,0001
Std. Deviation	0,0059	0,0046	0,0038	0,0069	0,0081	0,0114	0,0090	0,0078	0,0075	0,0095	0,0097	0,0091	0,0064

During post-Asian Crisis period, all of the emerging markets have a negative mean of market returns. In contrast, some of the developed markets have still a positive mean of market returns, such as USA and Australia. That means, after Asian Crisis the emerging markets are not interesting enough for the investor comparing to the developed markets. The market of AU is the best market with the highest mean of daily market returns, followed by US.

The emerging markets of Thailand, Philippines, Indonesian and Malaysian are strongly influenced by Asian Crisis and therefore have lower mean of daily market returns comparing to the other markets. Beside, standard deviations of daily market returns during post-Asian Crisis are higher than those during pre-Asian Crisis. That means, all the markets became more volatile and therefore became more risky for the investor.

Figure 1 presents the development of market indices in the Pacific-Basin region during the period of study. The markets respond the crisis in three different ways. US and Australian markets seem not to be influenced by Asian Crisis. The markets indices tend to increase from time to time, even after shock of July 1997.

Following shock of July 1997, the indices of China, Hong Kong, New Zealand and Singapore decrease for about one year, and then increase again. The other markets —Thailand, Taiwan, Philippines, Korea, Malaysia, and Indonesia— are strongly influenced by the crisis. The indices tend to decrease since July 1997, and do not back to the previous trend (before the crisis) until now.

Figure 2 presents the development of market returns of the Pacific-Basin markets during the period of study. Unlike the development of the market indices, all of the market returns have a similar trend, except China. Again, here we can see that the market returns after the crisis are generally more fluctuative comparing to those before the crisis. One side, it gives the investor a possibility to get more money from the markets. Another side, it will be more risky to make an investment in the capital market. China market, in contrast, seems to have smaller fluctuation after the crisis. It indicates that China market is relatively isolated market in this region.

Table 3 presents the correlation coefficients between daily market returns among Pacific-Basin markets. As expected before, the result indicates that the correlation coefficients are positive and generally significantly different from zero, with exception of China. The market of China seems to be uncorrelated with the other markets. Again, it indicates that the market of China is relatively isolated. Like other previous studies, the result also shows that correlation between Australasian stock markets and US stock market in the previous day, US(-1), is stronger than the corresponding correlation with the US market in the same day. That is fully reasonable, because they have difference opening and closing time.

The study also noted that geographically close markets tend to have strong return correlations. The Southeast Asian markets (Malaysia, Singapore, Thailand, Philippines, Indonesia) tend to have a strong correlation each other. The similar relations also occur in the East Asian (Japan, Taiwan, Hong Kong and Korea) and also in Oceania (Australia, New Zealand). Besides, correlations among developed markets (US, NZ, AU, HK, SG) are generally greater than correlation among emerging markets.

Following Asian Crisis 1997, the Pacific-Basin capital markets seem to become more integrated each other. Their correlation coefficients during post-Asian Crisis period are stronger than those during pre-Asian Crisis period. It indicates that economic in the region become more open and more integrated.

EMPIRICAL RESULT[2]

The VAR model assumes that the time series data to be stationar. We apply both the Dickey-Fuller and Augmented Dicky-Fuller (ADF) test and the test cannot reject the stationarity of all variables. Therefore, we conclude that all variables are stationar. Akaike Information Criterion (AIC) and Schwarz Bayesian Criterion (SBC) select order 1 and 0 for the VAR model, respectively, because of their maximum value. According to this result, we choose the VAR(1) model since this model is more reasonable.

We exclude China stock market from the model, since this market does not have strong correlations with

[2] The complete results of analysis are not presented in this paper. They are, however, available from the author upon request.

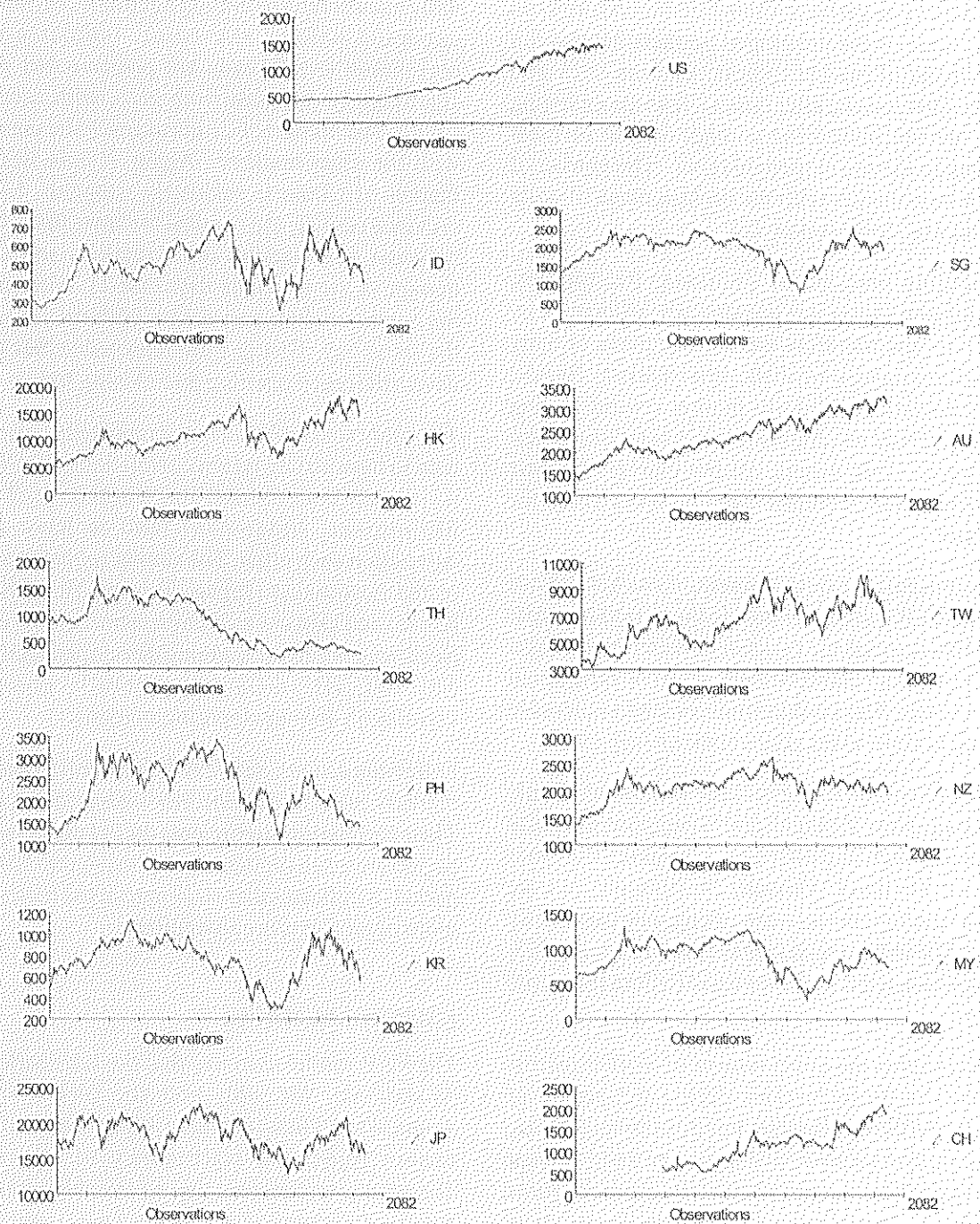

Figure 1. Development of the stock indices of the Pacific-Basin markets, October 1, 1992 – November 1, 2002

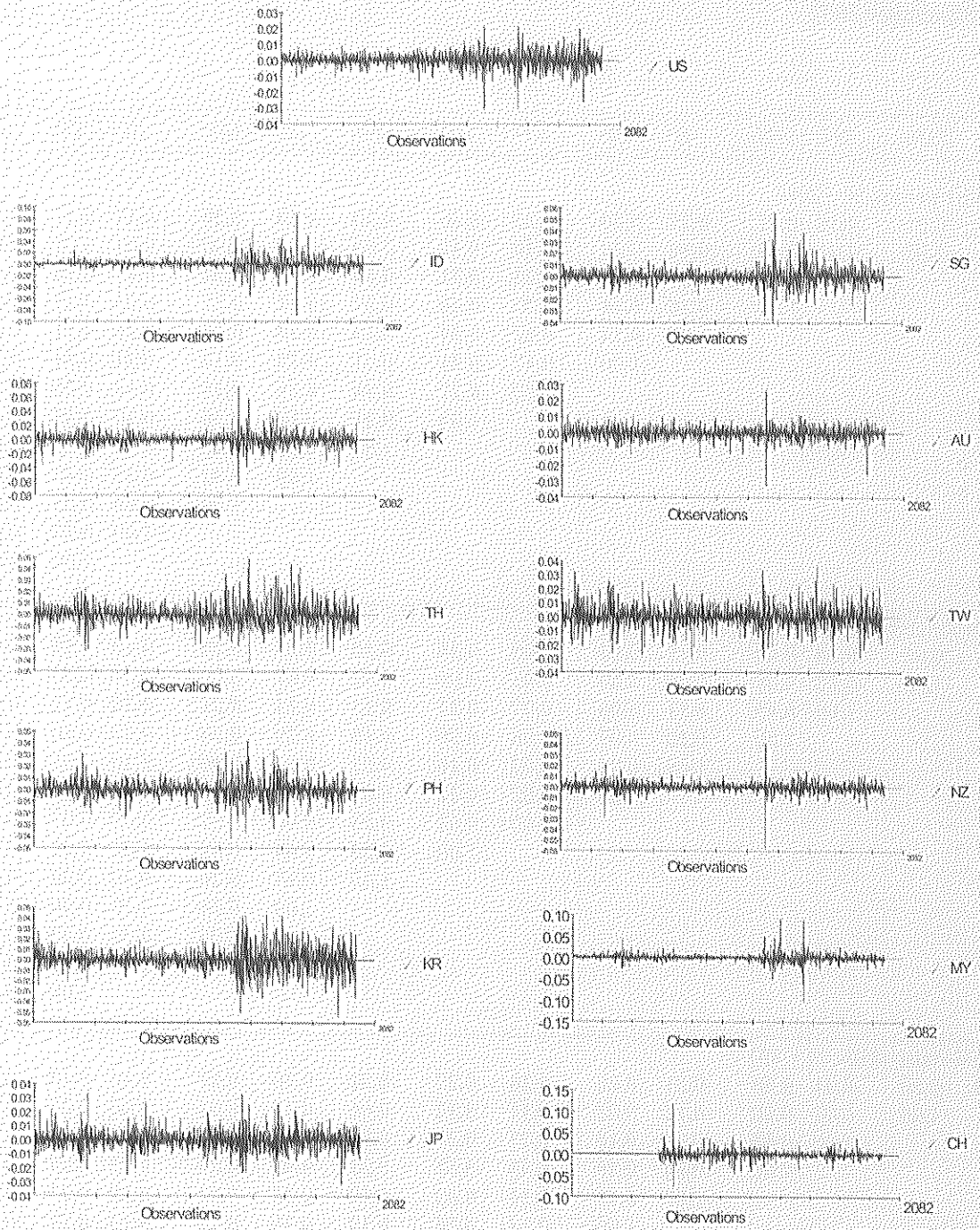

Figure 2. Development of the daily stock returns of the Pacific-Basin Stock Markets, October 1, 1992 – November 1, 2002.

Table 3. Correlation coefficients between daily market returns in local currency terms, 1st October 1992 – 1st November 2002

US(-1)	US	NZ	AU	JP	TW	KO	HK	PH	SG	MY	ID	TH	CH
Panel A. Entire period, N = 2082													
US(-1)1,00	0,01	**0,38**	**0,47**	**0,27**	**0,20**	**0,23**	**0,36**	**0,20**	**0,29**	**0,20**	**0,17**	**0,17**	0,02
US	1,00	0,01	0,09	**0,10**	0,05	**0,10**	**0,11**	0,05	**0,13**	0,00	0,01	0,05	-0,04
NZ		1,00	**0,53**	**0,20**	**0,14**	**0,22**	**0,31**	**0,25**	**0,33**	**0,22**	**0,17**	**0,20**	0,03
AU			1,00	**0,35**	**0,16**	**0,27**	**0,46**	**0,27**	**0,41**	**0,27**	**0,23**	**0,25**	0,03
JP				1,00	**0,14**	**0,22**	**0,34**	**0,14**	**0,28**	**0,18**	**0,16**	**0,17**	0,03
TW					1,00	**0,17**	**0,21**	**0,11**	**0,22**	**0,14**	**0,11**	**0,14**	0,03
KO						1,00	**0,27**	**0,18**	**0,29**	**0,18**	**0,14**	**0,25**	0,01
HK							1,00	**0,31**	**0,54**	**0,36**	**0,29**	**0,35**	0,04
PH								1,00	**0,37**	**0,22**	**0,29**	**0,29**	0,02
SG									1,00	**0,42**	**0,35**	**0,42**	0,03
MY										1,00	**0,26**	**0,33**	0,01
ID											1,00	**0,29**	0,01
TH												1,00	0,03
Panel B. Pre-Asian crisis, N = 1232													
US(-1)1,00	0,05	**0,34**	**0,44**	**0,17**	0,06	0,05	**0,35**	**0,15**	**0,25**	**0,19**	**0,19**	**0,15**	0,00
US	1,00	-0,02	0,08	0,05	0,00	0,03	0,06	0,02	0,07	0,06	0,05	0,00	-0,03
NZ		1,00	**0,49**	**0,11**	0,06	0,07	**0,23**	**0,13**	**0,21**	**0,21**	**0,18**	**0,12**	-0,02
AU			1,00	**0,20**	0,09	0,08	**0,38**	**0,18**	**0,29**	**0,24**	**0,23**	**0,18**	-0,03
JP				1,00	0,05	-0,02	**0,16**	0,03	**0,13**	**0,10**	**0,10**	0,05	0,00
TW					1,00	-0,02	**0,12**	0,08	**0,13**	**0,11**	0,05	0,05	0,02
KO						1,00	0,03	0,03	0,02	0,02	0,02	0,07	0,05
HK							1,00	**0,23**	**0,44**	**0,44**	**0,25**	**0,32**	-0,01
PH								1,00	**0,27**	**0,26**	**0,29**	**0,20**	-0,01
SG									1,00	**0,58**	**0,32**	**0,36**	-0,01
MY										1,00	**0,31**	**0,37**	-0,04
ID											1,00	**0,23**	0,00
TH												1,00	0,02
Panel C. Post-Asian crisis, N = 851													
US(-1)1,00	0,00	**0,41**	**0,50**	**0,31**	**0,26**	**0,26**	**0,37**	**0,22**	**0,30**	**0,21**	**0,16**	**0,18**	0,03
US	1,00	0,02	**0,10**	**0,12**	0,08	**0,11**	**0,12**	**0,06**	**0,14**	-0,01	0,00	0,07	-0,06
NZ		1,00	**0,55**	**0,24**	**0,18**	**0,27**	**0,34**	**0,31**	**0,37**	**0,23**	**0,18**	**0,25**	0,08
AU			1,00	**0,44**	**0,19**	**0,35**	**0,51**	**0,32**	**0,46**	**0,29**	**0,25**	**0,29**	0,08
JP				1,00	**0,19**	**0,31**	**0,43**	**0,19**	**0,34**	**0,21**	**0,18**	**0,23**	0,05
TW					1,00	**0,24**	**0,25**	**0,13**	**0,26**	**0,15**	**0,13**	**0,18**	0,03
KO						1,00	**0,34**	**0,23**	**0,35**	**0,22**	**0,16**	**0,30**	-0,01
HK							1,00	**0,35**	**0,58**	**0,33**	**0,31**	**0,37**	0,08
PH								1,00	**0,40**	**0,21**	**0,30**	**0,32**	0,06
SG									1,00	**0,38**	**0,36**	**0,45**	0,05
MY										1,00	**0,26**	**0,32**	0,04
ID											1,00	**0,32**	0,01
TH												1,00	0,05

Bold entries are statistically significant at 5 percent level

other markets. We use the US data from the previous days, because of the stronger correlation coefficient in compare to those for the same days.

Granger causality test

The results of Block Granger-causality tests are presented in Table 4. Each entry in the table denotes the chi-square value, explaining importance of a market in predicting all other markets in the system. Consistent with all other previous studies, the dominant role of the US stock markets remains unchanged during the period of study. Beside US, other developed markets of New Zealand, Australian and Japan are also play a significant role, especially after Asian crisis.

Surprisingly, all markets in the country under Asian crisis 1997 (Korea, Singapore, Malaysia, Indonesia and Thailand) also play a significant role in the system. It indicates that the Asian financial crisis 1997 seems to have a regional effect. However, it is not so clear whether the crisis influences all Pacific-Basin stock markets. The relative importance of Singapore stock market is significantly increased after the crisis.

Furthermore, we apply the bivariate Granger-causality test to examine the importance of one market in predicting another market in the system, and also to investigate whether the Asian crisis 1997 affecting all stock markers in the Pacific-Basin region. The results are presented in Table 5.

The results in Table 5 (Panel A) indicate that before Asian crisis 1997, the US stock market is the strongest one and influences all other markets, except South Korea. On the other hand, none of these markets have significant influence to the US market. The other influential markets during this period are Hong Kong, Malaysia, Singapore, and Thailand. They influence not only the emerging markets, but also the developed market of Australian. Australian Index plays important role in explaining the indices of New Zealand and Singapore, while Japan index is important for Australia and the Philippines.

Table 5 (Panel B) presents the results of bivariate Granger-causality test using data only after Asian crisis 1997. The results indicate that the dominance of US market remain unchanged. It affects all other Pacific-Basin markets, but none of these markets have a significant influence on the US market.

Table 4. Granger block causality for testing the importance of an index in the first column in predicting all indices in the system

Country	Chi-square		
	All period	Pre Asian crisis	Post Asian crisis
US	**37,16**	**30,7795**	**29,29**
NZ	**41,53**	18,4826	**36,34**
AU	**50,81**	10,4012	**22,09**
JP	**33,25**	11,8475	**29,13**
TW	8,93	**24,9436**	12,33
KO	**54,64**	**23,9261**	**48,60**
HK	**23,97**	8,4655	17,75
PH	16,62	11,6115	16,25
SG	**45,84**	10,8381	**28,78**
MY	**32,96**	**22,2958**	**25,03**
ID	**37,08**	**22,0050**	**33,18**
TH	**60,13**	**24,5512**	**43,12**

Note: Bold entries are statistically significant at 5 percent level

In general, the relationships among stock markets of Australia, Philippines, Korea, Singapore, Malaysia, Indonesia and Thailand become stronger. It indicates that the Asian crisis strongly influences stock markets in these countries. The Asian crisis has only a little influence on the developed markets of US, New Zealand and Japan.

According to the above tables, we also noted that there are significance influences among markets in the geographically and economically closed countries, such as US-Australian-New Zealand and ASEAN (Thailand, Singapore, Malaysia, Indonesia and The Philippines).

Decomposition of forecasting error variance

Using the decomposition of forecasting error variance, we analyze relative importance of each market in the VAR system. Figure 3 shows short summary of the results for Indonesia. The complete results can be found in the appendices.

From the table, we learn that about 60% error variance of the JSX Index can be explained through its own fluctuation. The international indices account for about 40% of the JSX error variance. The most important markets for the JSX are Singapore, Thailand and Hong Kong with the contributions about 7.5%, 6.1% and 5.7%, respectively. JSX itself can help to predict mostly the error variance of the Philippines stock market (4.8%) and Thailand stock market (4.6%).

The results also show that US market is not the most dominant one in explaining the error variance of Pacific-Basin indices. It explains only the developed markets such as Australia, New Zealand, Japan and Hong Kong.

Table 5. Bivariate-Granger-Causality Test to find the importance of index in the first row in predicting the indices in the first column.

F-value	US	NZ	AU	JP	TW	KO	HK	PH	SG	MY	ID	TH
Panel A. Before the crisis												
US		1,47	2,15	0,57	1,2	0,51	0,86	1,6	2,14	1,84	2,05	2,09
NZ	**81,3**		**18,8**	1,68	0,64	0,06	0,53	1,53	2,18	1,34	0,11	0,61
AU	**150**	2,95		**7,99**	0,03	0,83	**9,6**	0,73	**9,26**	**3,38**	2,96	0,48
JP	**20,8**	2,53	0,91		0,64	1,8	0,26	0,32	0,97	1,43	0,94	0,06
TW	**4,1**	0,36	1,48	0,52		1,76	**3,04**	2,92	**6,25**	**7,81**	1,13	**8,63**
KO	1,75	1,61	0,78	1,54	0,91		2,2	0,02	0,81	2,15	0,97	1,32
HK	**87,3**	1,6	2,55	0,04	0,07	0,76		0,31	2,89	2,87	0,13	**4,05**
PH	**16,3**	2	1,09	**3,06**	0,94	0,23	**10,7**		**11,4**	**17,1**	**7,58**	**11,6**
SG	**38,3**	1,39	**3,8**	1,28	0,24	0,95	**6,42**	0,99		**4,96**	0,56	2,25
MY	**21,1**	0,67	2,26	0,58	2,12	0,78	**3,75**	1,39	1,66		0,1	1,74
ID	**21,7**	0,3	2,86	0,93	0,73	2,57	**11**	**11,4**	**12,2**	**17**		**16,2**
TH	**15,8**	1,78	1,37	0,82	0,62	0,02	**6,07**	1,24	**6**	**5,7**	0,38	
Panel B. After the crisis												
US		0,16	0,01	2,37	0,01	2,61	1,06	0,15	0,34	1,04	0,35	1,95
NZ	**140**		**12,4**	1,44	0,05	1,21	**6,24**	0,25	2,09	0,25	1,05	2,68
AU	**243**	**4,37**		**5,53**	0,07	**5,01**	**10,2**	**4,09**	**9,16**	**6,35**	2,27	**6,03**
JP	**80,7**	0,87	0,76		1,52	**4,02**	1,96	0,25	**3,14**	1,66	1,63	1,37
TW	**51**	**9,23**	**9,43**	**9,62**		**8,85**	**11,2**	**6,81**	**16,3**	**9,58**	1,52	**4,46**
KO	**51,1**	0,15	2,68	1,14	1,85		**3,06**	0,55	**6,86**	0,86	0,36	**10,7**
HK	**112**	**5,68**	0,14	1,6	0,88	**5,58**		2,63	2,73	0,5	0,79	**5,72**
PH	**33,2**	0,22	**3,26**	0,94	0,99	**8,18**	**14,3**		**16,6**	**9,37**	**8,66**	**26,8**
SG	**62,5**	1,72	0,22	1,2	2,32	0,23	1,01	**5,4**		**4,37**	**3,48**	**5,29**
MY	**31,1**	0,07	0,17	0,1	0,66	**4,45**	**5,21**	**6,09**	2,09		**13,6**	**8,26**
ID	**19,4**	0,57	**3,92**	0,24	**0,03**	**16**	**8,73**	**4,35**	**4,76**	0,49		**12,4**
TH	**22,2**	0,59	1,54	0,96	**3,37**	**9,8**	**3,09**	1,94	**7,08**	0,12	**5,12**	

Note: Bold entries are statistically significant at 5 percent level

On average, the US market accounts for between 1.5 – 10.0% percent of the forecast error variance of the other markets. The US market influences Australian, New Zealand, Hong Kong and Japan more than other markets, followed by Singapore, Taiwan, South Korea, Malaysia, the Philippines, Indonesia and Thailand.

The variation of US index, in contrast, can be explained mostly through the indices of Australia, New Zealand, Hong Kong, Singapore and Japan. This result is somewhat interesting, since the previous studies always showed that other markets did not influence the US market. Total error variance of the US market explained by all foreign market is about 47.5 %.

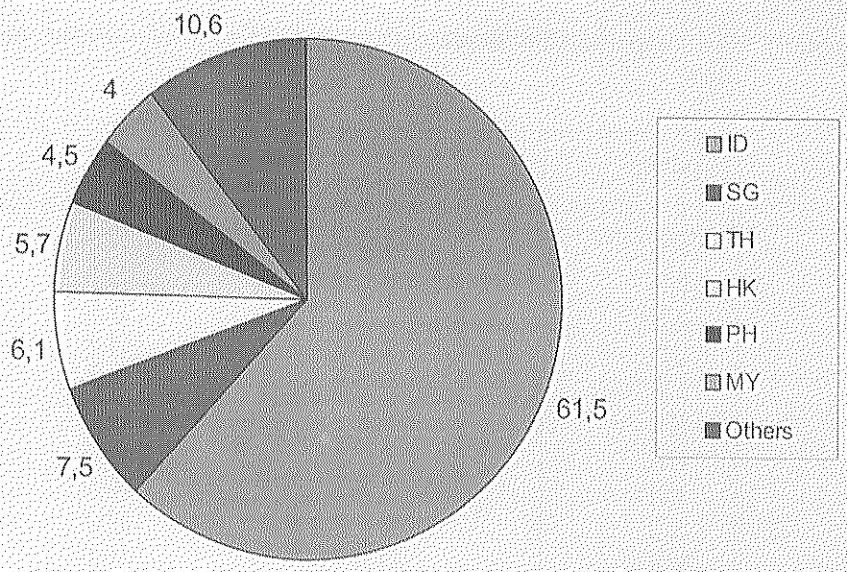

Figure 3. Decomposition of forecasting error variance of the Jakarta Stock Index, 1 October 1992 - 1 November 2002

The other dominant markets in the system are Australian, Hong Kong and Singapore. Australian market explains a substantial variation of the developed markets (US, Australia, New Zealand, Japan and Hong Kong), while Singapore and Hong Kong play an important role in explaining variation in all markets in the system.

Hong Kong, Singapore and Australia are the most 'endogenous' markets with more than 50% of its forecast error variance can be explained by combination of all other markets. The order of other markets being most influenced by all other foreign markets taken together is: New Zealand, US, Thailand, Malaysia, Philippines, Indonesia, Japan, Korea and Taiwan. Total of forecasting error variance explained by foreign markets are from about 25.0 % to about 63.5 %.

Again, the results also show that geographically and economically close countries have a significance influence each other, such as Australian-New Zealand, Japan-Taiwan-Hong Kong and ASEAN markets.

To study the effect of Asian Crisis, we divide the study in the two periods. We re-estimate the forecasting error variance decomposition using two different time period, i.e. pre - and post-Asian Crisis (see appendices for details). After Asian Crisis, all of the markets became more and more integrated each other, with exception of Malaysia.

For all indices but Malaysia, total forecasting error variance explained by foreign markets increase strongly after the crisis. The foreign error variance of Malaysia decreases from about 51 % before the crisis until about 43.5 % after the crisis. The possible explanation is maybe the exchange rate policy. Following the crisis, Malaysia practices the fixed exchange rate policy for the Malaysian Ringgit.

Table 7. The comparison of "degree of exogeneity" of Pacific-Basin stock markets, pre and post Asian crisis 1997.

Country	Degree of exogeneity (%)		Difference
	Before the crisis (1)	After the crisis (2)	(1) - (2)
US	61,2	47,9	13,3
NZ	63,5	47,5	16,0
AU	52,0	36,8	15,2
JP	83,8	51,8	32,0
TW	94,2	65,2	29,0
KR	97,0	53,8	43,2
HK	48,7	37,6	11,1
PH	76,6	51,9	24,7
SG	46,9	37,4	9,5
MY	47,8	56,6	-8,8
ID	68,4	59,8	8,6
TH	63,1	50,2	12,9

Table 7 shows the proportion of forecast error variances that can be explained by its own shocks, or "degree of exogeneity", before and after the crisis. We learn from the table that the "degree of exogeneity" for all countries have been generally reduced, implying that no countries are exogenous to the Asian financial crisis. There are reductions in the degree of exogeneity about 9.4 – 43.2 percent.

Impulse response analyze

Using impulse response functions we analyze the effect of a one standard deviation unit shock in a market on the other markets. To make the results comparable each other, the impulse responses are divided by their standard errors. Summary of the results related to Indonesia are presented in Figures 4-5.

From the tables, we learn that the JSX index responds immediately to the shocks in Hong Kong, Singapore, Thailand, Malaysia and Australia. Shocks in other stock markets will also be transmitted to the JSX, but without such a remarkable response. On the other hand, shock in Jakarta will also transmitted rapidly to the markets of Hong Kong, Singapore, Thailand and Malaysia.

Consistent with the other previous studies, the results show that shocks in US market are transmitted to all other markets in the next trading day. Shocks in the New Zealand, Australian, Hong Kong and Singapore markets are also rapidly transmitted to other Australasian markets in the same day, and by the day 1 in the US market. Shocks in the other markets will also transmitted, but without such a big effect.

CONCLUSION

In this paper, the dynamic relationships between Jakarta Stock Exchange and other Pacific-Basin capital market the period of pre- and post-Asian Crisis 1997 have been explored using correlation analysis, Granger causality and VAR models. All methods generally give qualitatively similar results.

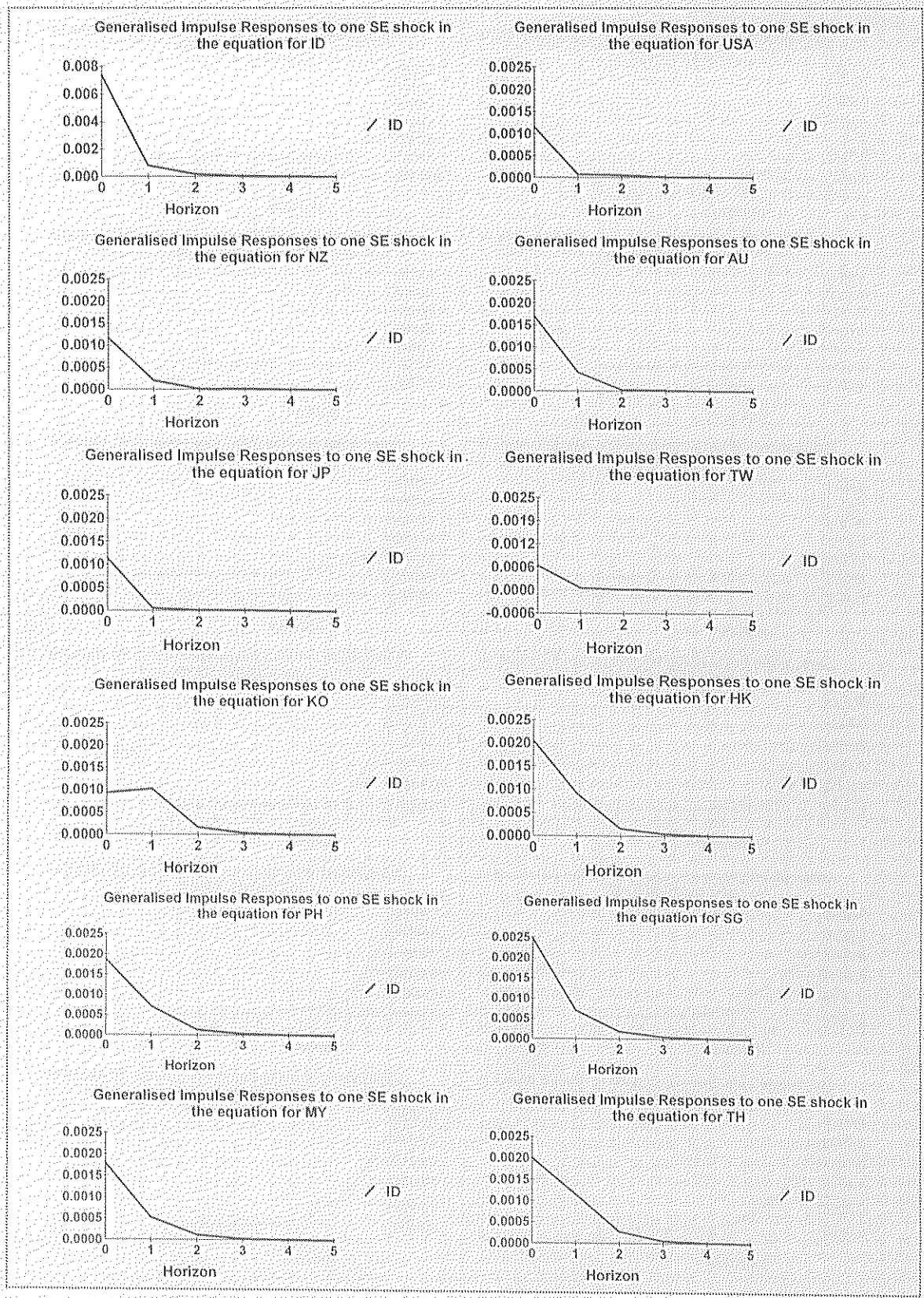

Figure 4 Response of the Jakarta Stock Index to the shocks at the other indices of the Pacific-Basin Stock Markets.

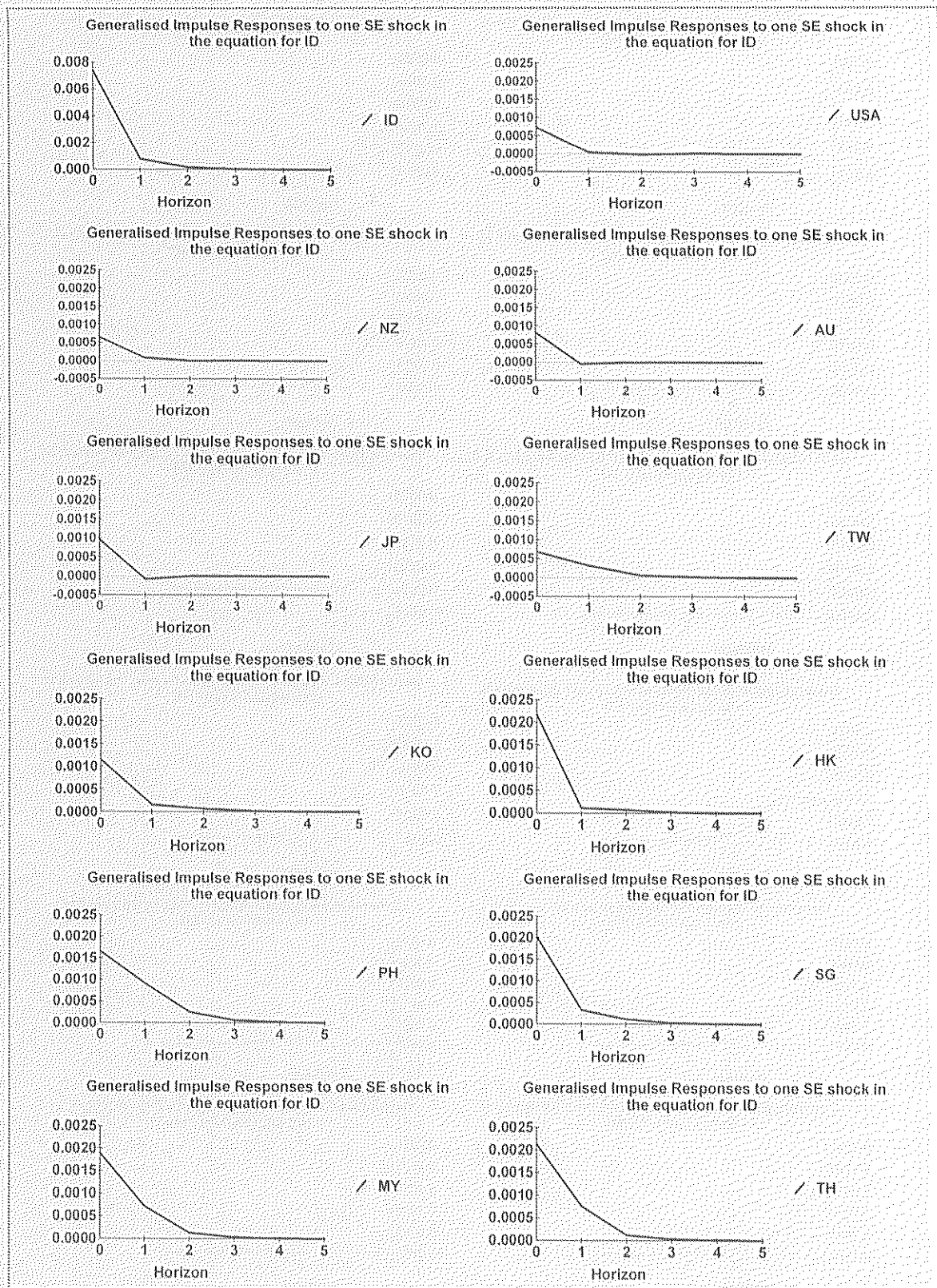

Figure 5. Response of the Pacific-Basin indices to the shocks at the Jakarta Stock Index.

The results showed that the Jakarta Stock Exchange was integrated with other Pacific-Basin markets. The most important markets for the JSX were Hong Kong, Singapore and Thailand. Indices of these markets play important role in predicting the behavior of JSX index. Shocks in these markets were also immediately transmitted and have significant effect to Jakarta. Correspondingly, shocks in Jakarta will also transmitted to these markets.

The study also noted that there are strong correlations among Pacific-Basin stock market returns, except China. The geographically and economically closed markets tend to have a stronger correlation such as ASEAN and Australia-US-New Zealand. Following Asian crisis, the Pacific-Basin stock markets became more integrated each other. The Asian crisis had a global effect on all stock markets and the linkages among stock them after the crisis were stronger than those before the crisis.

Somewhat interesting, US market was not the only dominant market in the region. The study noted that there were some other influential markets such as Hong Kong, Australian and Singapore. The developed markets of US and Australia have strong influence to the other developed markets, while Hong Kong and Australia have influence not only to developed markets, but not the emerging markets. Shocks in the developed markets were rapidly transmitted to other markets. Shocks in the emerging markets were also rapidly transmitted to other markets, but without such a big effect comparing to those in the developed markets.

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Appendix 1. Generalized decomposition of forecasting error variances of daily market returns for all market indices, Oct 1992 - Nov 2002 (in percent).

Panel A. Entire period, N = 2082

	k	US(-1)	NZ	AU	JP	TW	KR	HK	PH	SG	MY	ID	TH	All
US(-1)	1	52,12	7,03	11,93	4,50	2,01	3,01	7,52	1,96	5,08	2,13	1,28	1,44	47,88
	5	52,10	7,03	11,93	4,50	2,01	3,01	7,52	1,96	5,08	2,13	1,28	1,45	47,90
	10	52,10	7,03	11,93	4,50	2,01	3,01	7,52	1,96	5,08	2,13	1,28	1,45	47,90
NZ	1	6,98	51,84	15,22	2,39	0,77	2,59	5,39	3,02	5,64	2,67	1,33	2,16	48,16
	5	6,98	51,83	15,22	2,40	0,77	2,59	5,39	3,02	5,64	2,67	1,33	2,17	48,17
	10	6,98	51,83	15,22	2,40	0,77	2,59	5,39	3,02	5,64	2,67	1,33	2,17	48,17
AU	1	9,32	11,88	42,28	5,20	0,99	3,04	9,10	3,03	6,94	3,18	2,25	2,76	57,72
	5	9,32	11,88	42,28	5,20	0,99	3,04	9,10	3,03	6,94	3,18	2,25	2,76	57,72
	10	9,32	11,88	42,28	5,20	0,99	3,04	9,10	3,03	6,94	3,18	2,25	2,76	57,72
JP	1	4,71	2,49	7,60	62,00	1,28	3,21	7,20	1,19	5,07	2,03	1,49	1,74	38,00
	5	4,71	2,49	7,59	62,00	1,28	3,21	7,20	1,19	5,07	2,03	1,49	1,74	38,00
	10	4,71	2,49	7,59	62,00	1,28	3,21	7,20	1,19	5,07	2,03	1,49	1,74	38,00
TW	1	2,81	1,60	2,36	2,12	75,04	2,56	3,99	0,90	4,37	1,94	0,77	1,55	24,96
	5	2,80	1,60	2,35	2,12	74,96	2,56	4,01	0,91	4,39	1,94	0,77	1,58	25,04
	10	2,80	1,60	2,35	2,12	74,96	2,56	4,01	0,91	4,39	1,94	0,77	1,58	25,04
KR	1	3,16	3,03	4,62	3,30	1,73	64,69	4,64	1,76	5,56	2,08	1,05	4,40	35,31
	5	3,16	3,03	4,62	3,30	1,73	64,65	4,64	1,76	5,57	2,08	1,05	4,41	35,35
	10	3,16	3,03	4,62	3,30	1,73	64,65	4,64	1,76	5,57	2,08	1,05	4,41	35,35
HK	1	5,53	4,04	8,82	4,90	1,78	3,06	41,87	3,83	12,33	5,26	3,26	5,32	58,13
	5	5,53	4,04	8,82	4,89	1,78	3,06	41,86	3,83	12,33	5,26	3,26	5,33	58,14
	10	5,53	4,04	8,82	4,89	1,78	3,06	41,86	3,83	12,33	5,26	3,26	5,33	58,14
PH	1	2,05	3,15	4,29	1,30	0,50	2,06	6,74	57,17	8,38	3,52	4,73	6,11	42,83
	5	2,04	3,13	4,26	1,30	0,50	2,11	6,78	56,86	8,44	3,55	4,78	6,24	43,14
	10	2,04	3,13	4,26	1,30	0,50	2,11	6,78	56,86	8,44	3,55	4,78	6,24	43,14
SG	1	3,23	4,02	6,67	3,30	1,63	3,25	12,34	5,05	41,15	7,17	4,71	7,48	58,85
	5	3,23	4,01	6,67	3,30	1,63	3,26	12,34	5,06	41,12	7,17	4,72	7,50	58,88
	10	3,23	4,01	6,67	3,30	1,63	3,26	12,34	5,06	41,12	7,17	4,72	7,50	58,88
MY	1	2,32	2,67	4,23	1,83	0,91	1,85	7,50	2,54	9,84	56,44	3,85	6,01	43,56
	5	2,31	2,67	4,22	1,83	0,91	1,86	7,51	2,55	9,85	56,38	3,86	6,04	43,62
	10	2,31	2,67	4,22	1,83	0,91	1,86	7,51	2,55	9,85	56,38	3,86	6,04	43,62
ID	1	1,50	1,58	3,45	1,46	0,51	2,14	5,67	4,53	7,48	3,96	61,69	6,02	38,31
	5	1,50	1,58	3,44	1,46	0,51	2,16	5,68	4,54	7,50	3,97	61,55	6,10	38,45
	10	1,50	1,58	3,44	1,46	0,51	2,16	5,68	4,54	7,50	3,97	61,55	6,10	38,45
TH	1	1,49	2,24	3,68	1,58	0,78	3,66	7,24	3,91	10,17	5,67	4,55	55,04	44,96
	5	1,49	2,23	3,68	1,57	0,78	3,68	7,25	3,92	10,19	5,67	4,55	54,99	45,01
	10	1,49	2,23	3,68	1,57	0,78	3,68	7,25	3,92	10,19	5,67	4,55	54,99	45,01

Note:

a) Entries in each cell are the percentage of forecast error variance of index *i* in the first column explained by the index *j* in the first row

b) Entries in 'All' column indicate the total percentage of forecast error variance of the market in the first column explained by all foreign markets

Appendix 1. (continued ...)

Panel B. Pre-Asian crisis, N = 1232

	k	US(-1)	NZ	AU	JP	TW	KR	HK	PH	SG	MY	ID	TH	All
US(-1)	1	61,22	6,41	11,77	1,98	0,39	0,20	7,59	1,27	3,53	2,25	1,92	1,46	38,78
	5	61,25	6,41	11,77	1,98	0,39	0,20	7,59	1,27	3,53	2,25	1,90	1,46	38,75
	10	61,25	6,41	11,77	1,98	0,39	0,20	7,59	1,27	3,53	2,25	1,90	1,46	38,75
NZ	1	7,24	63,49	15,16	1,17	0,19	0,45	3,56	0,84	2,60	2,66	1,70	0,94	36,51
	5	7,24	63,47	15,17	1,17	0,19	0,46	3,56	0,84	2,60	2,66	1,69	0,94	36,53
	10	7,24	63,47	15,17	1,17	0,19	0,46	3,56	0,84	2,60	2,66	1,69	0,94	36,53
AU	1	10,40	13,38	52,08	2,27	0,53	0,31	7,45	1,67	4,05	3,09	3,02	1,74	47,92
	5	10,41	13,38	52,07	2,28	0,53	0,32	7,45	1,66	4,05	3,09	3,01	1,75	47,93
	10	10,41	13,38	52,07	2,28	0,53	0,32	7,45	1,66	4,05	3,09	3,01	1,75	47,93
JP	1	2,71	2,52	3,87	83,75	0,31	0,16	2,22	0,50	2,07	0,84	0,84	0,21	16,25
	5	2,71	2,52	3,88	83,75	0,31	0,16	2,23	0,49	2,07	0,84	0,83	0,22	16,25
	10	2,71	2,52	3,88	83,75	0,31	0,16	2,23	0,49	2,07	0,84	0,83	0,22	16,25
TW	1	0,30	0,24	0,79	0,31	94,24	0,17	1,21	0,50	1,15	0,81	0,07	0,21	5,76
	5	0,30	0,24	0,79	0,31	94,24	0,17	1,21	0,50	1,15	0,81	0,07	0,21	5,76
	10	0,30	0,24	0,79	0,31	94,24	0,17	1,21	0,50	1,15	0,81	0,07	0,21	5,76
KR	1	0,40	0,52	0,53	0,34	0,17	97,07	0,22	0,05	0,14	0,12	0,03	0,41	2,93
	5	0,40	0,53	0,53	0,34	0,17	97,03	0,23	0,05	0,16	0,13	0,03	0,41	2,97
	10	0,40	0,53	0,53	0,34	0,17	97,03	0,23	0,05	0,16	0,13	0,03	0,41	2,97
HK	1	6,19	3,36	7,02	1,29	0,82	0,07	48,78	3,04	9,93	9,65	4,24	5,60	51,22
	5	6,16	3,36	6,99	1,29	0,84	0,07	48,58	3,12	9,89	9,62	4,46	5,62	51,42
	10	6,16	3,36	6,99	1,29	0,84	0,07	48,58	3,12	9,89	9,62	4,46	5,62	51,42
PH	1	1,79	1,05	2,65	0,22	0,37	0,04	3,78	76,88	4,82	0,49	5,27	2,64	23,12
	5	1,80	1,07	2,67	0,22	0,37	0,04	3,79	76,65	4,84	0,49	5,41	2,65	23,35
	10	1,80	1,07	2,67	0,22	0,37	0,04	3,79	76,65	4,84	0,49	5,41	2,65	23,35
SG	1	3,04	2,56	3,78	0,10	1,01	0,05	9,22	4,17	47,14	15,97	6,36	6,60	52,86
	5	3,03	2,55	3,77	0,10	1,02	0,05	9,18	4,27	46,92	15,90	6,60	6,61	53,08
	10	3,03	2,55	3,77	0,10	1,02	0,05	9,18	4,27	46,92	15,90	6,60	6,61	53,08
MY	1	1,85	2,19	2,96	0,50	0,88	0,16	9,29	4,67	16,20	48,13	6,48	6,69	51,87
	5	1,84	2,19	2,94	0,50	0,90	0,16	9,23	4,83	16,09	47,81	6,84	6,68	52,19
	10	1,84	2,19	2,94	0,50	0,90	0,16	9,23	4,83	16,09	47,81	6,84	6,68	52,19
ID	1	2,70	2,29	3,99	0,88	0,18	0,04	4,59	0,47	7,14	6,25	68,68	2,79	31,32
	5	2,72	2,31	4,02	0,89	0,18	0,04	4,63	0,49	7,20	6,30	68,42	2,81	31,58
	10	2,72	2,31	4,02	0,89	0,18	0,04	4,63	0,49	7,20	6,30	68,42	2,81	31,58
TH	1	1,28	0,76	2,01	0,16	0,69	0,39	6,67	3,07	8,25	8,48	4,68	63,56	36,44
	5	1,28	0,76	2,00	0,16	0,70	0,39	6,64	3,23	8,20	8,43	5,07	63,14	36,86
	10	1,28	0,76	2,00	0,16	0,70	0,39	6,64	3,23	8,20	8,43	5,07	63,14	36,86

Note:

a) Entries in each cell are the percentage of forecast error variance of index *i* in the first column explained by the index *j* in the first row

b) Entries in 'All' column indicate the total percentage of forecast error variance of the market in the first column explained by all foreign markets

Appendix 1. (continued...)

Panel C. Post-Asian crisis, N = 851

	k	US(-1)	NZ	AU	JP	TW	KR	HK	PH	SG	MY	ID	TH	All
US(-1)	1	47,91	7,48	12,85	5,45	3,07	3,70	7,56	2,11	5,16	2,05	1,11	1,55	52,09
	5	47,89	7,48	12,85	5,46	3,07	3,69	7,56	2,11	5,17	2,06	1,11	1,55	52,11
	10	47,89	7,48	12,85	5,46	3,07	3,69	7,56	2,11	5,17	2,06	1,11	1,55	52,11
NZ	1	7,36	47,46	14,70	2,70	1,35	3,58	5,61	4,11	6,40	2,59	1,24	2,90	52,54
	5	7,37	47,44	14,71	2,71	1,35	3,58	5,61	4,11	6,40	2,58	1,24	2,91	52,56
	10	7,37	47,44	14,71	2,71	1,35	3,58	5,61	4,11	6,40	2,58	1,24	2,91	52,56
AU	1	9,55	11,40	36,79	6,85	1,45	4,39	9,44	3,52	7,93	3,17	2,21	3,29	63,21
	5	9,55	11,40	36,79	6,85	1,45	4,39	9,44	3,52	7,93	3,17	2,22	3,29	63,21
	10	9,55	11,40	36,79	6,85	1,45	4,39	9,44	3,52	7,93	3,17	2,22	3,29	63,21
JP	1	5,12	2,93	9,61	51,77	2,01	4,93	9,32	1,70	5,97	2,39	1,59	2,67	48,23
	5	5,12	2,93	9,61	51,76	2,01	4,93	9,32	1,70	5,98	2,39	1,59	2,67	48,24
	10	5,12	2,93	9,61	51,76	2,01	4,93	9,32	1,70	5,98	2,39	1,59	2,67	48,24
TW	1	3,89	2,69	3,41	3,42	65,23	4,43	5,32	1,14	5,38	2,01	1,04	2,05	34,77
	5	3,89	2,70	3,41	3,42	65,15	4,43	5,32	1,16	5,39	2,01	1,04	2,08	34,85
	10	3,89	2,70	3,41	3,42	65,15	4,43	5,32	1,16	5,39	2,01	1,04	2,08	34,85
KR	1	3,54	3,87	6,37	5,10	3,01	53,87	6,21	2,29	6,59	2,48	1,15	5,53	46,13
	5	3,53	3,87	6,37	5,10	3,01	53,84	6,21	2,29	6,61	2,48	1,15	5,53	46,16
	10	3,53	3,87	6,37	5,10	3,01	53,84	6,21	2,29	6,61	2,48	1,15	5,53	46,16
HK	1	5,36	4,41	9,46	6,82	2,52	4,39	37,62	4,27	12,68	4,11	3,25	5,12	62,38
	5	5,36	4,41	9,45	6,82	2,52	4,38	37,59	4,27	12,69	4,11	3,26	5,14	62,41
	10	5,36	4,41	9,45	6,82	2,52	4,38	37,59	4,27	12,69	4,11	3,26	5,14	62,41
PH	1	2,22	4,30	5,27	1,89	0,59	3,05	7,47	51,92	8,95	2,72	4,59	7,02	48,08
	5	2,21	4,28	5,24	1,88	0,59	3,12	7,48	51,69	9,00	2,72	4,65	7,13	48,31
	10	2,21	4,28	5,24	1,88	0,59	3,12	7,48	51,69	9,00	2,72	4,65	7,13	48,31
SG	1	3,19	4,70	7,99	4,20	2,21	4,22	12,76	5,68	37,47	5,35	4,55	7,70	62,53
	5	3,18	4,69	7,97	4,19	2,20	4,22	12,76	5,70	37,42	5,34	4,57	7,74	62,58
	10	3,18	4,69	7,97	4,19	2,20	4,22	12,76	5,70	37,42	5,34	4,57	7,74	62,58
MY	1	2,43	2,92	4,88	2,58	1,21	2,67	6,58	2,42	8,10	56,68	3,88	5,64	43,32
	5	2,42	2,92	4,88	2,58	1,21	2,71	6,58	2,43	8,11	56,60	3,90	5,68	43,40
	10	2,42	2,92	4,88	2,58	1,21	2,71	6,58	2,43	8,11	56,60	3,90	5,68	43,40
ID	1	1,38	1,59	3,69	1,79	0,83	2,77	5,89	4,57	7,48	3,53	59,86	6,63	40,14
	5	1,38	1,59	3,69	1,79	0,82	2,79	5,89	4,57	7,49	3,52	59,77	6,69	40,23
	10	1,38	1,59	3,69	1,79	0,82	2,79	5,89	4,57	7,49	3,52	59,77	6,69	40,23
TH	1	1,48	2,94	4,52	2,69	1,30	5,16	6,92	4,57	10,39	4,76	5,08	50,18	49,82
	5	1,48	2,94	4,52	2,69	1,30	5,18	6,93	4,58	10,41	4,75	5,08	50,16	49,84
	10	1,48	2,94	4,52	2,69	1,30	5,18	6,93	4,58	10,41	4,75	5,08	50,16	49,84